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

COMPLEMENTARY AND ALTERNATIVE MEDICINE TREATMENT-RELATED  
BELIEFS IN CANNABIDIOL USERS WITH GENERALIZED ANXIETY

By Aleta A. Cohn

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

June 2022

## DISSERTATION APPROVAL

This is to certify that the thesis presented to us by \_\_\_\_\_Aleta Cohn\_\_\_\_\_

on the \_\_\_\_19th\_\_\_\_ day of \_\_\_\_\_April\_\_\_\_\_, 2022, in partial fulfillment of the

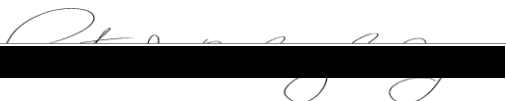
requirements for the degree of Doctor of Psychology, has been examined and is

acceptable in both scholarship and literary quality.

### COMMITTEE MEMBERS' SIGNATURES

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\_\_\_\_\_, Chairperson

\_\_\_\_\_  
\_\_\_\_\_, Chair, Department of Clinical Psychology

\_\_\_\_\_  
\_\_\_\_\_, Dean, School of Professional & Applied Psychology

## ACKNOWLEDGEMENTS

I am indebted to the Philadelphia College of Osteopathic Medicine for granting me admission to the program, an allowance without which none of this would be taking place. Drs. Stephanie Felgoise and Robert DiTomaso, I am grateful for everything that you do. I appreciate all the superiors who tirelessly gave their instruction, advice, training, education, and patience throughout. Special honors go to Dr. Michelle Lent, who transformed abstract ideas into rational works through her expertise, as well as to Drs. Susan Mindel and Patrick Boyle. Thank you to every researcher, living and dead, who laid the groundwork for students like me. To the people in my life who smiled and nodded every time you got an answer from me about what I was doing, I say thanks with love to all of you. Finally, this project is dedicated to the memory of Dr. David Festinger, whose simplicity and elegance I endeavor for. There is a maxim that says fortune favors the bold. He good-naturedly let me believe, and I am truly fortunate to have had his blessing to carry on with this wild ambition.

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**ABSTRACT**

Despite limited research supporting its benefits, adults in the United States commonly use herbal forms of complementary and alternative medicine (CAM) such as cannabidiol (CBD) for anxiety. Little is known about the treatment-related beliefs that may motivate their choice to use CAM. The present study used mixed methods to assess differences in CAM-related treatment beliefs in a sample of adults with generalized anxiety. For a cross-sectional online survey hosted via Research Electronic Data Capture (REDCap), 180 adults were recruited. Generalized anxiety symptoms and severity were assessed using the Generalized Anxiety Disorder 7 (GAD-7) screener. Beliefs about CAM were measured through the Complementary and Alternative Medicine Beliefs Inventory (CAMBI) and Holistic Complementary and Alternative Medicine Questionnaire (HCAMQ). An open-ended prompt and text box captured perceptions about perceived benefits and harms associated with CBD's relationship to cannabis. Independent samples *t*-tests were conducted for groups of CBD and non-CBD users endorsing anxiety to compare mean scores on the HCAMQ and CAMBI subscales. CBD users endorsed higher ratings of anxiety severity ( $p < .001$ ) and beliefs in natural treatment ( $p = .002$ ). The results of this study suggested that CBD users may place greater importance on treatment-related beliefs about naturalness than non-users. Future evaluations of treatment-related beliefs in CBD users as well as traditional provider approaches to integrative models of care are needed to better understand how such beliefs impact use behaviors.

## CHAPTER 1: INTRODUCTION

### Statement of the Problem

Complementary and alternative medicine (CAM) is a term referring to treatment approaches considered as beyond the purview of conventional or orthodox medicine in the United States (Bishop et al., 2006, 2007; Ding et al., 2018). CAM use seems prevalent in the United States, where mental healthcare providers might benefit from clarifying their knowledge of CAM and presenting more accurate information to the utilizers they treat (Bassman & Uellendahl, 2003; Jou & Johnson, 2016). Dialogues between providers and CAM users require a greater awareness on the part of providers of what motivates the choice to use CAM. Demographics, CAM type, and beliefs about illness and treatment are factors associated with CAM usage (Bishop et al., 2006, 2007).

Natural products have had the highest utilization rates by adults in the United States relative to other types of CAM (Clarke et al., 2015). Adults who endorse anxiety are among the top consumers of natural products (Nahin et al., 2009; Purohit et al., 2015). Anxiety is highly prevalent in the general population and the top psychological condition treated by CAM users in the United States, with an estimated one in five American adults using an herbal form of CAM to manage an anxiety disorder (Barnes et al., 2008; Bystritsky et al., 2012; Kessler et al., 2012). Certain demographic factors (e.g., higher education, identifying as female) have predicted CAM use for anxiety, as well as beliefs in holistic health, natural treatments, and self-management of health (McIntyre, Saliba, & Moran, 2015; McIntyre, Saliba, Wiener, et al., 2015). Those diagnosed with generalized anxiety disorder (GAD) are among the highest utilizers of CAM for anxiety (Ravven et al., 2011). Individuals experiencing GAD and CAM users with anxiety have analogous



treatment concerns, such as clinically significant perceptions of control over worry, according to criteria from the *Diagnostic and Statistical Manual of Mental Disorders* (5<sup>th</sup> ed.; *DSM-5*; American Psychiatric Association, 2013).

In herbal medicine, cannabidiol products represent one of the strongest markets in recent years (BDS Analytics, 2019). Cannabidiol (CBD), a naturally occurring cannabinoid found in *Cannabis*, is a compound found in several over-the-counter products sold throughout the United States (VanDolah et al., 2019). An estimated 14% of Americans currently use CBD products (Gallup, 2019). CBD has gradually acquired popularity and repute as a treatment for various illnesses due to its purported medical benefits and lack of intoxicating effects found in other cannabinoids such as tetrahydrocannabinol (THC; Corroon & Phillips, 2018; Schoedel et al., 2018; Soleymanpour et al., 2021; VanDolah et al., 2019). It is a proposed treatment for numerous mental disorders and physical conditions (White, 2019). However, the only clinical application for CBD approved by the U.S. Food and Drug Administration (FDA) to date is for the treatment of pediatric seizures (United States Food and Drug Administration [USFDA], 2020b). According to existing clinical trials and information on the safety profile of CBD, users have had negative health effects that would prohibit federal approval for clinical use (Bonaccorso et al., 2019; Brown & Winterstein, 2019; Taylor et al., 2019).

Given the lack of empirical support for and increasing public interest in its applications, CBD may be categorized as a form of herbal medicine and considered as CAM. For mental healthcare practitioners, this label lends a framework for understanding how and why individuals may choose to use CBD. Preliminary research exists on factors

associated with CAM use (i.e., demographics and form of CAM via CBD) in CBD-using populations. According to an anonymous online survey of users principally residing in the United States, anxiety is the most treated psychological condition and third most treated health condition overall in CBD-using adults (Corroon & Phillips, 2018). In an American poll of consumption habits, 20% of CBD users reported primarily using it in the self-treatment of anxiety (Gallup, 2019). Some clinical research suggests that CBD has anxiolytic properties, though the power and number of studies remain limited (Bonaccorso et al., 2019). In the absence of empirical support for CBD as a form of conventional medicine, motivations for CBD use in adults who have generalized anxiety may be identified through treatment-related beliefs as a predictive factor for CAM use.

Treatment and illness-related beliefs, as well as other factors that are predictive of CAM use may be understood collectively using the Common-Sense Model of Self-Regulation (CSM) as applied to health-related behavior (Leventhal et al., 2016). The CSM assumes that environmental cues and personal experiences interact with cognitive-behavioral processes related to illness in a reciprocal, dynamic manner. The model organizes potential motivations for CAM use such as perceived control over illness and treatment, using experiential information to support positive beliefs about CAM, or trying a novel treatment gaining public attention (i.e., adhering to a subjective norm; Bishop et al., 2007). In the context of the CSM, domains of treatment-related beliefs about CAM previously associated with the decision to use it (i.e., naturalness, scientific validity, holistic health characteristics, participation in treatment) may be considered as mutually influential on the decision to use CAM.

The efficacy of CBD as a form of CAM for anxiety remains unknown despite its common usage in the United States. Its common use and over-the-counter level of access may create competition with therapeutic and pharmacological evidence-based treatments for anxiety that results in opportunity costs for practitioners and users (Bandelow et al., 2017). CBD users may hold treatment beliefs about CAM that predict the choice to use it as an alternative or adjunctive therapy for anxiety. At the time of this review, no research was found concerning the state of treatment beliefs about CAM for adults who have experienced anxiety and choose CBD as a form of CAM as treatment in the United States. A study of treatment-related beliefs about CAM for adults who experience anxiety and use CBD serves to increase awareness of beliefs that may influence the choice to use CBD as CAM in an understudied but emergent population.

### **Purpose of the Study**

The present study used mixed methods to assess information about treatment beliefs related to CAM endorsed by both CBD-using and non-using individuals with generalized anxiety. An anonymous web-based cross-sectional survey captured demographic characteristics relevant to CBD users as well as non-using individuals with generalized anxiety. A screening tool based on core symptoms of GAD (i.e., the GAD-7) determined the presence of clinically significant anxiety symptom severity levels. Existing measures of CAM-related beliefs (i.e., the CAMBI and HCAMQ) were used to represent relevant beliefs towards using CBD as a form of CAM. Respondents answered an exploratory question regarding their beliefs about CBD's relationship to cannabis as these beliefs might pertain to the choice to use CBD. This furthered research on the topic of CBD use and characteristics of its users as data on this growing population remain

limited despite an identified need for best practices in working with CAM users in clinical settings.

### **Research Questions and Hypotheses**

1. What types of CAM-related treatment beliefs distinguish individuals using cannabidiol to manage generalized anxiety from conventional medicine users?

Hypothesis I: Individuals who choose CBD will have significantly higher scores on a measure of beliefs in the scientific validity of CAM relative to non-CBD users.

Hypothesis II: Individuals who choose CBD will have significantly higher scores on a measure of beliefs in the holistic properties of CAM relative to non-CBD users.

Hypothesis III: Individuals who choose CBD will have significantly higher scores on a measure of beliefs in natural treatment via CAM relative to non-CBD users.

Hypothesis IV: Individuals who choose CBD will have significantly higher scores on a measure of involvement in treatment relative to non-CBD users.

