PROBLEMATIC CANNABIS USE, ADVERSE CHILDHOOD EXPERIENCES, SELF-REGULATION, AND EMOTION-REGULATION IN TRADITIONAL-AGED COLLEGE STUDENTS DURING COVID-19

by
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(Under the Direction of Amanda Giordano)

ABSTRACT

Cannabis is the most prevalent federally illicit substance used on collegiate campuses with 44% of college students reporting annual cannabis use (CU) in 2020 compared to 38% in 2015, and 25% of college students reported using cannabis-based products in the past 30 days (Schulenberg et al., 2021). Daily CU also is on the rise. Specifically, in 2020, 8% of college students reported daily or near daily CU compared to nearly 5% in 2015 (Schulenberg et al., 2021). Negative outcomes related to CU include cannabis use disorders (CUDs; Hasin et al., 2016), respiratory issues, lower educational and career achievement, and greater risk of vehicular crashes (Carliner, 2017). Another concern related to chronic CU via the method of inhalation includes a higher probability to suffer an ischemic stroke (Thanvi & Treadwell, 2009). Specific neurological disorders associated with CU include cognitive dysfunction (attention, verbal, and nonverbal learning; Shrivastava et al., 2011) problems with behavioral sequelae (Sorkhou, 2021), difficulty with memory (National Institute on Drug Abuse; NIDA, 2019a), and alterations in the brain (Archie & Cucullo, 2019; Battistella et al., 2014). Other potential negative outcomes associated with CU include amotivational syndrome, and some scholars argue that CU is a "gateway" to harder drugs, which are defined as drugs that have the propensity to be highly addictive and can be injected (Kandel, 1975; Kandel et al., 2006; Secades-Villa et al., 2015). As such, it is important to examine predictors of CU, particularly among collegiate populations. Some previously identified predictors include self and emotion regulation as well as adverse childhood

experiences (ACEs) and poverty, yet these potential predictors have not been examined simultaneously. Therefore, the purpose of this study is to examine the extent to which ACEs, self-regulation (SR), emotion regulation (ER), and childhood poverty predict CU problems in traditional-aged college students. Additionally, the study aims to examine differences in CU methods, frequency, and social patterns of CU in traditional-aged college students from a timepoint before the COVID-19 pandemic compared to present day.

INDEX WORDS: PROBLEMATIC CANNABIS USE, ADVERSE CHILDHOOD EXPERIENCES, SELF-REGULATION, EMOTION-REGULATION, TRADITIONAL-AGED, COLLEGE STUDENTS, COVID-19

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EXAMINING CANNABIS USE, ADVERSE CHILDHOOD EXPERIENCES, SELF-REGULATION, AND EMOTION-REGULATION IN LOW-SES YOUNG ADULT COLLEGE STUDENTS

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DEDICATION

This dissertation is dedicated to my friends and family who have supported me throughout this process. I would especially like to thank my wife Amy for her unconditional love and support. I could not have accomplished this without you Amy!

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CHAPTER ONE

INTRODUCTION

The dried leaves of the *cannabis sativa* plant are known colloquially as marijuana (Leggett, 2006). The psychoactive chemicals found in marijuana act on the brain and can alter mood or consciousness (Stangor, 2014). As a drug of abuse, cannabis has several chemical compounds that can affect users; however, *tetrahydrocannabinol* (THC) is the primary chemical that causes the drug's psychological effects (Lafaye et al., 2017). Cannabis use (CU) is a prevalent and potentially problematic issue in today's society. Research based on the diagnostic criteria from the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association [APA], 2013) revealed that nearly 9% of individuals who use cannabis, and cannabis-related products, may meet the criteria to be diagnosed with a substance use disorder (SUD; Volkow et al., 2014). This potential risk is compounded by the fact that marijuana's THC potency has increased 8% between January 1, 1995, and December 31, 2014 due to the creation of stronger strands of cannabis in states that have legalized marijuana (ElSohly et al., 2016; Hopfer, 2014). The increase in THC likely has a major impact on the relationship between CU and mental health (Hines et al., 2020). Indeed, the effects of CU on an individual's mental health may include negative outcomes both in the short and long-term.

CU may be associated with a variety of negative outcomes including CUDs, respiratory problems, lower educational and career achievement, and vehicular crashes (Carliner, 2017; Hasin et al., 2016). In addition, there also may be an increased risk for ischemic stroke when engaging in CU, but more research is needed as there currently are contradictory findings in the literature related to CU and strokes (Rivers-Auty et al., 2014; Thanvi & Treadwell,

2009). Another potential negative outcome of CU is amotivational syndrome, which is defined as a decrease of motivation-related paradigms (self-efficacy, initiative, persistence; Lac & Luk, 2018). Moreover, potential neurological and mental-health related negative outcomes of CU include cognitive dysfunction (attention, verbal, and nonverbal learning; Shrivastava et al., 2011), behavioral problems (Sorkhou, 2021), memory issues (National Institute on Drug Abuse [NIDA], 2019a), and alterations in the brain (Archie & Cucullo, 2019; Battistella et al., 2014). Furthermore, in patients with severe mental health issues, CU has been shown to exacerbate psychotic symptoms, particularly in schizophrenic patients (Degenhardt & Hall, 2001). In addition, CU can cause an acute psychotic reaction in some non-schizophrenic individuals who use cannabis-based products heavily, although the psychotic symptoms are temporary and may decrease as drug effects wane (Diaz, 2017). Overall, individuals with mental health concerns may have more genetic predictors for developing a CUD (Lowe et al., 2019) or experiencing other negative outcomes of CU.

CU is considered by some researchers as a "gateway drug," which means CU may lead to the usage of substances that are highly addictive and can be injectable (Kandel, 1975; Kandel et al., 2006; Secades-Villa et al., 2015). For example, one study by the American Academy of Pediatrics reported that adolescents who engage in CU are 104 times more likely to use cocaine than adolescents who have never engaged in CU (Heyman et al., 1999). As such, the age of first CU also is an important factor to consider regarding potential negative outcomes, given that adolescents are more likely to suffer from severe memory impairment issues due to CU compared to adult populations (Jouroukhin et al., 2019). This effect is evidenced by a recent study by Rajapaksha et al. (2020), which examined 94 cannabis users who were recruited from the general population in the Albuquerque metro area during 2007–2010 and found that higher

risk of CUD was associated with younger age of CU. Heavy CU (i.e., smoking marijuana 27 days in 30 days) has a significant impact on an individual's ability to learn, their memory, and ability to function in society (NIDA, 2021b). In summation, considerable evidence suggests that CU may be linked to potential negative consequences and outcomes, particularly when used in a problematic manner. These negative outcomes may be associated with the rapid changes in legalization of cannabis in the U.S.

