Navigating Blind in the Green Rush: Clinical Considerations and Harm Reduction Practices for Cannabis

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Abstract

Background.—The United States has recently experienced extensive changes in state policy regarding the use of cannabis for recreational and medicinal purposes. Despite its rapidly increasing accessibility and social acceptance, there is a striking dearth of research on cannabis as a treatment for medical and psychological conditions. Research on cannabis is difficult to conduct as it is classified as a schedule I drug with high potential for abuse and currently no accepted medical use in treatment. As a result, no standard dosing procedures exist and the lack of conclusive scientific evidence has left clinical providers without evidence-based guidelines about if, when, and how to guide clients on using cannabis safely.

Objective.—To (1) provide critical psychoeducational information about cannabis and cannabis problems to guide client-provider conversations about cannabis use and (2) describe common clinical concerns around cannabis use, highlight special considerations for vulnerable populations, and review harm reduction techniques and practical resources that may help clinicians and their clients navigate safer cannabis use.

Conclusion.—The removal of regulatory barriers would enable researchers to address key public health questions about the potential therapeutic and adverse effects of cannabis use. Additionally, funds for research, clinician education, and public health education initiatives are necessary to reduce risk around cannabis use in the United States.

Keywords

Cannabis; Marijuana; Mental Health; Harm Reduction; Substance Use

1. INTRODUCTION

The United States (US) has recently experienced extensive changes in state policy regarding the use of cannabis for recreational and medicinal purposes. Thirty-one states, the District of Columbia, Guam, and Puerto Rico have legalized cannabis for the treatment of medical conditions, and nine of these states and the District of Columbia have also legalized cannabis for recreational use (see National Conference of State Legislatures, [2018]) [1] for updated and detailed information on state specific cannabis policy, as each state varies widely on policies of growing, selling, and marketing cannabis). According to the 2017 World Drug Report, the annual prevalence of cannabis use for US adults aged 12 years and older was 13.5% [2]. In 2014, 22.2 million Americans, ages 12 years old and older, reported using cannabis in the past 30 days, with approximately 1.8 million adolescents aged 12–17, 6.8 million young adults aged 18–25, and 13.5 million adults aged 26 or older reporting cannabis use in the past month [3]. Research suggests that cannabis use in adults has increased significantly, particularly in states that have passed medical cannabis laws [4, 5]. Further, the cannabis sales industry is booming, and is projected to generate $21 billion nationally in 2021 [6]. These historical changes in legalization and use trends coupled with the multi-billion dollar avalanche of capitalistic opportunities now available in the cannabis space has been coined the "Green Rush" as a spin off from the California Gold Rush.

Cannabis use disorder (CUD) diagnoses have also increased. Hasin and colleagues [4] found that since 1991, CUD increased more so in states with medical cannabis laws. Among military veterans in the Veterans Health Administration (VA), the largest healthcare system in the US, prevalence of CUD increased more than 50% from 2002 to 2009 [7]. Such trends are concerning as previous research has shown that higher rates of cannabis use are associated with lower perceptions of risk [8] and that attitudes about cannabis are one of the most robust predictors of future use [9].

Importantly, changing cannabis policy is not just a niche issue for clinicians specializing in addiction medicine. In an era where cannabis use will be more prevalent than ever, it will be paramount for clinicians and policy-makers to obtain cross-training in mental health and addiction medicine. Cultural and historical factors have limited the provision of integrated, evidence-based care for substance use and mental health conditions, and with the changing tides, these services can no longer be siloed. Furthermore, changing cannabis policy will impact other branches of psychology, including educational, forensic, social, industrial organizational, developmental, cognitive and beyond. The large variance between state policies on growing, selling, and marketing of cannabis will present further complications for scientific progress and may have differential implications for education, prevention, and treatment. Until empirical evidence is available to guide clinical decision making, mental health practitioners, health systems, and schools must be prepared to recognize the limits of the knowledge base and educate a variety of populations on cannabis [10].