2. What beliefs do CBD users endorse regarding CBD's relationship to cannabis?

## CHAPTER 2: REVIEW OF THE LITERATURE

In the United States, an estimated 38 million adults did not use conventional healthcare during the previous year and 38% of them had an identifiable health need (Nahin et al., 2010). Approximately 1 in 4 non-utilizers of conventional healthcare used a form of alternative medicine to address their health needs. These trends point toward an opportunity cost for evidence-based approaches in healthcare, as well as inefficient dialogues between healthcare professionals and non-utilizers about treatment. Though rapport between these parties could be improved by addressing the factors associated with choosing alternative medicine over conventional healthcare, mental health practitioners may favor tacit agreement with their clients' use of alternatives to conventional treatment and forego discussions of risk and harm (Bassman & Uellendahl, 2003; Gallup, 2019; Nahin et al., 2010).

Psychologists have cited mostly anecdotal evidence for their esteemed expertise in alternative forms of medicine, some of which are offered at the exclusion of evidence-based methods (Bassman & Uellendahl, 2003). For common psychological conditions such as anxiety disorders, alternative forms of treatment present both an opportunity cost and the potential for harm as there is greater evidentiary basis for the use of beneficial, low-risk treatments like cognitive-behavioral therapy (Bandelow et al., 2017). Once a treatment relationship is initiated with a patient, informed consent (e.g., safety, informed decision-making, quality of empirical support) and professional competency (i.e., reasonable care, negligence claims, training format and duration, knowledge of area/technique of interest) concerns must be addressed whether a provider offers

alternative therapies or not (Bassman & Uellendahl, 2003; Knapp et al., 2017).

Psychologists and others who offer therapeutic services could increase their commitment to professional ethics and improve their understanding of relevant risks by preemptively educating themselves on complementary and alternative therapies, as well as the knowledge, beliefs, and attitudes of their patients on these topics.

Natural products are the most used form of adjunctive or alternative medicine (Clarke et al., 2015). Natural products include dietary and nutritional supplements in edible, vaporized, or topical forms. Among currently expanding markets in the United States for natural products is the sale of cannabidiol (CBD), a cannabis plant derivative. Since 2014, CBD product sales have grown at a faster rate than general sales in cannabis dispensaries (BDS Analytics, 2019). CBD-only products may appeal to non-cannabis users as well given that 44% of CBD users do not agree with the legalization of cannabis and 1 in 10 do not believe marijuana has medical benefits (BDS Analytics, 2019). Being informed about current trends of what alternative treatments are consumed and how consumption takes place reasonably improves mental healthcare practitioners' competency in addressing the clinical needs of patients who use them. The identification of objective and subjective influences on the rise of CBD in the alternative therapies market and for the overall usage of natural therapies clarifies why these trends have occurred. For the current study, an evidentiary basis for and against CBD's clinical use, as well as substantiation for an investigation into treatment-related beliefs of adults with generalized anxiety who use alternative therapies has been provided for this purpose.

### **Complementary and Alternative Medicine**

*Complementary and alternative medicine* (CAM) is a categorical label used to describe approaches to healthcare not included in conventional practice (National Center for Complementary and Integrative Health [NCCIH], 2018). An approach is regarded as *complementary* when used adjunctively with other forms of conventional medicine, *alternative* if it is used in the absence of other conventional approaches, and *integrative* if coordinated between providers and patients (NCCIH, 2018). Additional specifiers that have been proposed are whether the approaches are safe or effective, evidence-based, and if they focus on primary (i.e., preventative) care as well as a holistic (i.e., whole person) approach to treatment (Ng et al., 2016). Though CAM users in the United States have expressed public interest in integrative and complementary approaches to medicine, CAM use is rarely queried by providers and over 42% of patients who use CAM do not disclose it to providers (Jou & Johnson, 2016). Reasons for non-disclosure include patient perceptions that providers should ask about CAM use or that reporting their use is unimportant for the scope of practice. In the interests of coordinating care and risk management, research on predictors for CAM use has identified areas of focus for facilitating discussions with CAM users about their behavior. Predictive factors for CAM use include user demographics and beliefs about treatment and illness, with the preferred form of CAM being significantly associated with both factors (Bishop et al., 2006).

#### **Demographics Associated with CAM Use**

The market for CAM in the United States is robust, with an estimated 33.9 billion United States dollars (USD) spent by adults on CAM in the United States in 2007 alone (Nahin et al., 2009). Nearly 40% of adults in the United States are estimated to be CAM

users, a rate that has gradually increased in the population since the 1990s (Barnes et al., 2008; Eisenberg et al., 1998; Committee on the Use of Complementary and Alternative Medicine by the American Public, 2005). CAM use is commonly endorsed by White women between the ages of 30 and 70, particularly those who endorse higher levels of education and income (Bishop et al., 2006; Committee on the Use of Complementary and Alternative Medicine by the American Public, 2005; Green et al., 2017). Forms of musculoskeletal pain are the most endorsed reasons for using CAM overall, while anxiety is the most treated psychological condition via CAM (Barnes et al., 2008). According to national survey data, 37% of adults with 1 or more symptoms associated with a mental disorder spent significantly greater out-of-pocket amounts on CAM therapies relative to others, particularly for symptoms of hypersomnia and anxiety (Purohit et al., 2015).

### *Operationalizing Anxiety*

Clinically significant anxiety is commonly represented in the form of anxiety disorders, which are mental disorders marked by disproportionate fear and anxiety that may be expressed through behavioral means (American Psychiatric Association, 2013). Fear is an emotion paired with neurobiological events and survival-based behaviors, whereas anxiety is an anticipatory mixture of cognitive-affective responses marked by strong negative affect, perceived lack of control over potential threats, and a state of intense self-focus (American Psychiatric Association, 2013; Barlow, 2016; Leahy et al., 2012). Experiences of apprehension differentiate anxiety from fear, as well as the level of organization and consistency found in the affective response of fear (Barlow, 2016). In Barlow's model of anxious apprehension, increasingly intense responses such as worry become associated with sensory cues (e.g., physiological arousal, visual stimulus, a loud



sound), leading to a narrower perceptual focus and a greater potential for behavioral dysfunction (e.g., avoidance responses, lack of concentration).

### ***Anxiety Disorders and CAM***

Greater usage of complementary or alternative forms of CAM for anxiety disorders occurs in higher income countries like the United States, especially in the treatment of severe anxiety symptoms (de Jonge et al., 2018). This may be partially attributed to the high prevalence rate of anxiety disorders in the United States, with approximately 1 in 3 individuals having one or more in their lifetime (Kessler et al., 2012). Undertreatment and underreporting are common for these conditions and the actual prevalence rate may be higher (Bandelow & Michaelis, 2015). Diagnosed anxiety disorders have leading demographics like those observed for individuals who use CAM as treatment (i.e., White women in adulthood), which are consistent with those found in cases of generalized anxiety disorder (GAD) as well (American Psychiatric Association, 2013; Asnaani et al., 2010; Bandelow & Michaelis, 2015; Upchurch & Rainisch, 2015).

**Generalized Anxiety Disorder and CAM.** Generalized anxiety disorder (GAD) is a form of anxiety disorder marked by excessive anxiety and worry, secondary symptoms associated with anxiety (e.g., restlessness, fatiguing easily, irritability), and a limited sense of control over these experiences (American Psychiatric Association, 2013). In contrast to other anxiety disorders, GAD names worry as a core feature of anxiety and is broadly representative of anxiety in the form of cognitive-affective symptoms (American Psychiatric Association, 2013; Barlow, 2015; Crocq, 2017; Leahy et al., 2012). GAD is less prevalent than other anxiety disorders with a 12-month prevalence rate of approximately 2.9% and 9% lifetime morbid risk (American Psychiatric

Association, 2013; Kessler et al., 2012). This disorder has been linked to underutilization of conventional treatment resources, delays in treatment-seeking, and later age of onset at the median age of 31 (Bandelow & Michaelis, 2015). GAD is also associated with greater usage of CAM as a form of mental health treatment. Of the estimated 1 in 25 adults in the United States using herbal remedies for anxiety or other emotion regulation, those diagnosed with GAD through structured interviews are the highest utilizers of herbal forms of CAM for these reasons (Ravven et al., 2011). At nearly 13%, their rate of CAM use for symptom management is significantly higher than non-diagnosed individuals and those diagnosed with other anxiety disorders (Ravven et al., 2011).

### **Type of CAM Usage**

A factor previously associated with the decision to use CAM was the type of CAM being used (Bishop et al., 2006). Though CAM type is not an independent predictor of CAM use, it is significantly associated with established predictors such as illness and treatment-related beliefs in addition to demographic variables that are predictive of the decision to use CAM (Bishop et al., 2006; Bishop et al., 2007). Understanding the relative strength of personal beliefs about treatment and illness in the specific context of clinical support and cautions for using certain types of CAM distinguishes relevant influences in the initiation and maintenance of CAM usage.

Types of CAM fall in general categories of natural products, such as vitamins or other dietary supplements, and mind-body practices like acupuncture or hypnotherapy (NCCIH, 2018). Natural products are the most utilized form of CAM by adults in the United States (Clarke et al., 2015). Herbal supplements are a common and enduring type of natural product with estimates of national use between 18% and 25% (Peregoy et al.,

2014; Wu et al., 2011). Herbal supplements are defined by the FDA as orally consumed, herb-based products labeled as dietary supplements, though the term is also used to refer to topical products and distillates (Johns Hopkins Medicine, 2019; NCCIH, 2020). The definition of what constitutes an herbal supplement accommodates products such as cannabidiol based on several complex clinical, legal, and economic considerations.

### ***Cannabis and Cannabidiol***

The third most-used psychoactive substance in the United States is cannabis, colloquially known as marijuana (Carliner et al., 2017). Acute effects (e.g., short-term memory, motor coordination, decision-making) and long-term consequences (e.g., cannabis use disorder, cognitive/physical impairments, induction or exacerbation of paranoid ideation and psychotic symptoms) are associated with the use of *Cannabis sativa*, a species of the plant (Volkow et al., 2014). The term *cannabis* refers to multiple species of the plant (e.g., *Cannabis sativa*, *Cannabis indica*) that are distinguished by varying amounts of the primary phytocannabinoid  $\Delta^9$ -tetrahydrocannabinol (THC) to which the psychoactive effects of the plant have been attributed (Anthony et al., 2016; Attard et al., 2018). Another naturally occurring cannabinoid found in *Cannabis sativa* is cannabidiol (CBD), which was first identified as an inactive component of the plant in 1940 (Burstein, 2015). Though structurally similar to the partial endocannabinoid agonist THC, CBD seems to function as an antagonist at CB<sub>1</sub> and CB<sub>2</sub> receptors with anti-inflammatory responses linked to various disorders (e.g., anxiety, multiple sclerosis, gastrointestinal imbalances, pain; Burstein, 2015; Pertwee, 2012). In recent years, there has been renewed interest in research regarding the potential actions of CBD in the

human body, particularly concerning its safety profile and potential moderating role for endocannabinoid dynamics in the central nervous system (Bonaccorso et al., 2019).