Current Legal Status in the U.S.

The current dichotomy between states with legalized marijuana and the federal stance that marijuana is an illegal substance has contributed to the variance in CU prevalence rates across the nation. Currently, 36 states and the District of Columbia and Guam have legislated medical marijuana laws (MML), and 19 of those MML states also have enacted recreational marijuana laws (RML; Anderson & Rees, 2021; D'Amico et al., 2017). States that have enacted MML and RML are connected to more liberal views of CU, such as increased acceptance, suggesting that societal norms may be shifting in the U.S. in support of CU (Anderson et al., 2018). The data indicate that states that have shifted toward legalization demonstrate increased societal acceptance regarding CU (Hopfer, 2014; Schuermeyer et al., 2014). Moreover, the literature suggests that Americans continue to trend towards more accepted views of CU, regardless of race, ethnicity, gender, education, religious or political affiliation (Felson et al., 2019).

As a result of legalization efforts, there are new gaps in CU literature and more research is needed to examine how marijuana impacts the health of the user and how implementation of MML and RML have contributed to problematic CU and CUDs (Zvonarev, 2019). Thus, although cannabis remains federally illegal, a growing number of states have passed legislation

supporting cannabis legalization. The growing number of states that have passed legalization legislation may reflect shifting societal perceptions of marijuana in the U.S.

Prevalence of CU in the U.S.

The prevalence rates of CU among various groups also are an important variable to consider. Regarding college students, cannabis is the most prevalent federally illicit substance currently used. There has been an increase in CU on college campuses as 44% of college students reported annual CU in 2020 compared to 38% in 2015, and 25% of college students reported past 30-day use (Schulenberg et al., 2021). Daily, or near daily, CU also has increased over the past few years given that in 2020, 8% of college students reported daily or near daily CU compared to around 5% in 2015 (Schulenberg et al., 2021). Attending college also may contribute to CU as college students who had never used cannabis in high school were 51% more likely to engage in CU in the past year compared to non-attending college peers (Miech et al., 2017). In addition, prevalence rates of CU may continue to change on college campuses as societal perceptions of usage shift. Due to the high prevalence rates of CU among students on college campuses, it is important to identify significant predictors of CU among college students.

Due to the intersection between emerging adulthood, more freedom and accessibility to explore substances on college campuses (Substance Abuse and Mental Health Services Administration [SAMHSA], 2019), and age-related susceptibilities to develop mental health concerns (Pedrelli et al., 2015), it is important to examine predictors of CU among collegiate populations (Schulenberg et al., 2021). Previously identified predictors of CU include self-regulation (SR; Dvorak & Day, 2014), emotion regulation (ER; Lucke et al., 2021), Adverse Childhood Experiences (ACEs; Richard et al., 2021), and poverty (Patrick et al., 2012). There is a plethora of literature examining the relationship between each of these variables and CU. For

example, CU has been found to be associated with dysfunctional regulation of emotional states (Garfinkle, 2017). Negative emotional stress reactions including anxiety, fear, sadness, and anger are common states that some individuals attempt to cope with via CU (Buckner et al., 2007). SR also has been found to be a predictor for CU. One study of 817 traditional college-age students and older found that those who scored higher on an SR measure were less likely to engage in CU (Dvorak & Day, 2014).

Researchers also have demonstrated a connection between ACEs and CU. A recent study by Fusco et al. (2021) reported frequent CU in nearly one third of participants who experienced traumatic events in childhood. Finally, researchers also have linked poverty to CU. Specifically, free/reduced lunch status has been shown to be related to CU as evidenced by a recent study of 583 marijuana using participants (Thrul et al., 2021). The researchers found that 411 (70.5%) of the sample reported free/reduced lunch status as a child. Although these predictor variables have been examined individually, these potential predictors have not been examined simultaneously in relation to CU. A simultaneous examination of these variables among a collegiate sample may shed light on how the interplay of these variables contribute to problematic CU and reveal the unique variance explained.

Statement of the Problem

CU on college campuses is increasing and current instruments used to assess CU may not be sufficient to accurately investigate the issue among traditional-aged college students. Also, more research is needed examining specific predictor variables to explore their unique and shared variance related to CU. It is known that CU rates among college students are increasing, as are problems associated with CU such as CUDs (Schulenberg et al., 2021), however, there exists a specific gap in examining the predictive role of four variables (i.e., SR, ER, ACEs, and

childhood poverty as measured by free/reduced lunch status) simultaneously with regard to problematic CU among college students. This study aimed to address that issue and potentially better inform clinicians, educators, and researchers about problematic CU among traditional-aged college students. In addition, this information may aid in designing prevention efforts for individuals in K-12, settings to combat the risk of CU in college. Finally, this study may help inform clinical interventions for those with problematic CU by specifically incorporating treatment paradigms focused on the underlying mechanisms that may be contributing to the development of CU problems.

While evidence of the independent relationships between ER, SR, ACEs, childhood poverty, and CU has been established, no study has investigated the relationship between these variables simultaneously among traditional-aged college students. The proposed study aimed to examine the interplay between ER, SR, ACEs, and childhood poverty to explore the unique and shared variance of these variables in the explanation of CU problems. The results of this study could lead to a more holistic and accurate understanding of collegiate CU. Additionally, COVID-19 has potentially changed the manner in which traditional-aged college students engage in CU (Chong et al., 2022). For example, students may be using cannabis at greater frequencies and in more social isolation, which potentially may increase the risk of developing an addiction, or the potential for cannabis to act as a gateway drug for other substance (Williams, 2020). Therefore, the second aim of this study is to examine how COVID-19 has impacted CU from before the start of the COVID-19 pandemic to present day. Specifically, the second research question explored whether there are significant differences in CU methods, frequency, and social patterns of CU in traditional-aged college students from a timepoint before the COVID-19 pandemic

compared to the present day. These research questions align with the Stress Sensitization Theory, which serves as the conceptual theory underlying this study.