Though changing cannabis policy affects all fields of psychology, clinicians treating individuals using cannabis are experiencing difficulties in treatment planning and delivery due to the lack of education, training, and conclusive scientific research on cannabis. Indeed, there are currently no clinical guides or resources for clinicians to help clients optimize their

safety and well-being when using cannabis for medical and recreational purposes. Thus, the objectives of the current article are to (1) provide critical psychoeducational information about cannabis and cannabis problems to guide client-provider conversations about cannabis use and (2) describe common clinical concerns around cannabis use, highlight special considerations for vulnerable populations, and review harm reduction techniques and practical resources that may help clinicians and their clients navigate safer cannabis use.

1.1. Cannabis Accessibility

There are a variety of ways to obtain cannabis, both for recreational and medicinal uses. In states where medicinal cannabis is legalized, individuals can visit doctors in person or via the internet to obtain a medicinal cannabis recommendation (i.e., prescription). The availability of "420 doctors"[1] (i.e., medical marijuana doctors) has made cannabis easier to access legally. "420 doctors" are traditionally licensed doctors who exclusively prescribe medical cannabis and charge small fees (e.g., as little as $39) for brief consultations in-person or online, and clients receive a copy of the cannabis recommendation a few minutes later. Cannabis can be obtained in-person at dispensaries or ordered and even, in some states, delivered to an individual's residence. Problematically, a cannabis recommendation does not come with dosing, strain, or specific cannabinoid instructions. Instead, these instructions tend to be determined by "budtenders" or workers at dispensaries and the evidence for their recommendations is largely anecdotal [11].

1.2. Research Barriers and Consequences for Clinical Practice

Despite the rapidly increasing accessibility and social acceptance of cannabis, there is a striking dearth of research on cannabis as a treatment for medical and psychological conditions. Despite numerous calls for funding to address these important and impactful questions [10, 12], the full range of risks and benefits of cannabis remains unknown. In 2017, The National Academies of Sciences [13] published a book, which thoroughly details the extensive challenges and barriers in conducting cannabis research. For instance, cannabis is federally classified as a schedule I drug, as it is categorized as having a high potential for abuse with no accepted medical use in treatment and there are no standard dosing procedures. Other drugs listed as schedule I are heroin, lysergic acid diethylamide (LSD), and 3,4-methylenedioxymethamphetamine (ecstasy).

Therefore, researchers who are conducting studies using federally funded grants must first obtain a schedule I license and access cannabis supply solely from the National Institute on Drug Abuse (NIDA). Further, for researchers to ask participants about cannabis use at many US research institutions, they must first apply for and obtain a certificate of confidentiality. This certificate ensures that responses remain confidential even if subpoenaed by a court of law. These associated regulations and oversight present researchers with a constellation of administrative, logistical, and legal barriers to carrying out studies that administer ecologically representative cannabis products. Specifically, the cannabis provided to

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[1]The use of the slang word "420" (pronounced four-twenty) for cannabis began in the 1970's and now, April 20th is celebrated as a counterculture holiday for cannabis called "Weed Day".

researchers from the federal government is not of comparable potency to cannabis available to users from dispensaries in legal states [14].

2.   CANNABIS 101

Cannabis research has primarily focused on effects of "whole plant" cannabis, which is made up of over 70 individual chemical compounds, called cannabinoids [15]. The cannabinoids most often studied are   9-tetrahydrocannabinol (THC) and cannabidiol (CBD), which vary drastically in terms of psychotropic effects, potency, and relative concentration within and between cannabis strains [16, 17]. THC is the main psychoactive component of cannabis, and may have anti-inflammatory, muscle relaxation, immunosuppression, sedation, analgesic, appetite-stimulant, and antiemetic properties [18]. While the majority of CBD research has documented an anxiolytic effect, CBD may induce anti-depressant-like effects and may benefit individuals with certain types of psychotic symptoms or seizures [19]. Importantly, cannabinoids may have nuanced effects when used in combination compared to when using isolated cannabinoids (e.g., 1:1 ratio of THC:CBD; [20–22]). Cannabis is also categorized by plant sub-species and cannabis strains within the U.S. are typically classified as one of 3 species designations within dispensaries: indica, sativa, and "hybrid" (e.g., cross breed). Consumer preferences for particular cannabis species for specific issues have been identified [17, 23, 24], however, research suggests that, due to the large amount of interbreeding and hybridization, cannabis species does not predict actual cannabinoid/terpenoid profiles [25].