**Legal Status of Cannabis.** In the United States, the legal status of cannabis remains tenuous. Public interest in its potential properties and applications has been met with suppression (e.g., taxation of product) as well as promotion (e.g., investment in medical research) by governing bodies (Mead, 2019). Through the Controlled Substances Act (CSA) of 1970, a federal statute regulating the sale, distribution, and use of narcotics with abuse potential across medical and other contexts, the utilization of cannabis became federally prohibited (Controlled Substances Act [CSA], 1970). Opposing regulations at the state level have revitalized the potential for a cannabis industry as the CSA designates federal preemption only in cases where state law poses a sufficient conflict of interest to the enforcement of federal law (1970). As compared with other substances mentioned in the CSA, federal agencies have not aggressively enforced the statute in response to cannabis use and distribution (Mead, 2019). Multiple state laws have permitted the use of cannabis for medical and recreational purposes based on increasing public initiatives for decriminalization and legalization, beginning in 1996 with Proposition 215 in California (Mead, 2019). 33 states currently permit medical applications of cannabis, and 13 states allow for cannabis containing no more than their predetermined maximum percentage of THC and no less than a minimum percentage of CBD content by weight to be used in medical contexts (National Conference on State Legislatures [NCSL], 2020a, 2020b).

**Legal Status of Cannabidiol.** Though CBD is licit, this legal status is contingent on multiple conditions. Until the passage of the 2018 Farm Bill, CBD was subject to federal regulation as a resinous byproduct of cannabis plants containing known

psychoactive compounds like THC (Cherney & Small, 2016; Mead, 2019; Potter, 2014). However, this changed with the descheduling of hemp and its exemption from the processing standards originally set by the CSA for cannabis. CBD products frequently originate from cultivated hemp, which has been distinguished from other forms of cannabis in the United States not by its own distinctive properties, but by non-intoxicating levels of THC content per plant (i.e., an internationally used and arbitrary concentration of less than 0.3%; Cherney & Small, 2016; Mead, 2019). At the federal level, hemp (i.e., non-psychoactive cannabis defined by low THC concentration) crop was made commercially available provided that special conditions for licensed use and analysis are met following the passage of the 2018 Farm Bill (Mead, 2019; Spindle et al., 2019). CBD is presently legal by way of hemp as the source crop has been federally authorized, though it remains a controlled substance if it is derived from a plant containing more than 0.3% THC content.

The legal status of CBD has been compromised by inadequate scientific evidence for its safety and effectiveness in human trials. The United States Food and Drug Administration (FDA), which specified that licensed uses of hemp do not include the manufacture of food or dietary products marketed as containing CBD, has expressed concerns about the undefined properties and effects of CBD (Gottlieb, 2018; Mead, 2019; USFDA, 2020a, 2020b). An FDA consumer update was published reaffirming this decision, citing limited data on the safe usage of CBD and existing findings that indicate health risks associated with its use (USFDA, 2020a). Nevertheless, CBD products are marketed and sold by means of ambiguous labeling and minimal enforcement of quality control standards (Mead, 2019; National Academies of Sciences, Engineering, and

Medicine [NASEM], 2017; Ott, 2018; Seltenrich, 2019; Soleymanpour et al., 2021; USFDA, 2017, 2020a). As a result, CBD is highly available in the natural products market despite multiple administrative warnings.

Depending on the context, CBD may be categorized as a licit or illicit product, which has hindered decisions being made about what conditions must be met for its legal use (e.g., under what circumstances its use is likely to be harmful or benign) and the enforcement of any relevant requirements. There are several barriers to the establishment of clear regulatory controls for the sale of CBD products warranting consideration before they may be enacted. Known issues bearing the greatest risk potential are quality control, contamination, adverse effects, and the narrow scope of the evidence for or against CBD use in various contexts.

**Quality Control and Contamination.** Whether obtaining CBD from low-THC or THC-potent forms of cannabis, the Current Good Manufacturing Practices (CGMP) set forth by the FDA require that crop sourcing and processing methods minimize contamination and product inconsistency to maintain consumer safety (USFDA, 2017). Sourcing from medical cannabis crops poses conflicts with federal requirements found in the CSA about limits to THC content in cannabis, limiting communication between cultivators and federal agencies about labeled contents due to possible penalties.

While the FDA is responsible for the regulation of CBD products, the process of monitoring for extraction quality only takes place in response to unapproved usage of CBD-focused labels for food or dietary products (USFDA, 2019). If a product has not been identified as containing CBD due to misleading labeling, this action is not taken. Quality control consequently becomes a responsibility of each state. State-level

regulation varies profoundly in terms of the number and strictness of hemp-based product restrictions, as well as the intensity of enforcement for these restrictions (NCSL, 2020b). Currently, there are no unified standards for the analysis of the contents of general market CBD products to certify dosage levels. This is an essential component of discerning how CBD may be used in conventional medicine by defining a therapeutic dose, as well as how consumer safety will be judged on an ongoing basis (Millar et al., 2019).

Cultivating CBD from an industrial hemp crop grown in fields used for other agricultural purposes is efficient in terms of licensing and production as this type of hemp crop is often used for fiber-based products as well (Attard et al., 2018; Cherney & Small, 2016). However, this method may increase the risk for contamination of CBD products. Industrial hemp crops have been used to clean agricultural plots because they are highly absorbent for harmful metals (e.g., lead, arsenic) and chemical contaminants (e.g., pesticides) that may otherwise pollute a field (Johnson, 2018; Russo, 2016b). THC-containing commercial cannabis samples also possess excessive contaminant levels that import significant health risks for consumers (Russo, 2016a). Though preventative measures of careful site development and extraction methods could reasonably reduce contaminant exposure, these measures have not been widely implemented by CBD producers (Citti et al., 2019; Russo, 2016a, 2016b).

**Adverse Effects.** Adverse effects for CBD have been identified in clinical trials as well as national data on e-cigarette or vaping product-associated lung injuries (EVALI; Brown & Winterstein, 2019; Lozier et al., 2019). When smoked using an electronic delivery system, CBD oil may contain additives, agents, or flavors linked to EVALI symptoms of gastrointestinal distress, tiredness, and traditional symptoms of pneumonia

(Chand et al., 2019). Of the nearly 2,300 reported cases of EVALI in the United States as of December 2019, 1% reported the exclusive use of CBD-based products and 12% used CBD products in conjunction with other e-cigarette or vaping products (Lozier et al., 2019). In an analysis of clinical trials, approximately half of all participants endorsed diarrhea, suppressed immunological responses, drowsiness, and exacerbation of hepatic impairments as adverse effects associated with FDA-approved CBD-based interventions (Brown & Winterstein, 2019). Potential drug-drug interactions based on CBD's pharmacokinetic (i.e., ways in which the drug is processed by the human body) and pharmacodynamic (i.e., the effects of the drug on the human body) profiles were identified that indicated a strong likelihood for changes in the metabolic processes associated with CBD and other drugs (e.g., opioids, cardiological treatments, antifungals) that impact their effectiveness and safety profiles. The dosage and route of administration may moderate the risk for drug-drug interactions due to associated variations in half-life and potency for CBD by form and method, such as longer lasting effects with smoking and oral consumption (Millar et al., 2019).

The use of CBD may also adversely affect genetic and molecular processes. In a cell culture model of adverse effects of CBD in humans, DNA damage (i.e., strand breakage) and chromosomal disturbances evidenced by oxidation (i.e., destabilizing electron losses from DNA in the process of chemical reactions) occurred (Russo et al., 2019). Given that the levels of CBD used in the study are comparable to those in plasma samples from CBD users, Russo and colleagues cautioned that cancer risks are likely to be associated with CBD's observed toxicity with genetic structures.



*Clinical Studies of Cannabidiol*

At present, few studies of the effectiveness and safety of CBD for adults with identified mental health conditions have been conducted, with anxiety and psychosis being the focus of most randomized controlled trials (RCTs; Van Ameringen et al., 2019; Black et al., 2019; Bonaccorso et al., 2019; Kirkland et al., 2022; Sarris et al., 2020). Existing findings have been broadly categorized as preclinical and clinical.

**Preclinical Findings.** Advocates for CBD research have indicated that preclinical findings are cause for a greater number of naturalistic studies of its effects on humans (Fischer et al., 2015). Findings from trials of CBD dosage in mice indicate possible anxiolytic properties, particularly for moderate injectable doses (Van Ameringen et al., 2019; Blessing et al., 2015). This evidence is conflicting, however, as the availability of THC or other cannabinoids may account for the anxiolytic effects that have been attributed to CBD (Van Ameringen et al., 2019). Success in animal studies of CBD treatment has not consistently predicted success in human trials (e.g., glycemic control for diabetes; Jadoon et al., 2016, Rajesh et al., 2010). Given that preclinical studies in behavioral medicine have been criticized as unreliable sources of evidence for the enactment of human trials due to various methodological and translational weaknesses, they have been excluded from the scope of this review (Pound et al., 2004; Shanks et al., 2009).

**Clinical Trials and Studies of Medical Conditions.** Dravet syndrome, a severe form of childhood epilepsy typically beginning in infancy, and Lennox-Gastaut syndrome are the only FDA-approved clinical applications for CBD (Perucca, 2017). Though CBD has been considered safe and effective in trials including children and adults with these

forms of epilepsy (Silvestro et al., 2019), as well as efficacious by parents of children with these conditions (Hussain et al., 2015), preliminary findings indicate that it may decrease in efficacy over time via physical tolerance (Uliel-Sibony et al., 2018).

However, this finding was previously contradicted in at least one longitudinal case study (Maa & Figi, 2014).

Typically used as an adjunctive therapy with THC, CBD has been evaluated as an intervention for medical conditions (e.g., pain management) relevant to mental healthcare due to the reciprocal relationship between psychiatric symptoms and physical illness in adults (Allan et al., 2018; DiTomasso et al., 2009). CBD use has been possibly evidenced in managing inflammation-linked side effects of chronic illnesses, though these effects may be attributed to THC and not CBD (Allan et al., 2018). As compared with other methods for pain management, CBD is considered as having a poor risk-benefit ratio. Adverse effects of CBD use are clear for other medical conditions relevant to mental status. For example, CBD is not recommended in the treatment of glaucoma, a condition associated with neurocognitive decline (Diniz-Filho et al., 2017; Tomida et al., 2006).