Conceptual Framework for the Study

The theoretical basis from which the proposed study evolved is essential in understanding how the four predictor variables (i.e., ER, SR, ACEs, childhood poverty) may relate to CU problems. This information undergirds and provides support for this study. The Stress Sensitization Model was developed by Post (1992) to explore how the relationship between stress and an affective disorder may change over the course of the disorder due to stress-related factors (Post, 1992). Specifically, Stress Sensitization Theory postulates that individuals who undergo negative experiences that cause stress may be more easily triggered by less intense forms of stress in the future and are characterized by an increasing severity of stress with successive episodes of affective disorders (Harkness et al., 2015). Thus, as individuals become more sensitized to stress through repeated experiences, the threshold to initiate a response to stressors may become increasingly lower with each successive episode of stress (Stroud, 2018).

Stress Sensitization Theory is linked to CU because a recent study showed that acute stressors may lead to an increased likelihood to engage in drug-seeking behaviors as a coping mechanism (Preston et al., 2018). Indeed, stress, coupled with drug cues, may lead to increased cravings for substances (Jobes et al., 2015). Using cannabis specifically as a means of coping with stress related to traumatic events and life stressors also has been documented in the literature (Hyman & Sinha, 2009). Therefore, as one's stress threshold lowers as a result of repeated stressful experiences, the individual may be more likely to cope via the use of substances such as cannabis.

The Stress Sensitization Theory provides a framework for the inclusion of the four predictor variables in this study. Specifically, research has indicated that those with higher SR scores have a decreased likelihood of engaging in CU (Dvorak & Day, 2014). In context with the Stress Sensitization Theory this means lower SR scores correlates with poorer abilities to cope with stress and an increase likelihood of relying on maladaptive coping mechanisms, such as CU to alleviate stressors (Jobes et al., 2015). ER is linked to the Stress Sensitization Theory because individuals who experience chronic stress are more likely to have deficient emotional coping mechanisms (Compare et al., 2014). For example, a study by Bonn-Miller et al. (2011) found that greater levels of stress resulted in a higher propensity to use substances, including cannabis, to cope and concluded that ER deficits may lead to increased CU coping motives. Moreover, there is a clear relationship between the Stress Sensitization Theory and ACEs, given that poorer stress reactivity among those with ACEs has been shown to lead to weaker impulse control, impaired cognitive functioning, and a greater likelihood of using substances (Lovallo et al., 2013). Finally, childhood poverty also is associated with the Stress Sensitization Theory through a lens of chronic stress, increased stress sensitization, and increased impairment by affective stressors (Kim et al., 2013). Families from lower socioeconomic status (SES) backgrounds experience higher degrees of stress compared to higher SES families (Reiss et al., 2019; Senn et al., 2014; Weyers et al., 2010). Therefore, the presence of chronic stress is associated with each of the variables (ER, SR, ACEs, childhood poverty), making them viable predictors of CU.

Purpose of the Study

Existing literature has demonstrated a connection between substance use and ER (Moffitt et al., 2011), SR (Bakhshani & Hosseinbor 2013), ACEs (Douglas et al., 2010), and childhood poverty (Lee et al., 2013). Each of these variables has been shown to be connected to the

presence of chronic stress and thus is supported by the Stress Sensitization Theory as potential predictors of CU. Chronic stress and the associated negative effects are directly linked to ER, SR, ACEs, and childhood poverty. Furthermore, these four variables have been found to be independently associated with CU. Currently, however, there is a dearth of empirical studies examining SR, ER, ACEs, and childhood poverty simultaneously as predictors of CU problems among traditional-aged college students. Therefore, this study aimed to investigate, ER, SR, ACEs, and childhood poverty as predictors of CU problems among traditional-aged college students in order to better understand unique and shared variance of the predictors. In addition, in light of the magnitude of the COVID-19 pandemic, this study aimed to explore differences in methods, frequency, and social patterns of CU in traditional-aged college students by comparing their use at a timepoint before the COVID-19 pandemic to present day.

Research Questions

This study aimed to evaluate the previously unexplored variance in four unique variables (ER, SR, ACEs, and childhood poverty) predicting one dependent variable, namely, problematic CU. CU is a potentially pervasive and problematic issue among traditional-aged college students. Moreover, the COVID-19 pandemic has contributed to changes in society and this study postulates that those changes will be reflected in CU methods, frequency, and social patterns of CU in traditional-aged college students. Therefore, the proposed research questions for this study were:

RQ1: To what extent do ER, SR, ACEs, and childhood poverty predict problematic CU in traditional-aged college students after controlling for gender, race/ethnicity, and age? The alternative hypothesis for this research question is that lower ER, SR, and higher ACEs and

childhood poverty are more likely to predict problematic CU in traditional-aged college students after controlling for gender, race/ethnicity, and age.

RQ2: Do significant differences in CU methods, frequency, and social patterns of CU in traditional-aged college students exist from a timepoint before the COVID-19 pandemic compared to present day? The alternative hypothesis for this research question is that COVID-19 has led to more CU via vaping, a higher frequency of CU, and more isolated CU when compared to a timepoint before the start of the COVID-19 pandemic.

Definition of Terms

The terms in this section are directly related to the literature supporting the current study.

Adverse Childhood Experiences (ACEs): An ACE is defined as a traumatic event that occurs in childhood. These events may lead to substance abuse behaviors in adulthood (Douglas et al., 2010). ACEs encompass 10 recognized trauma-related experiences that occur during childhood (birth to 17) in three overarching categories including abuse, neglect, and problems within the household (Chapman et al., 2007). Maltreatment (encompassing the categories of abuse and neglect) issues include physical abuse, sexual abuse, emotional abuse, emotional neglect, and physical neglect. Problems within the household include divorce, violence in the household, familial mental health problems, substance use in the home, and incarceration of a family member (Dube et al., 2003; Felitti et al., 1998).

Cannabis Use (CU): CU is defined as the consumption of cannabis-related products through inhalation, ingestion, topical, or other methods of use. Examples of CU products and methods of use include smoked cannabis products (joints, blunts, bong / water pipe, wax), ingested cannabis products (edibles), topical cannabis products (lotions, oils, patches, sprays, soaps, lubricants, and cool or warm balms), and vaped cannabis products (vaporizer pen, or an e-cigarette device).