2.1.   Methods of Administration

There are a wide variety of methods for cannabis use including smoked, vaporized, oral, sublingual, oral mucosal, and transdermal administrations [26]. The most common route of administration is inhalation of smoked flower cannabis through "joints", pipes, or water pipes [27]. Vaporizers heat cannabis to a temperature where cannabinoids are released in a mist without creating the toxins associated with smoking [28]. Meanwhile, "dabbing" is an increasingly popular method of smoking cannabis in which the user vaporizes concentrated oils containing higher THC concentrations than traditional cannabis [29]. Orally ingested cannabis (e.g., edibles) is a slower-acting and longer lasting alternative to smoked cannabis [19, 30]. Methods of oral and sublingual cannabis use include edibles and pills, which are produced with cannabis oil extractions. Sublingual methods of administration include liquid tinctures, typically used in the form of a spray. Nabiximols, a more regulated oral mucosal formulation, is currently available in the United Kingdom and undergoing clinical trials in the US for treatment of certain medical conditions [31, 32]. Further, transdermal cannabis products have emerged in the form of salves, lotions, and patches. These formulations exist in a variety of THC and CBD ratios, including small concentrations of other less well-known cannabinoids and terpenes. Transdermal application is absorbed through the skin directly, avoiding liver metabolism, which may potentially enable lower dosage levels of active pharmaceutical ingredients along with rapid and reliable absorption [33].

2.2. Medicinal vs. Recreational Cannabis Users

Studies suggest significant overlap between medical and recreational users, with the majority of medical users also reporting recreational use [34]. Medical cannabis users tend to have significant previous experiences with recreational use and, in some cases, medical use occurs within the context of chronic, regular use [35, 36]. Contrastingly, there is preliminary evidence for significant differences between medical and recreational cannabis users, including differences in frequency of use and number of medical problems [37]. Furthermore, motives for cannabis use are a large predictor of use and differ between medical and recreational cannabis users [23, 37, 38]. Importantly, medical cannabis users are subject to many of the same risks and potentially harmful health effects as recreational users [39].

2.3. Cannabis Use Disorder: Diagnosis and Assessment

With rates of cannabis use rising there has been increased focus on the consequences associated with cannabis use. A review by Volkow and colleagues [39] highlighted impairments in memory, motor coordination, and judgment as short-term consequences of cannabis use; cognitive impairment and heightened risk of psychosis were identified as long-term consequences of cannabis use. Indeed, a wealth of research has now documented that frequent (i.e., daily) use, particularly when initiated during adolescence and used regularly, can lead to dependence, psychological and physical health problems, poor life satisfaction or poor educational outcomes [7, 39]. According to the *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition* (DSM-5), CUD is a substance use disorder (SUD) characterized by eleven symptoms of problematic cannabis use, including abuse, dependence, craving, and tolerance [40]. The *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision* (DSM-IV-TR) divided problematic cannabis use into cannabis abuse and cannabis dependence [41]. The DSM-5 CUD diagnosis now captures a range of problematic use using thresholds for diagnosis (2–3 symptoms = mild diagnosis, 4–5 = moderate, 6+ = severe). Importantly, frequent or heavy cannabis use does not always equate to CUD. Clinicians need to assess the impact of use on functioning and the severity of negative consequences associated with use.