CBD has been proposed for the treatment of viruses and chronic disorders thought to be rooted in inflammatory responses (Mathur et al., 2020; Reznik et al., 2016). This assumption is primarily based on lab studies of the inhibitory effects of CBD on components of human cells involved in pro-inflammatory processes (e.g., cytokine or chemokine production; Couch et al., 2017; Petrosino et al., 2018; Ruhl et al., 2018). Inflammatory processes may influence the course of psychopathology at multiple stages, and as such CBD's anti-inflammatory properties may generate primary or secondary mental health benefits, though no RCTs have been conducted on this topic (Martone,

2019). Inflammation processes show consistent associations with anxiety-related experiences in human participants according to a comprehensive review of neuroimaging studies, which indicates a possible area of focus for future clinical trials evaluating the use of CBD in the management of mental health-related symptoms (Felger, 2018).

**Clinical Trials and Studies of Mental Disorders.** The findings for the use of CBD in the treatment of mental disorders are mixed due to methodological concerns and the limited number of studies conducted. No contraindications have been established, though CBD possesses the potential to interfere with dose-effectiveness for psychiatric medications and exacerbate symptoms such as suicidal ideation based on its previously reported side effects and chemical profile (Brown & Winterstein, 2019). CBD is considered ineffective or minimally effective in the treatment of bipolar disorder (Zuardi et al., 2010), Huntington's disease (Consroe et al., 1991), Parkinson's disease (Chagas et al., 2014), and alcohol use disorder (Nona et al., 2019). Most human trials have focused on schizophrenia and psychosis. According to a limited number of these trials, CBD use may be linked to reductions in positive symptoms like hallucinations (Bhattacharyya, Wilson, Allen, et al., 2018; Bhattacharyya, Wilson, Appiah-Kusi et al., 2018; Leweke et al., 2012; McGuire et al., 2018). Other trials of CBD use for schizophrenia and psychotic episodes have yielded few if any significant improvements in functional or assessment-based outcomes (Boggs et al., 2018; O'Neill et al., 2018).

Case studies indicate potential reductions in relapse rates and abstinence for adults with cannabis use disorders who were administered CBD (Crippa et al., 2013; Shannon & Opila-Lehman, 2015). However, specific methods for assessing frequency, duration, and quality of CBD administration were not present in at least one study, and

single-case results cannot be reliably generalized to a population of interest. CBD treatments may decrease cravings and frequency of cigarette use for tobacco users who smoke (Morgan et al., 2013). Tobacco users may have lower interest in cigarette-relevant cues with CBD treatments (Hindocha et al., 2018). A recent series of RCTs suggests that cravings may be inhibited short-term in dependent opioid users who use CBD (Hurd et al., 2015), and they may also experience longer-term inhibition of responsivity to heroin-related cues (i.e., decreased anxiety and cravings after exposure; Hurd et al., 2019). A caveat of the latter study was that these effects were present in controlled but not naturalistic environments where cues are more likely to facilitate relapse.

**Anxiety Disorders.** There are few studies of the use of CBD for anxiety disorders, even in the context of research on cannabis use (Van Ameringen et al., 2019). Defining and measuring anxiety-related constructs and CBD interventions, as well as ethical considerations (e.g., informed consent, participant safety) are some of the cited methodological impediments for research on this topic (Leen-Feldner et al., 2021). Existing studies have mostly small sample sizes based on predominantly healthy male volunteers, which reduces the likelihood of generalizable outcomes (Skelley et al., 2020). Though the data are limited, there is some empirical support for the use of CBD to treat clinically significant anxiety. Medical marijuana users in multiple large-scale surveys reported decreased levels of stress and anxiety regardless of how severe their anxiety symptoms were, particularly when using products with more CBD content (Van Ameringen et al., 2019). However, findings on these effects for medical marijuana users may not be comparable to those for CBD-only users. Adults receiving treatment as usual in an outpatient clinic endorsed sustained reductions in anxiety symptoms when engaging

in concurrent CBD use (Shannon et al., 2019). Shannon and colleagues (2019) acknowledged that patients at the sampling site frequently avoided using pharmaceutical interventions for anxiety, which may have biased self-report ratings (Van Ameringen et al., 2019). In a later study, this supposition was cited in the context of placebo effects. Spinella and colleagues observed that participants with strong preexisting beliefs that CBD reduced anxiety rated themselves as experiencing less anxiety when expecting to receive hemp oil containing CBD versus a dose of CBD-free hemp oil, unaware that neither dose contained CBD (Spinella et al., 2021).

Individuals with clinically significant social anxiety have endorsed significant decreases in perceived anxiety with moderate doses of CBD, but not a placebo condition (Crippa et al., 2011). CBD dosage and reductions in perceived anxiety appear to co-occur with changes in cerebrovascular flow in paralimbic and limbic areas previously associated with subjective anxiety that may mediate the relationship between CBD and anxiety reduction (Crippa et al., 2004; Li et al., 2019; Skelley et al., 2020). In another randomized controlled trial, Bergamaschi and colleagues (2011) found that individuals with social anxiety who received CBD treatment experienced significant reductions in negative self-perceptions and anxiety during a public speaking simulation relative to other groups. The results of another single-condition trial of men who participated simulated public speaking suggested that moderate doses of CBD significantly reduced their subjective social anxiety ratings (Linares et al., 2019). In similar studies of healthy volunteers, moderate doses of CBD also reduced anxiety levels following simulated public speaking tests (Zuardi et al., 1993; Zuardi et al., 2017). Adults treated with CBD in another study did not endorse reductions in anxiety based on social rejection, nor

responsivity to negative emotional stimuli, suggesting that situational social anxiety may not be affected by CBD use (Arndt & de Wit, 2017).

### **Beliefs about Treatment and Illness**

The decision to use CAM is independently related individual beliefs regarding treatment and illness (Bishop et al., 2006). Vincent and Furnham (1996) advanced the terms *push factors* and *pull factors* for reasons that CAM users avoid conventional medicine or might engage in the use of alternative practices. Push factors identified by their sample of CAM users, such as ineffective treatment encounters and adverse effects of conventional medicine, appear to align with large scale survey data on adult CAM users in the United States (Jou & Johnson, 2016; Nahin et al., 2010; Vincent & Furnham, 1996). American adults who use CAM have reported an unmet need for more proactive and collaborative dialogues about CAM usage initiated by conventional providers, which may be a partial basis for their expressed dissatisfaction with conventional treatment (Jou & Johnson, 2016). Pull factors include relatively greater accessibility, perceived effectiveness, natural and holistic attributes, and desire to participate in treatment (Bishop et al., 2006, 2007; Vincent & Furnham, 1996). CAM users place greater importance on psychological well-being relative to conventional medicine consumers (Bishop et al., 2006, 2007).

The importance of push and pull factors may vary according to CAM users' levels of interest in novel treatments, dissatisfaction with conventional medicine, and adherence to beliefs that validate CAM use (Furnham & Kirkcaldy, 1996). National surveys and smaller scale studies provide moderate support for this proposed subcategorization of CAM users based on differences in their CAM use behaviors (e.g., level of collaboration

with CAM or conventional provider, type of CAM chosen) as well as demographic and belief-related variables (Bishop et al., 2006, 2007). Pull factors at the level of pro-CAM beliefs, as opposed to novelty and push factors from conventional medicine, are the most consistently associated with CAM usage overall (Bishop et al., 2006, 2007).

### ***Herbal Supplements and Treatment Beliefs***

Herbal supplement users endorse similar treatment beliefs to CAM users, with pull factors regarding the benefits and amenable properties of herbal medicine predicting use behaviors better than push factors (Welz et al., 2019). Beliefs in the benefits of choosing more effective (i.e., positively experienced) and healthier (i.e., beneficial because it is “natural” and assumed to have fewer side effects/risks) forms of medicine have stronger relationships with herbal CAM use behaviors than push factors (Welz et al., 2019). Per Welz and colleagues, individuals already using CAM gave higher endorsements to these expectancies for herbal medicine use as compared to new users. Familiarity and familial traditions may increase the likelihood of use, especially if comparing established users to new users, though the generalizability of these culture-linked findings from a German sample to an American sample was uncertain.

### ***Anxiety and Beliefs about Illness and Treatment***

For individuals managing anxiety symptoms through CAM, their illness and treatment-related beliefs appear to be congruent with those of other CAM and herbal medicine users (Bishop et al., 2007; McIntyre, Saliba, Wiener, et al., 2015; McIntyre et al., 2019). According to a model derived from the theory of planned behavior, control-related beliefs and anxiety symptom severity predict the intention to use herbal forms of CAM as well as positive attitudes towards CAM usage (Ajzen, 1991; McIntyre et al.,

2019). Beliefs in control over symptoms and health when taking herbal medicine predict intentions to use herbal CAM to treat anxiety, which may also be attributed to pull factors (i.e., fewer side effects, attribute of “naturalness”) and ease of access (McIntyre, Saliba, & Moran, 2015; McIntyre, Saliba, Wiener, et al., 2015; McIntyre et al., 2019). The core dilemma of perceived lack of control inherent to anxiety symptomatology may intensify the importance of control beliefs (Barlow, 2015).

Symptom severity has consistently predicted the intention to use herbal supplements, which pertains to belief content as aversion to risk and uncertainty increases with symptom severity and reinforces attempts to self-treat with interventions deemed safest based on perceived attributes (Bystritsky et al., 2012; McIntyre, Saliba, & Moran, 2015; McIntyre, Saliba, Wiener, et al., 2015; McIntyre et al., 2016; McIntyre et al., 2019; Ravven et al., 2011). Naturalness is an attribute that herbal CAM users with anxiety have associated with effectiveness and safety, particularly in the context of experiences such as dissatisfaction with conventional medical encounters that function as push factors (McIntyre, Saliba, & Moran, 2015; McIntyre, Saliba, Wiener, et al., 2015). It is possible that push factors influence risk-benefit evaluations of conventional treatment and perceptions of illness manageability. These factors should be considered considering the aforementioned factors of symptom severity as well as control beliefs.

Subjective norms related to social approval are less predictive of the intent to use herbal CAM for anxiety, which is consistent with the clinical hypothesis that anxiety results in preoccupation with a subjective state (Barlow, 2016; McIntyre et al., 2019). However, subjective norms based in familial traditions or behavioral precedent in one’s



social group may be a source of influence warranting further investigation (Welz et al., 2019).