Cannabis Use (CU) Problems: CU problems refer to a range of problematic behaviors associated with use of cannabis over the past year. Examples include how many times an individual "went to work or school high or stoned" and "tried to control your marijuana use by trying to smoke marijuana only certain times of day or certain places" (Vandrey et al., 2005).

Emotion Regulation (ER): ER has many definitions in the literature, yet this study is informed by Gratz and Roemer's (2004) definition:

> Involving the (a) awareness and understanding of emotions, (b) acceptance of emotions, (c) ability to control impulsive behaviors and behave in accordance with desired goals when experiencing negative emotions, and (d) ability to use situationally appropriate emotion regulation strategies flexibly to modulate emotional responses as desired in order to meet individual goals and situational demands (Gratz & Roemer, 2004, p. 42).

Coronavirus Disease 2019 (COVID-19): COVID-19 is defined as the specific coronavirus that emerged in December 2019. COVID-19 is an infectious disease caused by the SARS-CoV-2 virus. This virus has caused a pandemic of respiratory illness, known as COVID-19.

Free/Reduced Lunch Status: Free/reduced lunch status is defined as low-cost or free lunches provided to children each school day. There is no universal standard to assess SES and childhood poverty and the approach often used is relative to the model, research design modalities utilized, and available data (Braveman et al., 2005). However, the U.S. federal government does provide a poverty threshold each year as a benchmark for financial poverty. Therefore free/reduced lunch status has been used in past research as a marker of poverty and will be utilized similarly in this study. K-12 students are eligible for reduced-priced lunches that cannot cost more than 40 cents per meal if their familial household income is between 130% and 185% of the poverty threshold (Rosso & FitzSimons, 2016).

Self-Regulation (SR): SR is defined as the way in which an individual exerts control over their attentiveness, thoughts, emotions, impulses, and behaviors (Baumeister & Vohs, 2007). More recent studies described SR as enabling individuals to guide their thoughts, feelings, and behaviors in a purposeful manner (Kelley et al., 2019). Specific SR activities can include goal setting, strategic planning, and behavior modification paradigms (Mann et al., 2013).

Traditional College-Aged Students: Traditional college-aged students are defined as students who are typically between the ages of 18 and 24 years of age and who pursue their college education immediately after graduating from high school (Markle, 2015).

Procedures

I obtained approval from the university's institutional review board to conduct this study. Participants were recruited from one university in the Southeast with a total desired sample size of 250 students. Convenience sampling was used in this study for the selection of professors at the university based on discipline diversity and class enrollment. I selected and emailed at professors from various disciplines and requested 30 minutes of class time for survey administration. After receiving consent to collect data in their classrooms, I scheduled a day and time to visit each classroom and administered the one-time, in-person survey**.** Convenience sampling was ideal for this study because it was less expensive, more efficient, and simpler to execute in order to obtain basic data compared to using a randomized sample (Jager et al., 2017). The inclusion criteria for this study were a) full-time student, b) undergraduate student, and c) at least 18 years of age. The age cutoff for this study was 24 (all students who met the three inclusion criteria were invited to participate and enter the raffle for a gift card, but only those aged between 18-24 were included in the analysis).

I utilized a demographics questionnaire assessing participants' age, year in school, gender, race/ethnicity, sexual orientation, familial income-level during childhood, if participants ever used cannabis products, age of first CU, usage in the past 30 days, preferred methods of use, and changes in patterns of use since the inception of the COVID-19 pandemic. To assess income level during childhood, participants reported if they received free/reduced lunch during K-12 schooling. Participant demographics were coded as follows: (lunch status: no = 0, yes = 1, unsure = 2). Gender was coded as follows: (male = 1, female = 2, trans = 3, nonbinary = 4, other = 5). Sexual orientation was coded as follows: (prefers opposite sex partners = 1, prefers same sex partners = 2, prefers both opposite sex and same sex partners = 3, other = 4). Year in school was coded as follows: (freshman = 1, sophomore = 2, junior = 3, senior = 4, fifth year or older = 5; high school student taking college courses = 6). Variables included in the primary analysis were dummy coded with the largest group serving as the reference group.

In addition to the demographic questionnaire, I measured problematic CU via the Marijuana Problem Index (MPI; White et al., 2005; White & Labouvie, 1989). Issues with ER were assessed using the Difficulties in Emotion Regulation Scale – Short Form (DERS-SF; Kaufman et al., 2016). SR was assessed via the Short Self-Regulation Questionnaire (SSRQ; Carey et al., 2004). ACEs was examined using the ACE Questionnaire (ACE-Q; Felitti et al., 1998).

To answer the first research question, I utilized a hierarchical regression model. A hierarchal regression analysis was fitting for this research question because it allowed for an examination of incremental validity (Lewis, 2007). The rationale for using a hierarchical regression in this study is that the relationship between nine tested independent variables (DERS-SF [strategies, non-acceptance, impulse, goals, awareness, and clarity], free/reduced lunch

status), SSRQ, ACE-Q, and one dependent variable (MPI) was examined to discern the relationship and variance between the variables. This study also controlled for specific variables including gender, race/ethnicity, and age to investigate the variance explained by the main predictors over and above the demographic variables.

To answer the second research question, I utilized a Wilcoxon signed-rank test. This research question compared two related, or matched samples on the same, categorical variables (CU frequency [daily, weekly, monthly, yearly, other], CU methods [inhalation, oral, topical, other] and social patterns of CU before and during the current phase pandemic [alone, with one-two others, in a group]). The Wilcoxon signed-rank test is a satisfactory analysis to accurately gauge differences in categorical variables with paired samples (Winters et al., 2010). The benefit of using a Wilcoxon signed rank-test was that it can be used for ordered categorical variables that do not have a numerical scale and there is evidence in the literature of this analysis for correlated, or repeated, data (Kim, 2014). Other evidence supporting the Wilcoxon signed rank-test related to cannabis research includes one study by Anderson et al. (2019) in which the analysis was performed on marijuana using patients to treat the effects of cancer and compared their baseline symptom scores and symptom scores to four months later. The two research questions of this study were designed to answer pressing questions in the fields of counseling and addictions related to CU.