To help with assessing CUD, new tools have been developed for the detection and monitoring of cannabis-related problems. The Cannabis Use Disorders Identification Test-Revised (CUDIT-R; [42]) is an 8-item screening tool that assesses individual cannabis consumption, problems associated with abuse, dependence, as well as psychological consequences according to the DSM-IV. A 3-item CUDIT-Short Form is also available for settings where time to administer a screening is limited [43]. Using a cut score of 2, this brief screening tool identified 78.26% of participants in the US sample and 78.31% of participants in an Australian sample who met DSM-5 criteria for CUD. Importantly, clinicians may not screen for CUD due to lack of training and experience in substance use treatment. Several evidence-based treatments (e.g., cognitive-behavioral therapy, contingency management, motivational enhancement/ motivational interviewing) are available to address cannabis use disorder, but many clinicians may not be familiar with or competent in these practices [44].

3. CLINICAL CONSIDERATIONS

Underreporting of substance use by clients is a frequent clinical concern. The research on the validity of self-reported substance use is mixed. A validation study completed by Substance Abuse and Mental Health Services Administration (SAMHSA) found that although 89.9% of participants showed agreement between self-reported use and drug test result, 4.4% reported no use despite receiving a positive test result [45]. Additionally, systematic review of self-reported cannabis use in substance users found that self-report was a valid and affordable tool in screening and tracking cannabis use [46]. These mixed findings are problematic for the purposes of identifying potential drug-drug interactions between the cannabinoids clients are using and their current medication regimen. Please see Thomas [47] for a review of medications that potentially interact with THC/CBD.

Perhaps the most challenging part of discussing cannabis with clients is that many already use cannabinoids to self-medicate, despite the early state of the scientific literature on its effectiveness. Indeed, application is far outrunning current scientific understanding. Discussion of cannabis use with clients must be nuanced and should acknowledge and validate the perceived, anecdotal benefits while balancing the explanation that the data are incomplete. For example, initially, researchers falsely believed that THC was solely responsible for cannabis' psychoactivity and medicinal benefits [48]. Scientists have only recently begun to identify the therapeutic potential of other cannabinoids (e.g., CBD, cannabichromere [CBC], cannabinol [CBN], tetrahydrocannabivarin [THCV]). There are likely many potential interactions between cannabinoids and other compounds present in the cannabis plant, which may impact the direct effects of THC and CBD on the endogenous cannabinoid system in humans [19, 21, 49]. This uncertainty highlights a need for caution when interpreting the findings of clinical trial data that treat the plant as homogenous. Results of studies that randomly assign participants to receive "cannabis" or placebo tell us little about the generalizability of use of any single strain or preparation on our own clients' individual symptoms.

Media reporting of recent developments in cannabinoid therapeutics for mental health conditions, including headlines suggesting that cannabis could be helpful for specific conditions, may influence psychiatric clients to initiate cannabis use. As with all treatment, good clinical judgment should be used to identify the how and why a client is using medicinal cannabis because cannabinoids have the potential to both treat and exacerbate psychiatric symptoms. For example, preliminary data suggests that certain cannabinoids could improve extinction learning [50], which may be beneficial for conditions such as posttraumatic stress disorder [51], generalized anxiety disorder [52] and specific phobias [53]. At the same time, higher doses of THC are intoxicating. If the client uses a high THC strain of cannabis to emotionally numb as a means of avoidance, it is likely that their cannabis use could exacerbate avoidance-driven anxiety symptoms, as has been documented in epidemiological studies [54, 55]. Moreover, choice of cannabinoid, ratio of cannabinoids (e.g., THC:CBD), and dosing may be critical for psychiatric conditions. While THC in low doses may be beneficial for anxiety [56], higher doses may be anxiogenic [57], and different ratios of THC:CBD can be both helpful and detrimental to sleep [58]. Client-provider

discussions that weight the cost/benefits of medicinal cannabis will need to be nuanced and focused on choice of cannabinoid.