### **Common-Sense Model of Self-Regulation**

The *Self-Regulatory Model of Illness* (SRMI), currently termed the *Common-Sense Model of Self-Regulation* (CSM), was selected to organize factors related to CAM usage for generalized anxiety (Leventhal et al., 1992; Leventhal et al., 2016). This model assumes that consumers using self-directed medical approaches to treatment employ identifiable, predictable cognitive-behavioral processes in deciding their response to a perceived threat to their health. The CSM presents an accommodating framework for the primary mechanisms of generalized anxiety as its focal points of self-regulation and managing unpredictability are important to those with anxiety disorders (Barlow, 2016).

In the CSM, self-regulatory processes are triggered by experiential and contextual cues such as mass media, the opinions of others, or atypical somatic events (Leventhal et al., 2016). Contextual cues have a reciprocal relationship with personal norms (i.e., prototypes; Schwartz, 1977) as well as mental representations of illness and treatment. In the CSM, prototypes of one's functioning (i.e., "being healthy" or "being sick") are made through identity (e.g., labels such as healthy, sick, able, disabled, etc.), a timeline (e.g., time of onset, duration, and decline for health status), consequences (i.e., potential or actual outcomes), causes (i.e., what conditions, internal or external, create health status), and control (i.e., self-efficacy as well as control of others over health or illness).

The same influential factors apply to representations of illness and treatment. For anxiety, a representation of illness will consist of a label (e.g., anxiety, worry, nerves, etc.), timelines, anticipated and actual outcomes, contributing causes, and perceptions of

control. Corresponding perceptions of a treatment like CBD would be mentally categorized according to what it is, expectancies for its effects, why it works, what it treats, and how manageable it is as a form of treatment for that individual. These perceptions frequently present as beliefs.

Finally, the CSM addresses behavior in the form of the action plan. Action plans are behavioral responses and related expectations linked to environmental cues, prototypes, mental models for illness and treatment, and broader subjective norms for health status. Action plans include strategies for potential, current, and ongoing concerns in the form of behavioral initiation as well as maintenance. This is pertinent to CAM and anxiety in terms of responses to cognitive-affective events as well as behaviors that change how anxiety is experienced (e.g., avoidance-based coping strategies; Cameron, 2003). Per Cameron, anxiety bears a bidirectional relationship in the CSM with information processing and environment. This corresponds with existing hypotheses on the synergetic relationships of context cues, fear, cognitive processing, and both affective and behavioral responses in anxiety (Barlow, 2016; Cameron, 2003).

CSM components have multiple levels (i.e., behavioral, perceptual, and actual) that can all influence how each one is managed. Therefore, the model is non-linear in nature, not requiring specific degrees of influence or a procedural process for treatment belief formation. In the context of the current study, several factors (i.e., demographic variables, symptom severity, experiences with CAM, beliefs about illness and treatment, perceptions of control) have exhibited varying degrees of reciprocal influence in prior research on the decision to use CAM (Bishop et al., 2006; McIntyre et al., 2019; Ravven et al., 2011). The CSM is appropriate for understanding these factors as multifaceted,

dynamic influences on the decision to use an herbal form of CAM as a means of self-regulation. It has previously been applied to studies of CAM users, though the literature on these applications is limited in volume (Bishop et al., 2005, 2006, 2008; Usher et al., 2015).

### CHAPTER 3: METHOD

The purpose of the current study was to assess for potential differences in CAM-related treatment beliefs for cannabidiol-using adults residing in the United States who endorsed symptoms of generalized anxiety disorder as defined by the criteria set forth in the *DSM-5*. A cross-sectional, between-groups design was used with an anonymous self-selecting sample according to CBD use status to obtain quasi-experimental and observational data on these groups. The online survey in this study utilized mixed methods as both existing quantitative scales and an exploratory question were presented. An adapted form of the Complementary and Alternative Medicine Beliefs Inventory (CAMBI; Bishop et al., 2005) measured treatment beliefs through a 17-item questionnaire via a 7-point Likert scale to assess the level of endorsement for CAM-related treatment beliefs in natural treatments, participation in treatment, and holistic models of health. The Holistic Complementary and Alternative Medicine Questionnaire (HCAMQ; Hyland et al., 2003) was used to measure beliefs about the scientific validity of CAM through an 11-item questionnaire on a 6-point Likert scale. Respondents answered dichotomous questions about the legal status of all drugs as well as non-prescription recreational use of cannabis. An exploratory question inquired about beliefs respondents had about CBD being a cannabis derivative.

#### Participants

Participants recruited for this study were adults (i.e., 18 years of age or older) residing in the United States who endorsed symptoms of generalized anxiety disorder. Out of 330 respondents, 180 participants were acquired. The participant group was near

equally divided for user and non-user groups. Demographics for participants have been described in the results.

### **Inclusion and Exclusion Criteria**

Eligible participants were 18 years of age or older and endorsed anxiety symptomatology. Participants who endorsed THC and/or cannabis use in addition to CBD were included in the user group. Adults who endorsed using CBD for conditions other than GAD were included. Respondents who did not complete the survey or appeared to be invalid responders (e.g., spammers, random responders, repeat responders) were excluded. Respondents endorsing ages below 18 years were excluded. Respondents under 18 years of age presented concerns potentially unique to their age, such as neurodevelopmental differences or attitudes that are markedly dissimilar from adults, which may have significantly influenced study results. Individuals who endorsed neither lifetime prevalence nor current experiences of generalized anxiety symptoms were excluded from the study.

### **Screening and Recruitment**

Participants self-selected into the study by clicking through a hyperlink to an online survey promoted on social networks (i.e., specific forums related to surveys or CBD on Facebook user groups and subreddits) or electing to participate based on recommendations from their own social network sources. Information about the study was posted on Facebook via content-relevant user groups. Screening occurred automatically within REDCap in the form of initial questions about the age and country of residence for the participant. Participants were asked a dichotomous question regarding lifetime prevalence for generalized anxiety at the start of the survey.

Respondents who answered “no” to this question and failed to endorse generalized anxiety on the Generalized Anxiety Disorder Scale 7 (GAD-7; Spitzer et al., 2006) were not included in study.

### **Measures**

All reported demographic data and survey responses were captured and organized in REDCap.

#### **Generalized Anxiety Disorder Scale 7**

The GAD-7 (Spitzer et al., 2006) is a screening tool used to detect symptoms of generalized anxiety disorder (GAD) based on self-reported symptoms from the past two weeks. Its seven criteria are based on primary symptoms of GAD as defined by the *DSM-5* (American Psychiatric Association, 2013). These symptoms are presented on 4-point Likert scales ranging from 0 (*not at all*) to 3 (*nearly every day*) and indicators of symptom severity. Severity is considered in the form of mild (5-9 points), moderate (10-14 points), and severe (15 or more points) ranges. Scores above 10 points are clinically significant and warrant additional follow-up with a clinician. The GAD-7 has demonstrated good internal reliability ( $\alpha = .92$ ) as well as test-retest ( $r = .83$ ) reliability. Its developers established criterion and construct validity in the form of professional judgments, convergent and divergent measures of psychopathology, as well as functional outcomes (e.g., level of healthcare service utilization; Spitzer et al., 2006). The GAD-7 is externally valid overall, though it may undervalue symptom severity in specific groups (Parkerson et al., 2015).

**The Holistic Complementary and Alternative Medicine Questionnaire**

The HCAMQ (Hyland et al., 2003) was developed based on groups of British conventional medicine users and CAM users. It uses a 6-point Likert scale from 1 (*strongly disagree*) to 6 (*strongly agree*) to assess the overall strength of pro-CAM beliefs in two areas. It was selected for use as its items on scientific validity capture beliefs associated with CAM use not captured by the CAMBI. Overall high scores have been significantly associated with lower age, increased natural product use, and decreased use of conventional painkillers. It possesses two subscales representing beliefs in the validity of CAM and holistic health, respectively. Internal reliability was established for the overall scale ( $\alpha = .80$ ), the validity subscale ( $\alpha = .83$ ), and the holistic health subscale ( $\alpha = .75$ ). Significant group differences on the holistic health subscale were not detected, nor was this subscale predictive of trends in antibiotic use as a form of conventional medicine (Hyland et al., 2003). The construct validity of the measure has been questioned as it may be significantly improved by eliminating two positively worded items and reordering the remaining items into two subscales: beliefs about CAM and holistic health (Kersten et al., 2011). There have been mixed findings regarding the measure's generalizability in a limited number of diverse populations (Fortier et al., 2014; Ganasegeran et al., 2014; Izgu & Gok Metin, 2020).

**Complementary and Alternative Medicine Beliefs Inventory**

The CAMBI (Bishop et al., 2005) is a scaled measure of the strength of treatment beliefs related to CAM normed on British CAM users. In the context of the current study, it was used to assess the categorical content and relative strength of pro-CAM treatment beliefs in an unstudied population (i.e., individuals using CBD for generalized anxiety). The

CAMBI uses a 7-point Likert scale for 17 items on three subscales pertaining to treatment beliefs and CAM. The subscales pertain to categories of treatment beliefs for CAM users (i.e., natural treatments, holistic models of health, and participation in treatment) and each subscale has either five (i.e., participation in treatment) or six (i.e., natural treatments, holistic health) items. Ratings range from 1 (*strongly disagree*) through 4 (*neither agree nor disagree*) and ending at 7 (*strongly agree*). Items with anti-CAM content are reverse scored, and increased scores on the items indicate greater endorsements for pro-CAM treatment beliefs associated with use.

Information on the reliability and validity of the CAMBI primarily comes from the initial results published by its developers (Bishop et al., 2005). Internal reliability for the distinct subscales of natural treatments ( $\alpha = 0.75$ ), holistic health ( $\alpha = 0.73$ ), and participation in treatment ( $\alpha = 0.68$ ) pose concerns with the acceptability of the latter subscale and the results of these scales may be interpreted with caution. The internal consistency of the overall measure was acceptable ( $\alpha = 0.81$ ). Criterion validity for the CAMBI was established through positive and significant intercorrelations between scores on the CAMBI and reported CAM use ( $\rho = .39$ ) as well as the three subscales, holistic health correlating most strongly ( $\rho = .47$ ). Convergent construct validity was established through correlations between the CAMBI and HCAMQ ( $\rho = -.55$ ). External validity has been generally established in diverse patient and practitioner populations (Brewer et al., 2019; Goldstein et al., 2015; Kuo et al., 2018) except for older adults in the United States (Grzywacz et al., 2013).