Significance of the Study

This study was designed to yield information that may serve to advance the fields of counseling and addictions. A gap currently exists in the literature regarding the examination of the predictive role of four variables (SR, ER, ACEs, and childhood poverty as measured by free/reduced lunch status) simultaneously with regard to CU problems among traditional-aged

college students. This study is significant because it addressed that gap and provided information that can aid in designing interventions for traditional-aged college students experiencing problems with CU (and who may be at risk for addiction). Understanding predictors of problematic CU and how those predictors interact may better inform interventions for collegiate clients using cannabis. This study also aligned with Chickering's Seven Vectors of Identity Development Theory. This is a psychosocial theory which postulates that identity development as a young adult may be impacted by attending college (Chickering, 1969). Finally, this study explored the connection between childhood trauma and addiction in adulthood and may potentially inform future prevention efforts and interventions in childhood and adolescence that counselors, counselor educators, school counselors, and other mental health professionals can utilize. To summarize, this study aimed to fill in pertinent gaps related to college students experiencing problems with CU (and who may be at risk for addiction).

A Priori Limitations of the Study

There are several a priori limitations of this study to consider. First, this data was gathered from only one university, which may not be generalizable to other geographic regions. Second, this study utilized convenience sampling and does not have the benefits of randomized sampling. Third, this study relied on self-report data from students, and thus the accuracy cannot be verified. However, there is evidence supporting the use of self-report data as valid, reliable, and is viewed as an effective tool in addictions studies (Harrison, 1997). For example, self-report data in addictions literature has demonstrated high level of reliability between verbal report and laboratory data (alcohol = 97%, cocaine = 93%, and marijuana =83%; Brown et al., 1992). Overall, a priori limitations are important to note in light of the potential implications of this study.

Chapter Summary

This study and chapters were organized in the traditional dissertation format and chapter one encompassed a brief manuscript of the full study. Chapter one included a brief literature review of CU as being potentially problematic and pervasive and included outcomes and recent trends in CU behaviors and how cannabis has evolved in the U.S. over the past several decades. Chapter one also discussed how frequency, age of onset, and quantity of CU are imperative to accurate assessment of CU in modern times. Also included in the literature review were CU prevalence rates, particularly among college students. Next, chapter one entailed a statement of the current problem that this study aimed to address and particularly focused on the relationship between ER, SR, ACEs, childhood poverty, and cannabis use simultaneously. Chapter one also highlighted the importance of exploring differences in CU methods, frequency, and social patterns of CU in traditional-aged college students due to COVID-19 as a current concern of interest. After chapter one discussed the current problem, it then delved into the conceptual framework for the study, namely the Stress Sensitization Theory, and how skills such as SR and ER modalities may be lower due to chronic stress, and a gradual weakening response to stressors. Then, the purpose of this study and my first research question was discussed in brief detail and included an investigation of the unique and shared variance of ER, SR, ACEs, and childhood poverty in the prediction of CU problems among traditional college-age students. Chapter one also discussed the second research question and detailed the importance of exploring differences in CU methods, frequency, and social patterns of CU in traditional-aged college students by comparing their use at a timepoint before the COVID-19 pandemic to present day. Finally, the research questions of the study, definition of terms, significance of the study, and a priori limitations of the study were covered in detail. Chapter two will entail a more

extensive literature review, chapter three will focus on the methods and data collection procedures of this study, chapter four will present the results of the analyses, and chapter five will incorporate a discussion of findings, implications for future research and clinical practice, and what existing interventions may potentially align with the findings of this study.

CHAPTER TWO

LITERATURE REVIEW

Marijuana is commonly described as the green, brown, or gray mix of dried leaves of the *cannabis sativa* plant (Leggett, 2006). Marijuana contains psychoactive chemicals that act on the brain and can alter mood or consciousness and a chemical compound is classified as psychoactive when it alters consciousness, perceptions, and mood (Stangor, 2014). Cannabis has a long history of use for medicinal and recreational purposes in light of its psychoactive properties. Although cannabis contains many different compounds, *Tetrahydrocannabinol* (THC) is the chemical responsible for most of marijuana's psychological effects (Lafaye et al., 2017). Specifically, Delta-9-THC is the cannabinoid compound that was first identified as the primary psychoactive constituent of marijuana (Gaoni & Mechoulam, 1964). The potency of cannabis, and specifically marijuana, is primarily evaluated according to a sample's THC concentration (Lafaye et al., 2017). THC activates neurons in the brain that influence pleasure, memory, thinking, coordination, and time perception (National Institute on Drug Abuse [NIDAa], 2021). The physiological, and psychoactive effects of cannabis use (CU) are directly related to the amount of THC in the product (Volkow et al., 2014).

Historical records show that the cannabis plant has been used since ancient times for spiritual, ceremonial, medicinal, social, and recreational purposes (Merlin, 2003). There is evidence of CU occurring 5,000 years ago in regions in modern day Romania (Holland, 2010). There also is some evidence of CU dating back even further, approximately 11,700 years ago, in Central Asia (Pisanti & Bifulco, 2019). It should be noted that the cannabis plant was used for more than just medicine, and has long been cultivated for fibers, food, and oils (Crocq, 2020). It

is postulated that cannabis was propagated throughout the world by the migration of nomadic peoples and early traders nearly 12,000 years ago from Euroasia (Crocq, 2020). There is strong evidence that propagation of cannabis came from one primary region due to the fact that similar descriptive words across varying languages in the Euroasian landmass were used to describe the plant's properties and features (Barbera, 2016).

The psychoactive properties of cannabis are important given that the use of psychoactive drugs, such as marijuana, has the potential to lead to addiction (Stangor, 2014). Indeed, research utilizing criteria from the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association [APA], 2013) revealed that 9% of individuals who engage in CU present with characteristic symptoms of a substance use disorder (SUD; Volkow et al., 2014). Importantly, research also reveals that marijuana's THC potency has increased substantially over the past few decades with an 8% increase in average THC levels between January 1, 1995, and December 31, 2014 (ElSohly et al., 2016). This increase is significant because the potency of THC has an impact on the relationship between CU and mental health (Hines et al., 2020). Evidence shows that higher doses of THC is correlated with increased levels of memory impairment and psychotic-like symptoms (D'Souza et al., 2004). The increase in proliferation of cannabis with high-potency THC levels is partially due to some legalization efforts in the U.S. (Stuyt, 2018), however THC levels also have increased in illegal cannabis markets as well (Freeman et al., 2019). Risks for cannabis-related SUDs also have increased among users reporting high-potency CU (Hines et al., 2020).