3.1. Cannabis Regulation and Absence of Clinical Governance

Discussions on current cannabinoid use should also include education on the risks inherent in use of a substance that is deemed unlawful by the federal government and, therefore, falls outside the purview of the Federal Drug Administration (FDA). Standards for testing and labeling of cannabinoid products are at the discretion of individual municipalities, or more often, either do not exist or are unenforced. Two recent studies highlight the pervasiveness of improper labeling of cannabinoid content in commercially available products [59, 60]. Bonn-Miller and colleagues [59] compared the product label of CBD extracts available for purchase online with their actual cannabinoid content and found a moderately high frequency of THC within these products, which was significantly higher than legal limits for THC (< .3%) for hemp-derived products. This result can explain case reports of intoxication from self-medication with cannabinoid products thought to contain only the non-intoxicating cannabinoid, CBD [61].

Without FDA oversight, there is also no standard for commercial testing of impurities within cannabinoid products [62]. Indeed, the presence of mold and pesticides in herbal cannabis is a frequently reported problem [63, 64]. This is not just an issue for illegally produced cannabis. The federal government's own research supply has been susceptible to contaminants due to this lack of appropriate standards [65]. Clients should be advised of this risk and encouraged to have their cannabinoid products tested.

3.2. Considerations for Vulnerable Populations

Clinical concerns surrounding cannabis use are particularly important among high-risk and vulnerable populations. Until further research investigates the potential risks of cannabis for vulnerable populations, clinicians should adhere to extant recommendations and take special precautions.

3.2.1.   Adolescents—Adolescents are increasingly initiating recreational cannabis use at younger ages despite potential risks for disruptions in neurological development. Recent longitudinal research has found that adolescents diagnosed with CUD evidenced decreased functional connectivity among frontal brain regions over a period of 18 months, while healthy controls evidenced increases among those same regions [66]. Similarly, Lichenstein and colleagues [67] found that decreased functional connectivity between frontal brain regions among adolescents with escalating cannabis use was associated with higher levels of depression and anhedonia, as well as poorer educational attainment. However, a recent twin study found that adolescents who used cannabis performed similarly on measures of intelligence and executive functioning relative to their non-cannabis using twin [68]. The authors attributed this finding to family background factors, which may predispose some adolescents to use cannabis. Given these discrepant findings, additional research is needed to determine the directionality of the relationship between functional connectivity of frontal brain regions, early onset cannabis use, and cognitive functioning. Importantly, recreational cannabis use is not allowed for individuals under the age of 21 in any states or areas of the

US that have legalized cannabis. Special cases of cannabis use in adolescents may apply to children with cancer, epilepsy, and other conditions [69].

3.2.2. Pregnant Women

The impact of cannabis use among pregnant women and breastfeeding mothers is difficult to determine because those who use it often use other drugs, including tobacco, alcohol, or illicit drugs, and in part because of other potential confounding exposures. Furthermore, mental health disorders, socioeconomic, and educational factors render research on this topic difficult. Though there is theoretical potential for cannabis to interfere with neurodevelopment, human data have not identified any long-term meaningful differences between children exposed in utero to cannabis and those not [70]. A recent investigation of substance use among pregnant women suggests that cannabis use alone is not associated with a significantly increased risk of adverse events; however, the co-use of cannabis and cigarette smoking presents an increased risk over either substance on its own [71]. A review of pharmacokinetic and neurodevelopmental data on cannabis use during pregnancy concluded that THC does cross the placenta and fetal exposure to cannabis may cause subtle changes in cognition and psychological health [72]. Furthermore, women who used cannabis during pregnancy were more likely to have preterm delivery and preeclampsia [73]. Additionally, children of women with prenatal cannabis use were more likely to be anemic, have lower birth weight, require placement in neonatal intensive care, and die in the first year of life than infants of mothers who did not use cannabis [73, 74]. Studies have also shown links between prenatal cannabis exposure and impaired higher-order executive functions such as impulse control, visual memory, and attention during the school years [75]. Although cannabis use during pregnancy does not appear to present the same degree of risk as other substances, additional research is warranted to elucidate potential harm. In 2017, the American College of Obstetricians and Gynecologists [76] issued an updated committee opinion discouraging physicians from suggesting use of cannabis during preconception, pregnancy, and lactation. Volkow and colleagues [77] advised that pregnant women and those considering becoming pregnant should avoid using cannabis or other cannabinoids either recreationally or to treat their nausea.