### Procedures

This study was conducted by a doctoral-level student in a clinical psychology program based in the Eastern U.S. near a major city. Participants who followed the hyperlink for the initial phase of the study were presented with screening prompts for age, country of residence, and lifetime prevalence of core generalized anxiety symptoms (e.g., “feeling anxious or on edge”, “becoming easily annoyed/irritable”) in a survey hosted on REDCap. Respondents not over the age of 18 or residing outside of the United States were thanked for their interest and informed they were excluded from participation in the study. Those who met the age and location inclusion criteria were presented with a summary of the study’s purpose (i.e., to share their views on CBD and its applications). Following this review, respondents were presented with questions about initial demographic information (i.e., gender, age, ethnicity, state of residence, income, and educational levels). Respondents were asked if they had a confirmed diagnosis from a list of common conditions potentially associated with CBD use based on results from a prior cross-sectional online survey and national consumer survey of CBD users (Corroon & Phillips, 2018; Gallup, 2019).

Questions were asked regarding current and/or prior use of CBD and behavioral trends for personal use of CBD (i.e., route of administration, dosage, frequency, progression of use, concurrent or primary use of cannabis). Equivalent questions were asked about participants’ past and present trends for THC use. Respondents were presented with the GAD-7, HCAMQ, and CAMBI questions in electronic format through REDCap. Radio buttons were used for the ratings on the Likert scales, and both drop-down and check boxes were implemented where possible for demographic data.

Participants had the option to answer two dichotomous yes-no prompts regarding the legal status of recreational use of substances (i.e., “In my opinion, the personal use of all drugs should be legal in the United States”; “In my opinion, the personal use of cannabis without a prescription should be legal in the United States”). An open-ended text response box was used for the exploratory question (i.e., “In your opinion, what are some pluses and minuses about CBD being a cannabis-based product?”) with a 500-character limit.

Respondents had the option to enter a \$50 gift-card drawing from a selection of major vendors (i.e., eBay, Amazon, Starbucks) by clicking through to a separate survey not linked to the primary survey. They were asked to input their name and e-mail address. This was done to help ensure participant privacy by separating the data of a respondent from their identifiable entry into the drawing. Data were coded, stored, and protected through the same program and analyzed in SPSS (for quantitative data) and ATLAS-ti (for qualitative prompt) software.

### **Statistical and Data Analyses**

Multiple forms of analysis were used for the cross-sectional, mixed-methods study. Descriptive statistics were used to characterize the study sample. Mean differences, standard deviations, and percentages related to demographic characteristics, overall scores, and subscales of each measure were presented. Collected characteristics included mean age, ethnicity, gender, income level, educational level, state of residence, current and/or historic endorsement of generalized anxiety, current and/or prior cannabidiol (CBD) use, current and/or prior cannabis use, current and/or prior other forms of CAM use, and methods of use (i.e., for CBD and cannabis). Percentages were

calculated for response frequencies on prompts about legalization for recreational cannabis and all drug use in the United States.

Chi-square and independent samples *t*-tests were performed to assess for significant differences between groups for demographic characteristics (i.e., age, gender, level of education) as well as anxiety symptom severity as rated on the GAD-7. For Hypotheses I, II, III, and IV, independent samples *t*-tests were used to examine whether significant mean differences in scores on relevant subscales of the CAMBI and HCAMQ existed between CBD and non-CBD user groups in the sample. These tests were performed to examine the relationship between endorsements of CBD use for anxiety and CAM-related treatment beliefs. Assumptions associated with the use of the independent samples *t*-test that were evaluated included normality, homogeneity of variances, and independence of groups and observations. Descriptive statistics (i.e., mean, standard deviation, kurtosis, skewness) were reviewed to assess for normality in addition to Kolmogorov-Smirnov and Shapiro-Wilk values. Homogeneity of variances were tested via Levene's test for equality of variance. Independence was established through screening questions to distinguish the data of CBD users from non-CBD users. Histograms and boxplots facilitated the identification of extreme scores in the dataset.

An open-ended qualitative prompt was used to gather belief content intended to represent answers to the exploratory question regarding positive and negative perceptions of the relationship between cannabis and CBD in different CBD user groups. Answers to this question were exported into a text document. This content was subject to thematic analysis (i.e., data reviewed, codes generated, subthemes assessed and defined for overall

themes of “advantages” and “disadvantages”) based on Braun and Clark’s guidelines (2006), as well as visualized using ATLAS.ti software.

### **Power Analysis**

Differences for CBD user and non-CBD user group means on a two-tailed independent measures *t*-test were assessed via post hoc power analysis. The analysis was performed in G\*Power assuming a 95% confidence interval with a 5% margin of error (Faul, et al., 2007). Means and standard deviations for CBD and non-CBD users on the Natural Treatments subscale of the CAMBI were entered given the significance of the results of this hypothesis for the overall study and absence of a priori data for reference. With these data, an effect size of  $d = 0.47$  was determined. Statistical power exceeding 80% was achieved based on the values established above.

## CHAPTER 4: RESULTS

### Participants

All participant recruitment took place online during July 2021. In total, 180 of 330 responses to the survey were complete and subsequently included in analyses. Of the 180 included participants, the majority identified as male (82.1%) and over half identified as White (55.6%). The mean participant age was 30.8 years old ( $SD = 6.9$ ). Most participants had college-level degrees and reported annual earnings between \$25,000 and \$100,000. The most reported comorbidities were sleep disorders (43.9%), depression (42.8%), and chronic pain (38.3%). Substances most endorsed on a prompt regarding active use by participants were cannabis (42.2%), alcohol (37.8%), and caffeine (34.4%). Participant characteristics are in Tables 1 and 2.

For analyses, participants were divided into subgroups based on their responses to questions about their CBD use. Those who never tried or tried but do not use CBD were categorized as non-users. All other responders were categorized as CBD users. CBD users ( $n = 94$ ) did not significantly differ from non-users ( $n = 85$ , 1 participant CBD status unknown) by age,  $t = -0.032$ ,  $p = .74$ . User and non-user groups did not differ significantly by gender,  $\chi^2 = .12$ ,  $p = 0.73$ , or education level (i.e., GED/high school diploma and above versus lower levels),  $\chi^2 = 3.22$ ,  $p = 0.07$ . Participant age did not significantly relate to any of the four study outcome scales,  $p > 0.05$  for all.

**Table 1***Sociodemographic Characteristics of Survey Respondents (N = 180)*

Variable	<i>n</i>	%
Age (years)	135	75
Identified gender		
Male	147	82.1
Female	32	17.9
Third gender or non-binary	--	--
Race or ethnicity		
Alaskan native or native American	14	7.8
Asian or pacific islander	34	18.9
Black or African American	25	13.9
Caucasian or White	100	55.6
Hispanic or Latinx	11	6.1
Multiracial	--	--
Other ethnicity not listed	--	--
Highest level of education		
No formal education	4	2.3
Formal education without high school diploma or GED	12	6.9
High school diploma or GED	56	32.2
Technical or associate's degree	39	22.4
Bachelor's degree	52	29.9
Master's degree	10	5.6
Doctorate	1	0.6
Annual income		
None	1	0.6
Less than \$25,000	11	6.2
\$25,000 to 49,999	51	28.8
\$50,000 to 74,999	65	36.7
\$75,000 to 99,999	40	22.6
\$100,000 to 149,999	7	4.0
\$150,000 or greater	2	1.1
Residential region		
Midwest	15	9
Northeast	38	21
South	46	26
West	79	44

*Note.* Missing values were recorded for age ( $n = 45$ ), gender ( $n = 1$ ), highest level of education ( $n = 6$ ), annual income ( $n = 3$ ), and residential region ( $n = 2$ ) as responses were optional for these questions.

**Table 2***Comorbidities and Current Substance Use in Survey Respondents (N = 180)*

Variable	N	%
<b>Comorbidities <sup>a</sup></b>		
Depression	77	42.8
Chronic pain	69	38.3
Gastrointestinal disorder(s)	50	27.8
Thyroid disorder(s)	24	13.3
Sleep disorder(s)	79	43.9
None of these apply to me	15	8.3
<b>Actively used substances <sup>a</sup></b>		
Alcohol	68	37.8
Amphetamines	21	11.7
Caffeine	62	34.4
Cannabis	76	42.2
Cocaine	32	17.8
Crack	10	5.6
Ecstasy or molly	14	7.8
Fentanyl	5	2.8
Hallucinogens	12	6.7
Inhalants	13	7.2
Heroin	6	3.3
Methamphetamine	4	2.2
Oxycontin	2	1.1
PCP	--	--
Tobacco or nicotine vape	49	27.2
Xanax	2	1.1
Other	1	0.6

<sup>a</sup> Percentages were based on the overall number of participants, not the number of responses, as participants could select more than one response.

### **THC and CBD Product Use**

Approximately 44% of participants reported either trying but not currently using, or never using THC (Table 3). Eighty-five participants reported never trying or trying and not using CBD products (Table 4). Oral consumption and smoking or vaping were the most common methods of use for both THC and CBD. Most THC-using participants endorsed less than 7 grams of THC per use and no more than 10 milliliters for liquid products. Nearly all CBD users endorsed less than 500 milligrams per use. About 78% reported no change in the amount of THC and/or CBD used over time.



**Table 3***THC Use in Survey Respondents (N = 180)*

Variable	N	%
Frequency of THC use		
Never	41	22.8
Tried but don't use	39	21.7
Less than once a month	21	11.7
1-3 times per month	23	12.8
Once a week	25	13.9
1-6 days per week	20	11.1
Daily	8	4.4
Multiple times per day	3	1.7
Method of THC use <sup>a</sup>		
Topical oil/lotion/cream	1	0.6
Oral edibles	38	21.1
Oral pills/supplements	41	22.8
Oral drops or oil	29	16.1
Smoke with tobacco	34	18.9
Smoke without tobacco	13	7.2
Vape	5	2.8
Amount of THC per use		
Less than 1 gram	4	2.2
Approximately 1 gram	20	11.1
Approximately 3-4 grams	42	23.3
7 grams	35	19.4
14 grams	10	5.6
28 grams	--	--
Over 28 grams	--	--
Amount of liquid THC per use <sup>a</sup>		
1 to 10 milliliters	36	64.3
11 to 30 milliliters	9	16.1
31 to 50 milliliters	8	14.2
51 to 70 milliliters	2	3.6
71 to 90 milliliters	--	--
91 to 100 milliliters	1	1.8
Endorsed change in THC amount used <sup>b</sup>		
Yes	38	21.3
No	140	78.7

<sup>a</sup> Percentages were based on the overall number of participants, not the number of responses, as participants could select more than one response.