Cannabidiol

Cannabidiol (CBD) is the second-most abundant cannabinoid and is one of over 80 various chemical compositions of the cannabis plant (Shannon et al., 2019). CBD has gained

attention recently due to a noted absence of psychotropic activity among users (Larsen & Shahinas, 2020) and because of evidence of therapeutic effects (Pisanti et al., 2017). In addition, more literature has emerged over the past few years revealing that the amount of CBD administered may also mediate against some negative effects from THC (Huestis, 2019), yet more research is needed to confirm how CBD interacts with THC therapeutically (Niesink & van Laar, 2013). Elsohly et al. (2016) found that the ratio of THC to CBD has decreased from 28% in 2001 to 15% in 2014, demonstrating a growing trend in the disproportionality between the amount of THC and CBD in a product (14:1 THC to CHD ratio in 2001 to an 80:1 ratio in 2014). These data suggest there may be less CBD to mediate against potentially negative effects of THC. The cannabis industry continues to grow rapidly in the U.S. with cannabis production increasing and stronger chemical cannabinoid formulations being created (Lafaye et al., 2017).

Delta-8-THC

Another recent trend in CU is the rise of Delta-8-tetrahydrocannabinol (Delta-8-THC) products on the market. Delta-8-THC is another naturally occurring compound in cannabis with similar, but less potent, psychoactive effects compared to Delta-9-THC (Hollister & Gillispie, 1973). The relative potency of Delta-8-THC compared to Delta-9-THC was measured at 2:3 and has been evaluated with multiple methods of use including oral and intravenous administration (Hollister & Gillispie, 1973). A more recent study by Avraham et al. (2004) regarding the relative potency of Delta-8-THC and Delta-9-THC found that Delta-8-THC increased food intake significantly more than did Delta-9-THC. Interestingly, the scholars reported that resulting performance and activity levels were comparable between the two compounds. Researchers also have examined the potential medical benefits of Delta-8-THC, with scholars suggesting that Delta-8-THC cannabinoids could potentially be a novel therapeutic modality for corneal pain and

inflammation (Thapa et al., 2018). Due to recent federal and state laws related to industrial hemp, Delta-8-THC is technically deemed legal in some U.S. states because of the 2018 Farm Bill. Specifically, this bill established the federal legality of industrial hemp through measurement of Delta-9-THC and not Delta-8-THC levels (Mead, 2019). The establishment of laws related to Delta-8-THC are significant because the term "industrial" is currently defined as any part of the hemp plant, with a Delta-9-THC concentration of 0.3%, or less (Mead, 2019). Some states interpreted the language of this bill to mean that Detla-8-THC products qualify as industrial hemp and thus are exempt from the Controlled Substances Act (21 U.S.C. 801 et seq.). This interpretation currently is permissible because there is no language describing allowable amounts of Delta-8-THC in the federal law.

Synthetic Cannabinoids

It also is important to note the presence of synthetic cannabinoids (SCs) in the cannabis industry, particularly for those who engage in frequent CU. SCs are not organic cannabis products, however they mimic the psychotrophic effects found in natural cannabis and Delta-9-THC, albeit with more potential negative side effects (Cohen & Weinstein, 2018). Indeed, research suggests that the synergistic interactions within SCs may exacerbate unpredicted adverse effects compared to natural cannabinoids (Casteneto et al., 2014; Fattore, 2016).

SCs are appealing because they potentially provide psychoactive effects comparable to cannabis products but may go undetected through traditional drug screening tools (Lafaye et al., 2017). The intoxication effects of SCs are more intense than natural cannabis products, however, and SC use is connected to symptoms such as nausea, psychomotor agitation, diaphoresis, and heart palpitations (Seely et al., 2012; Spaderna et al., 2013). Moreover, chronic SC use is associated with mood disorders and executive functioning deficits (Castaneto et al., 2014; Cohen

et al., 2018). Since 2008, there have been over 200 different types of documented SCs from herbal mixtures across various countries (Asmaro et al., 2014; van Amsterdam et al., 2015). The existence of many types of documented SCs is potentially due to the ephemeral processes of production and the usage of chemical compositions that continue to be changed in an effort to circumvent state and federal regulations (Fattore, 2016). The Synthetic Drug Abuse Prevention Act of 2012 permanently placed several different classes of psychoactive substances, including many SCs, into Schedule I of the Controlled Substances Act, which is the most restrictive classification (Casteneto, 2014). This categorization occurred because the composition and pharmacological properties of SCs make them potentially dangerous addictive substances without accepted medical use (Lafaye et al., 2017). Therefore, it is important to understand the nature and effects of SCs, Delta-9-THC, Delta-8-THC, and CBD when examining CU. Another important factor to consider is the method of cannabis ingestion.

Methods of CU and Recent Trends

With each passing year, the cannabis industry matures and continues to rapidly grow and develop. This growth is evident not only in the size of the market, but also in the diversifying methods of production and recent trends in CU behaviors.

Methods of CU

There are various methods by which to engage in CU. Cannabis can be smoked, inhaled, mixed with food, or made into tea; however, all methods of use fall under one of three basic delivery paths: inhalation, oral, and topical (Whiting et al., 2015). Cannabis products usually are smoked in a joint or a water pipe, commonly referred to as a bong (sometimes with tobacco added). With water pipe use, users typically inhale deeply and hold their breath to maximize the amount of THC absorbed into their system (20-70% delivered to lungs and 5-24% reaching the

brain; Room et al., 2010). Ingested cannabis products also have increased in popularity in recent decades including edible, liquid, or oil products, and are appealing to users because there are no risks associated with inhalation of smoke or vapors (Grotenhermen, 2001). A known risk associated with ingested cannabis products, however, is a higher likelihood of edible-related poisoning due to delayed absorption and delayed onset of THC's psychoactive effects (Fischer, 2017).