3.2.3. Older Adults

Though it is often assumed that substance use decreases with age, the prevalence rates of SUD, including CUD, have remained high among the baby-boom generation [78] and the number of older adults needing treatment of SUD is expected to grow substantially among this generation [79]. Researchers hypothesize an increase need in treatment as older adults use cannabis to cope with illness-related side effects [79]. Furthermore, prior research has demonstrated individuals ages 50–64 that had used cannabis in the past year were more likely to use other substances and have higher levels of distress, which indicates that they are a group at increased risk for problems [80]. Physiological changes due to aging may render older adults who use cannabis more vulnerable to cardiovascular and cerebrovascular events, falls, and cognitive impairment [81, 82]. It is unclear how the effects of cannabis on older adults may ultimately impact their health and thus it is important for clinicians to screen for cannabis use to reduce the risk of drug-drug interactions and other health-related problems. Additionally, different expectancies and motives for cannabis use in older adults should also be taken into consideration. Haug et al.

[83] found older users preferred oral ingestion of cannabis and were more likely to report using cannabis for cancer, glaucoma, and human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS).

3.2.4.　Individuals with Other Substance Use Disorders—Many individuals with substance use problems are turning to cannabis as a replacement for other commonly used drugs. Medical cannabis clients reported that they use cannabis as an alternative to opioids in the treatment of chronic pain and are able to reduce the quantity of opioids they consume [84]. In fact, there are significantly fewer deaths attributed to opioid analgesic overdose among states with medical cannabis laws [85]. Prior research also found that a significant number of medical cannabis clients also used cannabis as a substitute for other substances, including anti-anxiety, migraine, and sleep medications, while fewer clients reported replacing anti-depressants and alcohol with cannabis [86]. Cannabis use is commonly seen as a safer alternative to other substances; however, there is a need for more research on the risks and consequences of cannabis as a substitute for alcohol or other commonly used drugs.

3.2.5.　Psychosis—Research has historically indicated that early cannabis use is linked with the onset of psychosis among genetically predisposed individuals. Mané and colleagues [87] found that early cannabis use and presence of the COMT Val158Met and BDNF Val66Met genetic polymorphisms significantly predicted age of initial psychotic episode, especially among males. However, recent research suggests that cannabis use and psychosis may share a common genetic vulnerability such that the same genetic variants increase the risk that individuals will use cannabis and develop psychosis in their lifetime [88]. Regular cannabis use often predates the onset of an initial psychotic episode and there is a high prevalence of cannabis use among individuals experiencing their first episode [89]. It is clear a relationship exists between cannabis use and psychosis, but the origin and directionality of this relationship merits further investigation.

4.　HARM REDUCTION STRATEGIES

Harm reduction strategies, which are designed to reduce negative consequences associated with behaviors, represent one approach that clinicians can employ to address these concerns. It is therefore critical that clinicians have a basic understanding of cannabis and are familiar with harm reduction techniques to help clients optimize their safety and well-being when using cannabis for medical and recreational purposes. Prior research on harm reduction strategies for cannabis use has focused on reducing the legal and health risks, but due to the dramatic transformation of policy, accessibility, and social acceptance of cannabis, there is an urgent need for updated, empirically-informed strategies.