<sup>b</sup> Missing values were recorded for amount of THC used ( $n = 2$ ) as responses were optional.

**Table 4***CBD Use in Survey Respondents (N = 180)*

Variable	N	%
Frequency of CBD use		
Never	41	22.9
Tried but don't use	44	24.6
Less than once a month	19	10.6
1-3 times per month	25	14.0
Once a week	14	7.8
1-6 days per week	24	13.4
Daily	10	5.6
Multiple times per day	2	1.1
Method of CBD use		
Topical oil/lotion/cream	2	1.1
Oral edibles	42	23.3
Oral pills/supplements	40	22.2
Oral drops or oil	26	14.4
Vape	24	13.3
Amount of CBD per use		
1 to 100 milligrams	13	7.2
101 to 200 milligrams	27	15.0
201 to 300 milligrams	28	15.6
301 to 500 milligrams	26	14.4
501 to 1000 milligrams	4	2.2
Over 1000 milligrams	2	1.1
Don't know	--	--
Endorsed change in CBD amount used		
Yes	39	21.7
No	141	78.3
Frequency of CBD use		
Never	41	22.9
Tried but don't use	44	24.6
Less than once a month	19	10.6
1-3 times per month	25	14.0
Once a week	14	7.8
1-6 days per week	24	13.4
Daily	10	5.6
Multiple times per day	2	1.1

*Note.* Missing value was recorded for frequency of CBD use ( $n = 1$ ) as responses were optional.

Percentages for the method and amount of CBD use were based on the overall number of participants, not the number of responses, as participants could select more than one response.

### Anxiety Severity

Participants endorsed a full range of scores on the Generalized Anxiety Disorder-7 (GAD-7) Scale, with a minimum score of 0 and maximum score of 21. The mean participant score on the measure was 9.2 ( $SD = 4.4$ ), which falls between the Mild to Moderate anxiety level range (Table 5). CBD users ( $n = 94$ ) reported significantly greater GAD scores ( $M = 11.01$ ,  $SD = 3.36$ ) compared to non-users ( $n = 85$ ,  $M = 7.38$ ,  $SD = 4.60$ ),  $t(177) = -6.08$ ,  $p < .001$ . T-test results were confirmed to be significant with a Mann-Whitney  $U$  test,  $p < .001$ .

**Table 5**

*Mean Generalized Anxiety Disorder-7 Responses (N = 180)*

Scale	<i>M</i>	<i>SD</i>
GAD-7	9.24	4.41

### Opinions about Substance Use Legalization in the United States

Most participants endorsed support of both the legalization of all drugs ( $n = 132$ ) and cannabis ( $n = 129$ ) for personal use in the United States (Table 6).

**Table 6**

*Frequencies for Beliefs about Legal Status of Substances in the United States (N = 180)*

Beliefs	<i>n</i>	%
Personal use of all drugs		
Legalize	132	74.2
Do not legalize	46	25.8
Recreational use of cannabis		
Legalize	129	72.5
Do not legalize	49	27.5

*Note.* Missing values were recorded for the first ( $n = 2$ ) and second prompt ( $n = 2$ ) as responses were optional for both questions.

### Outcomes and Assumptions

Prior to conducting independent samples *t*-tests (CBD versus non-CBD users), assumptions were assessed. Analyses indicated that outcome variables significantly deviated from a normal distribution (Table 7).

**Table 7**

*Tests of Normality for the Complementary and Alternative Medicine Beliefs Inventory and Holistic Complementary and Alternative Medicine Questionnaire*

Subscale	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	<i>df</i>	Sig.	Statistic	<i>df</i>	Sig.
<b>CAMBI</b>						
Holistic Health	.114	122	.001	.956	122	.000
Natural Treatments	.100	122	.005	.978	122	.043
Participation in Treatment	.141	122	.000	.848	122	.000
<b>HCAMQ</b>						
Scientific Validity	.101	180	.000	.957	180	.000

Due to deviation from a normal distribution for resulting data, significant findings from parametric tests were confirmed by utilizing a nonparametric Mann-Whitney *U* test. On the Holistic Health subscale of the CAMBI, most participants endorsed scores between 15 and 25 with a maximum possible score of 35 ( $M = 20.23$ ,  $SD = 2.86$ ). The average score for all participants who completed the Natural Treatments subscale was approximately 23 out of a maximum possible score of 42. Across participants who completed the subscale of Participation in Treatment, the average score was approximately 16 out of a maximum possible score of 35. Most participants endorsed scores between 20 and 25 with a maximum possible score of 36 ( $M = 22.23$ ,  $SD = 2.38$ ) on the Scientific Validity subscale of the HCAMQ. Respective means and standard deviations for these scales are listed in Table 8.

**Table 8**

*Mean Scores for the Complementary and Alternative Medicine Beliefs Inventory and Holistic Complementary and Alternative Medicine Questionnaire (N = 180)*

Subscale	<i>M</i>	<i>SD</i>
<b>CAMBI</b>		
Holistic Health	20.99	3.38
Natural Treatments	25.27	5.65
Participation in Treatment	16.09	2.38
<b>HCAMQ</b>		
Scientific Validity	22.23	2.38

*Note.* Missing values were recorded for participant responses to the Holistic Health ( $n = 30$ ) and Participation in Treatment ( $n = 51$ ) subscales.

### **Hypothesis I**

The primary hypothesis that CBD users would endorse significantly stronger beliefs in the scientific validity of CAM as compared with non-users was not supported as CBD users did not endorse significantly higher scores on the Scientific Validity subscale as compared with non-CBD users,  $t(150.61) = 1.70, p = .091$ , Table 9.

**Table 9**

*Subscale Score Differences by User Group*

Subscale	CBD users		Non-users		<i>df</i>	<i>t</i>	<i>P</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
<b>CAMBI</b>							
Holistic Health	21.06	3.29	20.92	3.48	148	-0.26	.792
Natural Treatments	26.45	4.56	23.83	6.31	151.57	3.15	.001
Participation in Treatment	16.11	2.07	16.06	2.71	127	-0.11	.907
<b>HCAMQ</b>							
Scientific Validity	21.96	1.94	22.57	2.72	150.61	1.70	.091

*Note.* Equal variances were assumed for analyses of Holistic Health and Participation in Treatment data.

**Hypothesis II**

The second hypothesis, that CBD users would report stronger beliefs in the importance of holistic properties of CAM than non-users was not supported. Specifically, no significant difference in scores between CBD-user and non-user groups was found on ratings of Holistic Health,  $t(148) = -0.26, p = .792$ , Table 9.

**Hypothesis III**

The hypothesis that CBD users would hold stronger beliefs in favor of natural treatment than non-users was supported in the anticipated direction. There was a significant difference in scores between CBD using ( $M = 26.45, SD = 4.56$ ) and non-using ( $M = 23.83, SD = 6.31$ ) groups on ratings of Natural Treatments,  $t(151.57) = 3.15, p = .002$ , Table 9. A subsequent Mann-Whitney  $U$  test confirmed that these results were significant,  $p = .001$ .

**Hypothesis IV**

The final hypothesis that CBD users would endorse stronger beliefs than non-users in the importance of being actively involved in their treatment was not supported as no significant difference in scores on the Participation in Treatment subscale was found between groups,  $t(127) = -0.11, p = .907$ , Table 9.

**Beliefs about Relationship to Cannabis**

In total, 70 independent responses to the open-ended question at the end of the survey were identified and exported into a text file. This file was imported into ATLAS.ti software for thematic analysis. After labeling words and phrases associated with common concepts found in prior research on beliefs about CAM, data were placed into conceptual groups. Thematic groups and frequencies are listed in Table 10.

**Table 10***Content from Respondent Beliefs about Cannabidiol being a Cannabis Derivative*

Subthemes	Example quote	<i>N</i>	%
Advantages			
Accessible	“You can buy CBD ... legally” “Can be used internally and externally” “Convenient”	6	8.6
Effective/Efficacious	“Effective in treating anxiety” “Can be used medically” “Therapeutic”	53	75.7
Natural	“It’s 100% natural” “It’s natural”	3	4.3
Safe	“No hallucinogenic effect” “Non-addictive”	11	15.7
Disadvantages			
Costly	“Expensive” “Not easy to buy” “Not easy to purchase”	4	5.7
Harmful	“Significant side effects” “Addictive” “Creates dependence” “Hurts appetite”	45	64.3
Illicit association	“Compounds from cannabis can cause intoxication” “Negatively associated in society with illegal use” “People think I’m getting high”	5	7.1
No Difference	“I don’t think they are fundamentally different”	1	1.4

*Note.* The full text of the open-ended prompt was, “In your opinion, what are some pluses and minuses about CBD being a cannabis-based product?”.

## CHAPTER 5: DISCUSSION

This study compared CAM-related treatment beliefs in individuals experiencing generalized anxiety who engaged in or denied CBD use. Existing data suggest that American adults have increased use of herbal supplements such as cannabidiol (CBD) for anxiety despite safety warnings and possible adverse effects (Brown & Winterstein, 2019; USFDA, 2020a, 2020b). Treatment-related beliefs concerning complementary and alternative medicine (CAM) may motivate CBD use in this population. Researchers have previously hypothesized that access, control, and satisfaction with treatment motivate individuals with anxiety to use herbal forms of CAM (McIntyre, Sarris, & Moran, 2015; McIntyre, Sarris, Wiener, et al., 2015). The purpose of this study was to gain a better understanding of the similarities and discrepancies between treatment-related beliefs in CBD users relative to non-users with anxiety.

Demographically, CBD users in this study were comparable to non-users in terms of their level of education, gender, and age. CBD users reported significantly higher clinical ratings of generalized anxiety symptoms than non-users. Most CBD users reported oral use or smoking for routes of administration. Overall, participants from both user groups reported support for the legalization of recreational cannabis and other substance use in the United States. Based on prior studies of herbal medicine and general CAM users, multiple hypotheses regarding the strength of beliefs potentially implicated in using a form of CAM as treatment were explored (Bishop et al., 2006; McIntyre, Sarris, Wiener, et al., 2015).