Cannabis concentrates also have gained attention in recent decades, although CU utilizing liquid concentrates has evidence dating back to the Vietnam War and earlier (Booth, 2005). The practice of using cannabis concentrates, commonly known as *dabbing*, involves the administration of butane hash oil, which has high concentrations of THC (Al-Zouabi et al., 2018). Dabbing has several risks that other methods of CU do not, including hydrocarbon burns, a chance to inhale potentially hazardous impurities including solder, rust, and benzene, and more negative side effects, such as increased withdrawal symptoms compared to other methods of CU (Loflin & Earleywine, 2014; Stogner & Miller, 2015). Currently, cannabis concentrates are considered a public health concern due to potentially higher levels of tolerance and withdrawal symptoms because of more rapid and effective THC delivery, meaning the propensity to develop a Cannabis Use Disorder (CUD) is increased (Loflin & Earleywine, 2014; Varlet et al., 2016). A CUD is defined as a persistent and problematic pattern of cannabis usage that causes a significant level of distress, or impairment in daily functioning (Sherman & McRae-Clark, 2016). Along with diverse methods of CU, another factor to consider is the recent trends of cannabis use, particularly with regard to the emergence of electronic nicotine delivery systems (ENDS).

Recent Trends in Usage

The marijuana industry is rapidly changing, and prior methods used to assess CU may no longer be adequate (Keyhani et al., 2020). There is an increasing consensus from a diagnostic perspective that frequency, age of onset, and quantity of CU are important variables regarding the effects of CU (Cuttler & Spradlin, 2017; Volkow et al., 2016). In light of these variables, there is a paucity of psychometrically sound inventories for assessing all dimensions of CU. Most prior assessment research has focused on assessing frequency of use among clients with a CUD (Johnson et al., 2019). Specifically, short-time usage (within the past 30-days) modalities have been the most studied, and because of the parameters of the assessments, they are not effective at establishing chronic patterns of use or assessing lifetime use in older adults (Johnson et al., 2019). The current state of assessment research is a concern for treatment of a CUD and the field of addictions because there is lack of psychometrically sound inventories measuring the frequency, quantity, and age of onset of CU, which often forces researchers to utilize measures such as in-house survey questions that may not be valid or reliable (Cuttler & Spradlin, 2017).

As societal attitudes regarding CU continue to change, the prevalence rates of DSM-5 CUD have increased (Hasin et al., 2015). Prevalence rates of 12-month (2.5%) and lifetime CUD (6.3%) are significant because only 13.2% of individuals diagnosed with a CUD will engage in professional treatment (Hasin et al., 2016). In 2017, to address the swiftly changing marijuana field, the National Academy of Sciences Engineering, and Medicine (NASEM) called for more robust standardized tools to be created to quantify CU more effectively (NASEM, 2017). Scholars attempting to create new instruments to meet this standard stated that measures of CU must account for methods of use other than smoking, and frequency of use throughout the day (Keyhani et al., 2020). Novel instruments also must account for emergent trends as the marijuana

industry continues to evolve. In sum, more effective assessment tools are needed to measure cannabis intake, both to assess and quantify CU trends for research and clinical practice (Steigerwald et al., 2018).

Another factor to include in the assessment of CU is the use of vaping devices. Newer trends in CU revealed a rise in ENDS, otherwise known as *e-cigarette devices*, to engage in CU through vaporization, or "vaping" of parts of the cannabis plant in the form of hash oil, wax oil, or dried cannabis buds or leaves (Kowitt et al., 2019). Vaping is particularly popular among youth, as CU and e-cigarettes are among the most used substances by adolescents in the U.S. (Jacobs et al., 2021). Both cannabis and nicotine can be used with a vaporizer, meaning individuals who use cannabis or nicotine may be at risk of using the other substance at some point in their lives (Cullen et al., 2018). Almost one in ten high school students reported engaging in CU utilizing a vaporizer in their lifetime (9.6%; Kowitt et al., 2019), and 52.7% of middle and high schoolers who have used an ENDS in the past 30 days also reported CU with a vaporizer (Farsalinos et al., 2021). A study from the National Youth Tobacco Survey (NYTS) revealed that 26.2% of students in 6th through 12th grade have engaged in CU using a vaporizer (Taleb et al., 2020). CU prevalence rates have been shown to increase throughout high school similar to nicotine-based products, and CU vaping rates also showed an increase between 8th and 12th grade (8th graders [8.1%], 10th graders [19.1%], 12th graders [22.1%]; Miech et al., 2021). Though popular among adolescents, using ENDS for CU also is prevalent among adults. Indeed, among a sample of 3,706 adults who have used a vaporizer, 28% reported engaging in CU (Xie & Li, 2020).

A previous study by Pomahacova (2009) found vaporizers to be a more efficient THC delivery method, likely because less THC is lost in the process of burning, combustion, or

potential side stream smoke (which is defined as the smoke that is released from the end of a burning cigarette, cigar, or pipe). Some researchers, however, found that vaporization and smoking provide comparable cannabinoid delivery (Newmeyer et al., 2016). Results remain mixed as a more recent study found that vaporized cannabis produced significantly greater subjective drug effects, cognitive and psychomotor impairment, and higher blood THC concentrations than the same doses of smoked cannabis (Spindle et al., 2018). Overall, vaporizers may be a more effective THC delivery method compared to smoking, although more research is needed to confirm drug effects and THC concentrations of vaporized cannabis products and how characteristics of vaporizers, such as temperature and power output, mediate THC activity (Pomahacova 2009; Spindle et al., 2018). In sum, current methods of CU are diverse and frequently changing. Trends of CU indicate an increasing or stable frequency of use across time. To understand current CU rates, it is important to consider the history of marijuana in the U.S.

History of Marijuana in the U.S. and Drug Laws

With regard to the history of U.S. laws and regulations, scholars have noted that responses to substance use often reflect the country's systemic discrimination towards marginalized racial groups because many drug laws were implemented without a fact-based inquiry (Solomon, 2020). For example, the U.S. federal government began heavily regulating cannabis products in 1973 with the Marijuana Tax Act. The Marijuana Tax Act prohibited the possession or usage of hemp, or other cannabis products, at the federal level and included penalties and potential incarceration for cannabis and hemp provisions (Musto, 1972). Marijuana prohibition began amid racially biased appeals and an anti-immigrant sentiment under the guise of public safety by suggesting that marginalized racial groups suffered from "reefer madness"

(White, 2004). The federal government responded to pressure from alarmed groups, including enforcement agencies, who feared the use and spread of cannabis by Mexican immigrants (Musto, 1972). Solomon (2020) argued that racism and sensationalism played into the political dialogue during the time the Marijuana Tax Act was implemented. Since 1937, additional federal regulations also have been enacted to regulate marijuana and CU such as the Boggs Act (1952), Narcotics Control Act (1956), Controlled Substances Act (1970), and Anti-Drug Abuse Act (1986), which led to increased punishment for the possession, use, sale, and cultivation of cannabis and the classification of marijuana as a Schedule I drug (Gerber, 2004).