Harm reduction strategies may help clinicians mitigate the risks surrounding their client's cannabis use (e.g., avoid driving in a car or caring for a child after cannabis use, using small amounts and waiting to experience effects before using more). The practice of harm reduction is intended to shift the focus away from drug use itself to the consequences or effects of the behavior [90]. By placing harmful effects of use along a continuum, harm reduction strategies promote a gradual "step-down" approach to encourage individuals with

excessive or high-risk behavior to take it "one step at a time" to reduce the harmful consequences of their behavior [90]. Teaching harm reduction strategies and reinforcing existing protective strategies that limit potential consequences may help clinicians and clients as they work together to reduce cannabis related harms. Additionally, these discussions could offer providers an opportunity to learn what cannabinoids their clients are using to better inform their treatment. For clinicians, it is important to recognize that if legal consequences are removed, such as if recreational use is legal in a client's state or one has a medicinal cannabis recommendation, protective strategies for use may change substantially. Additionally, protective strategies may vary for users in different states, such as for those younger than 21 years of age and those 21 years and older, for users with sole medicinal versus recreational use, and between genders and ethnicity/race groups [91].

Within harm reduction discussions, clients should be advised to read product labels carefully, and be aware that "cannabis" represents an umbrella term for quite literally hundreds, if not thousands of potential strains and preparations [15]. Until appropriate oversight is in place, clients who use cannabinoid products should be made aware of these inconsistencies in labeling and testing and advised to be diligent and thoughtful regarding the products they choose and where they purchase them. Clients should also be made aware that, given the current state of the industry, accuracy in dosing at a specific mg/kg may be difficult to achieve. There are a multitude of factors that could predict how a client will respond to using cannabinoid products they might obtain from a friend, purchase in a dispensary, or grow at home. Expectations guided by the popular press and other outlets may need to be tempered. Discussions should highlight how clinical trial results should be interpreted with caution when attempting to apply findings to the individual's situation and anticipated treatment response.

In addition to discussion of type and ratio of cannabinoids, if a client does choose to use cannabis, harm-reduction talks should also include discussion of method of administration. There are several factors that the client will need to consider in determining how they plan to administer cannabis and each method is associated with different benefits and risks. Oral and sublingual methods can produce stronger and more enduring effects, and may be easier for the client to achieve a steady-state dose [92]. Although this delivery modality may be seemingly ideal for a medicinal client, the effects of oral absorption may be different than the effects of inhaled cannabinoids and their derivatives [93], which in turn, may or may not be optimally beneficial for specific conditions. Steady-state dosing may also lead to more rapid tolerance to the beneficial effects of cannabis, most notably for high THC products [29]. Moreover, the delayed onset of oral administration can make titration of dose far more difficult, resulting in a stronger or weaker effect than anticipated.

If a client prefers an oral to inhaled route, sublingual administration should be considered. Onset of effects for sublingual administration can occur within twenty minutes (compared to 1–2 hours for oral; [94]), which may improve ability to titrate dose more effectively and can provide swifter relief from symptoms. For clients who prefer inhalation, which results in the fastest onset (within 90 seconds) and shortest duration of effects (60–90 minutes; [94]), the vaporizer is associated with fewer bronchial symptoms compared to smoking a pipe, bong, or joint [95]. "Dabbing" is viewed as a more dangerous form of cannabis use due to the

dangers of the inhalation process and the increased THC concentration [29]. Even clients who insist on use of highly concentrated forms of cannabinoids (e.g., butane hash oil [BHO]) may be able to reduce some harm by switching the mode of administration from "dabs" to a vaporizer pen designed for concentrates.

Finally, a measure of Protective Behavioral Strategies for Marijuana (PBSM; [91]) may enable clinicians to measure what protective strategies are in use and may offer a scaffold to build upon in treatment. The PBSM demonstrated that protective behavioral strategies for cannabis can be measured and are related to frequency of use and associated consequences in young adults [91]. For instance, utilization of the PBSM at intake and throughout treatment may help clinicians reinforce existing strategies. Furthermore, discussion of these strategies may also be useful when delivering the intervention models that already exist, which also incorporate discussion of protective strategies. Of note, items in the PBSM that were endorsed with the greatest frequency centered around avoiding use in certain situations (e.g., when with family, in public places, in a car, before school or work, when using other drugs, when feeling anxious/paranoid), taking breaks from use, avoiding potential legal repercussions, and only using when there are no important things to do for the rest of the day [91]. Currently, the PBSM has only been utilized in young adult populations and its psychometric properties need to be established in larger, diverse samples.