The first hypothesis of the study was that individuals who chose CBD in the treatment of generalized anxiety would endorse stronger beliefs in the scientific validity



of CAM as compared with non-CBD users. The results indicated that this hypothesis was not supported. The second and fourth hypotheses that beliefs regarding holistic properties of CAM and participation in one's own treatment would be stronger for CBD users than non-users were likewise not supported. The third hypothesis regarding CBD users having significantly stronger beliefs in the importance of natural treatment when compared with non-users was supported. Lastly, participants reported information about their beliefs about advantages and disadvantages of CBD being a cannabis derivative, as well as whether they endorsed the legalization of recreational cannabis and other substance use in the United States. This provided information about what concepts individuals who experience generalized anxiety associate with CBD and cannabis use.

### **Interpretation and Implications**

The trends for descriptive characteristics gathered in this study were partially consistent with previously reported demographics for individuals with anxiety and CAM users (American Psychiatric Association, 2013; Asnaani et al., 2010; Bandelow & Michaelis, 2015; Bishop et al., 2006; Committee on the Use of Complementary and Alternative Medicine by the American Public, 2005; Green et al., 2017; Upchurch & Rainisch, 2015). Specially, respondents were mostly White and middle-aged as anticipated, yet more participants identified as male and had lower reported annual income than expected. No characteristic-based distinctions were found between user and non-user groups. While CAM users may have sorted into either the CBD user or non-user group, these results are indicative of differences in demographic trends for individuals who self-treat anxiety with CBD in the United States as compared with general CAM users and those who experience anxiety. One interpretation of these findings is that CBD

users represent a specific subpopulation of CAM users that does not reflect an overall trend towards female herbal supplement users (McIntyre, Saliba, Wiener, et al., 2015), which could reflect greater number of male than female cannabis users in the United States (NASEM, 2017). This study's sample may have also been affected by the predominantly male demographic on Reddit forums observed in a national poll of social media users in the United States given that Facebook group users are predominantly female (Auxier & Anderson, 2021). In the context of the Common-Sense Model of Self-Regulation (CSM; Leventhal et al., 1992; Leventhal et al., 2016), gender identity and level of income may be influential factors in the choice to use CBD over other forms of CAM, though this claim requires further investigation. Healthcare professionals may wish to add specific questions about CBD use to patient questionnaires as CBD users may not consider themselves members of general CAM groups. Evidence that CBD users preferred to consume oral products or smoke may be valuable in practice as mental healthcare providers and general practitioners inquiring about CAM use can ask clarifying questions to help identify CBD users (e.g., if endorsing a positive history of smoking, ask about products used).

One result from the study merits comment, as CBD users endorsed significantly greater levels of generalized anxiety than non-users. In previous literature, symptom severity has predicted the intention to use herbal supplements, a trend speculated to stem from avoidance of interventions perceived as riskier in favor of self-administered options (Bystritsky et al., 2012; McIntyre, Saliba, & Moran, 2015; McIntyre, Saliba, Wiener, et al., 2015; McIntyre et al., 2016; McIntyre et al., 2019; Ravven et al., 2011). The CSM may account for this finding as indicative of weaker control beliefs or stronger prototypes

for perceptions of personal illness. This suggests that at the level of behavior, CBD users with anxiety may seek ways to manage symptoms by external means (i.e., by taking a form of tangible treatment they may attribute control over their well-being to, as opposed to modifying cognitions of self or symptoms). Mental healthcare providers may incorporate this finding into their practice by addressing avoidance-based behaviors, given that anxiety symptoms may be functionally reinforced by them, and that addressing perceptions of self-efficacy may facilitate symptom relief.

Past researchers have found that CAM users are more concerned with pull factors such as treatment being holistic, a desire to participate in treatment, accessibility of interventions, and perceived effectiveness than non-users (Bishop et al., 2006, 2007; Vincent & Furnham, 1996). The present study showed that a subpopulation of CAM users who use CBD may place greater relative importance on the pull factor of choosing natural treatment interventions as compared with other motivations to use CAM. However, concepts affiliated with other factors were present throughout free responses entered by participants (e.g., accessibility, effectiveness), suggesting relevant beliefs were perhaps present but not captured by the structured measures used. As expected, push factors were rarely identified in the responses to the open-ended prompt asking for advantages and disadvantages of CBD's relationship to cannabis as consistent with previous literature on pro-CAM beliefs and herbal supplement users (Bishop et al., 2006, 2007; Welz et al., 2019).

The results of this research provide supporting evidence that the pull factor of perceived "naturalness" may be a source of influence in forming the intent to use CBD to treat anxiety for CBD users. Participants in this study expressed belief content suggesting

that accessibility and effectiveness may be assumed attributes for CBD for individuals experiencing anxiety. Individuals who experience anxiety and have beliefs related to controlling their own health are more likely to use herbal CAM, meaning that belief content expressed in the current study was consistent with previous findings about herbal CAM users self-treating anxiety (McIntyre, Saliba, & Moran, 2015; McIntyre, Saliba, Wiener, et al., 2015; McIntyre et al., 2019). Interestingly, herbal CAM users connotated naturalness with effectiveness and safety in prior research, and these attributes were frequently referred to by respondents in response to the final question of the study (McIntyre, Saliba, & Moran, 2015; McIntyre, Saliba, Wiener, et al., 2015). Definitions of these attributes may be shaped by dissatisfying encounters with traditional medicine. Though participation in treatment was not valued more strongly by CBD users than non-users in the current study, push factors may have latently influenced appraisals of risk and benefits of conventional medicine. Higher ratings for anxiety symptoms may have also been related to perceptions that conventional forms of treatment were previously ineffective, though the results of the current study did not establish this directly. The finding that most participants supported legalization of recreational use of cannabis without a prescription implied a corresponding preference for uncontrolled, self-administered use of cannabis products.

The CSM accounts for belief content endorsed by participants as a reciprocal influence on the decision to use CBD (Leventhal et al., 1992; Leventhal et al., 2016). Representations of treatment are based on defining what the treatment is or is not, probabilities of what it will or will not do as a treatment, attributions of what causes it to work and under what conditions, and how well the individual can control its use. Bearing

in mind their higher anxiety symptom severity ratings, descriptive characteristics, and reported use behaviors, CBD users in this study may have determined that as a natural product CBD is safe, effective, complementary to conventional medicine, and highly controllable. By using it more frequently, use behavior may strengthen assumptions that CBD use is essential to processes of self-regulation. For healthcare professionals interacting with CBD users, incorporating these findings into practice might involve conversations about treatments that users may perceive as natural, easy to access, safe, and effective from a list of complementary approaches that enhance processes of self-regulation (e.g., somatic awareness exercises).

### **Strengths and Limitations**

Strengths of this study are its addition to a limited body of literature and novel investigation regarding the treatment-related beliefs of those who use CBD as a form of CAM. The qualitative prompt used in the study captured the perceptions of individuals who have experienced generalized anxiety on the topic of CBD being a cannabis-derived product, which informs both CBD and cannabis-focused research in the form of thematic content on this topic. CBD users represent an increasing yet understudied population that remains undefined in terms of descriptive characteristics, which were obtained in the present study. Their similarities to previously studied CAM user groups contribute to the general study of CAM users. Their differences further questions about whether CBD is a form of CAM, and why their belief content may vary. Using the framework of CAM to understand trends of use for a specific product (i.e., CBD) for generalized anxiety provided existing measures, factor structures, models, and data that may be applied to

ongoing explorations of CBD use. This information can be used to inform how CBD users are categorized in future studies of their beliefs and use behaviors.

The present study had multiple limitations. The use of a cross-sectional and single-phase online design did not allow for comparative conditions (e.g., pre- and post-CBD use phases) or follow-up questioning, rendering the results exploratory and descriptive. Participants self-selected into the study and thus the participant selection could not be randomized. The questionnaires used were designed to target general users or non-users of CAM and had not been previously used in groups of CBD or cannabis users. Additionally, the predominantly male sample identified in this study is not reflective of the anticipated female demographic previously linked to intent to use herbal CAM for anxiety (McIntyre, Saliba, Wiener, et al., 2015). Due to these factors, the generalizability of the sample used in this study to the general population remains uncertain. Use of other forms of CAM in comparison groups was not accounted for that may have influenced reported belief content for non-CBD users. All data were collected through self-report without a secondary means of corroborating reported statuses due to the anonymized online design, rendering results vulnerable to issues such as response bias. Quality control of the CBD or THC cannabis products being used by participants could not be assessed as respondents reported on their private use of commercially available products with varying standards for purity.

### **Future Directions**

Increased interest in and reported use of supplement-based complementary and alternative medicine (CAM) such as cannabidiol (CBD) for adults in the United States have not been matched by an increase in general research on what CBD users know and

believe about mental health and treatment. Identifying potential predictors and maintaining factors for CBD use through other forms of research may contribute to an evidentiary base of information for consumers and providers. Human trials involving CBD use, particularly multiphase studies, would also better establish its safety profile and potentially anxiolytic actions. Studies employing larger, more diverse samples may also enhance the state of research regarding CBD.

The results of the present study may be advanced through inquiries about what participants use in terms of conventional treatments for anxiety symptoms such as forms of psychotherapy and prescribed medications used in conjunction with forms of complementary medicine. Exploring this topic further serves to inform our knowledge of how experiences with conventional medicine affect the decision to use CBD. An analysis of data like those collected for the present study may reveal differences in cannabis-associated belief content by user group. Qualitative interviews with users and non-users may provide greater detail about how individuals with generalized anxiety obtain information, their perceptions of CBD as a form of conventional medicine or CAM, and what the construct of naturalness connotes.

An opportunity to enhance the evidentiary base for this study would be the qualitative development of scales specific to content of beliefs, attitudes, and experiences of CAM users seeking to treat generalized anxiety symptoms. Few existing measures of CAM-related beliefs and attitudes have been developed, and of these measures none specifically address users seeking to manage anxiety symptoms (McIntyre, Sarris, Wiener, et al., 2015). Moreover, existing tools seem to possess substantial developmental flaws (e.g., lacking a pilot phase, insufficient rationale for item content, lack of a

grounding theoretical model). Turning the focus of scale development towards the appraisal of cognitive styles and errors (e.g., logical errors derived from inaccurate sources of health literacy) as opposed to associational demographic variables has been proposed as a stronger predictor of CAM use (Lindeman, 2011). This has the potential to partially address issues of underutilization and underreporting in this population (Bandelow & Michaelis, 2015).

Although the results of the present study call for further substantiation in future studies, the findings are indicative of opportunities to improve mental healthcare as well as general healthcare practice now through changing patient-provider dialogues. This research serves to start these conversations about the ambiguities of CBD use and user views about the importance of attributes like naturalness in treating anxiety in the absence of adequate evidence for its categorization as a form of conventional medicine.



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