5. CONCLUSION

In the wake of the impending Green Rush, all fields of psychology will be called upon to advance the science around cannabis. For clinical providers, there is still much unknown about optimal dosing parameters, route of administration, and how effects differ as a function of age, medical, and mental health population. Further, there is little research to help guide use of cannabis, especially among vulnerable populations such as veterans and adolescents, or as a replacement method for other substances such as opioids. Indeed, cannabis research is monumentally behind the rapid changes in cannabis popularity and policy. The removal of regulatory barriers that have impeded the advancement of cannabis research, such as the schedule I classification, would enable researchers to address key public health questions about the potential therapeutic and adverse effects of cannabis use. The cannabis industry is not held to the same rigor as the pharmaceutical industry, where products are first tested in animals and then humans to ensure the benefits outweigh the risks before becoming available to the public. In pharmaceuticals, prescriptions would not be given without follow up and substantial supporting evidence. Without FDA oversight to create standards for testing and labeling of cannabinoid products, our ability to trust these products at face value is limited.

The changing cannabis landscape coupled with the lack of research has placed clinicians in a difficult position. As providers enter a new era where cannabis use will be more prevalent than ever, they need to be prepared to have informed conversations about cannabis use that can facilitate shared decision-making [96]. Accordingly, it will be paramount for clinicians to use good intake practices and screen for cannabis use and cannabis related problems, just as one would screen for alcohol use, violence, and cultural and religious practices. It is incumbent upon clinicians to pursue dialogue about cannabis, as silence encourages

acceptance without consideration of the scientific evidence or lack thereof. Furthermore, cross-training in mental health and addiction medicine is recommended to ensure integrated, evidence-based care for SUD and mental health conditions. Clinicians would also be well-advised to become familiar with harm reduction techniques to help clients optimize their safety and well-being when using cannabis for medical and recreational purposes, but more research needs to be conducted to inform and test the effectiveness of these practices.

The burden that has been placed upon providers around cannabis could be relieved in many ways. Most importantly, there is a need for dosing guidelines created by experts without interests in the cannabis industry. Additionally, just as there are large consultation groups for clinicians that work with specific populations (e.g., veterans), there is a need for free state or federal consultation to be available to community-based clinicians that are working with clients that use cannabis or have cannabis-related problems. Affordable and accessible continuing education credits in the form of webinars or podcasts may also help providers receive timely and needed information about the state of cannabis literature.

Changing cannabis policy has widespread implications across all branches of psychology. For instance, cognitive and neuropsychology research will be valuable in capturing the neurocognitive effects of recreational cannabis use; educational psychologists will need to determine how cannabis impacts learning, achievement, and performance; developmental psychologists will be central to assessing how cannabis impacts mood and well-being and our capacity to thrive across the lifespan. Social and industrial organization psychologists will be central in the efforts to determine how cannabis affects employees in the workforce and organizations more generally. Forensic psychologists will be charged with the task of assessing how cannabis intoxication relates to culpability in crimes ranging from child neglect to driving under the influence, and so forth. The general field of psychology would benefit exponentially from interdisciplinary collaboration. Centers that recruit psychologists from diverse backgrounds to study cannabis outside the influence of industry pressures and agendas will likely be best positioned to inform policy and practice guidelines.

Additional funds for research and public health education initiatives for consumers, like those for alcohol and tobacco, would also help to alleviate the burden placed on clinicians to educate their clients. Ultimately, these initiatives could help protect public health by supporting clients and providers. Moving forward, providers will need to harness science to better inform practices around cannabis use and hold open dialogues with colleagues and clients about this important issue.

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