In addition to specific anti-marijuana laws, President Nixon's 1971 "War on Drugs," which was later amplified by President Regan's administration, increased the size of federal drug control agencies and the enforcement of drug laws that came with more extreme measures such as mandatory sentencing and no-knock warrants. Mandatory sentencing requires that offenders must serve a predefined term for certain crimes, and no-knock warrants are issued by a judge, allowing law enforcement officers to enter a property without immediately notifying the residents of the property (such as by knocking or ringing a doorbell). These policies disproportionally impacted Black Americans and members of other marginalized racial groups (Neill, 2014). Indeed, the "War on Drugs" is said to reflect a racially biased criminal justice system and has been aptly named "The New Jim Crow" by scholars and critics (Alexander, 2010; Nunn, 2002). One study by Alexander (2012) found that despite all races using drugs at similar rates, (White adolescents were slightly higher than others), 75% of those imprisoned for drug crimes are people of color. Regarding CU specifically, defendants from marginalized racial groups continue to represent most marijuana arrests (Beckett et al., 2005).

Regan's specific focus of the "War on Drugs" was on criminal punishment over clinical treatment and rehabilitation for drug-related offenses. Reagan's philosophy led to a massive increase in incarcerations for nonviolent drug charges, from 50,000 in 1980 to 400,000 by 1997 (Drug Policy Alliance, 2014). Currently the U.S. prison system is recognized as a for-profit system and has the highest rates of incarceration in the world (Alexander, 2012). Both federal and state laws have played a role in the formation and development of mass incarceration for drug offenses (Alexander, 2012). Recent trends reveal marijuana arrest rates among both Black and White adults have decreased in states that have legalized CU, however, legalization policies have not eliminated racial inequities in arrests. Indeed, disparities in marijuana arrests for Black Americans are still major concerns (Gettman, 2015; Oregon Public Health Division, 2016; Firth et al., 2019). Overall, the "War on Drugs" and U.S. drug laws have disproportionally impacted marginalized racial groups and caused the U.S. to have the highest rates of incarceration for drug-related offenses in the world (Alexander, 2012; Neill, 2014). In addition to the history of drug laws, it is important to examine the effects of current legalization policies, such as the rapidly evolving statewide legal status of cannabis.

Current Legal Status in the U.S.

In 1996, the legalization of marijuana began in the U.S. when California became the first state to enact medical marijuana laws (MML; D'Amico, 2017). Supporters of the bill, known as Proposition 215, or the "Compassionate Use Act of 1996" argued that seriously or terminally ill patients should not be subjected to state-level prosecution for engaging in CU as a form of medical treatment (Satterlund et al., 2015). Proposition 215 began the establishment of laws permitting CU for medical and recreational purposes. In 2002, 19% of the U.S. population lived in a state with legalized medical CU, however, as states other than California began passing

MML, the percentage of the population living in state with legalized medicinal CU increased to 72% in 2020 (Anderson & Rees, 2021; Carliner et al., 2017). As of April 2021, 36 states and the District of Columbia and Guam have legislated MML, and 19 of those MML states also have enacted recreational marijuana laws (RML; Anderson & Rees, 2021; D'Amico, 2017).

There is a clear connection between lenient state cannabis laws, increased acceptance, and positive perceptions of CU. Marijuana state laws are connected to an increase in acceptance and accessibility to marijuana, which suggests the formation of new norms in the U.S. supporting CU (Anderson et al., 2018). These CU norms could continue to change depending on new administrations, however, when states shift toward legalization, societal acceptance regarding CU may increase (Hopfer, 2014; Schuermeyer et al., 2014). Some factors that have influenced policy change the past several decades include rising state costs associated with incarceration of nonviolent drug offenders (Raphael & Stoll, 2013) and strained state budgets that have caused legislatures to seek taxable resources (Caulkins et al., 2015).

Legalization Controversy

From a federal perspective, however, the stance on legalization is far more stymied. Although currently categorized as a Schedule I drug, the emergence of MML forced the federal government to reevaluate the drug status of marijuana. In 2013, then-Deputy Attorney General (AG) James Cole's memo attempted to limit most marijuana incarcerations and encouraged the federal government to allow the states to implement their own policies regarding RML and MML (Cole, 2013). However, the sparsity of literature on the potential benefits of CU at the time of Cole's memo led the U.S. Drug Enforcement Administration to reaffirm the status of marijuana as a Schedule I drug in 2016, citing a lack of evidence of efficacy in medical use (Klugman, 2016). This decision was made in light of the fact that in 2016 there were much fewer

studies discussing the potential benefits of medicinal marijuana use compared to what is now documented in the literature. In 2017, there was a bipartisan proposal to change marijuana's drug status to a Schedule III drug. In 2018, during the Trump administration, AG Sessions reversed Cole's policy that allowed for states to decide their own status on MML (Sessions, 2018). During the past decade, societal opinion about CU has shifted in favor of legalization (Caulkins et al., 2015). The AG Sessions' stance on cannabis during the Trump administration, and the presence of a new presidential administration currently in 2021 (President Biden), means that the short-term legal future of marijuana in the U.S. is uncertain.

A recent exploration of the federal government's knowledge of known risks and benefits of CU, and treatment between marijuana, opioids, and ketamine, revealed that marijuana may be unnecessarily withheld and stigmatized, with the federal government failing to acknowledge any potential benefits from CU, but instead, choosing to incorporate the use of other drugs, such as opioids, medicinally (Krystal, 2018). Substances such as opioids are known to be highly dangerous with opioid overdose deaths increasing 27.7 % between 2015 and 2016 (Yang et al., 2020), whereas state enactment of MML is associated with lower state-level opioid overdose mortality, when individuals choose to engage in CU rather than using opioids for pain management. Opioids, however, are classified as a Schedule II drug and deemed less dangerous than marijuana by the federal government (Ishida et al., 2019). Those who are not in favor of marijuana legislation policies believe that pro-marijuana laws will increase CU, lead to increases in crime, potentially impact public health and safety, and lead to lower teen educational achievement (Dills et al., 2016). However, a recent study showed that claims about cannabis legalization, by both advocates and opponents, are not grounded in scientific evidence (Pacula & Smart, 2017). Legalization of marijuana has created new gaps in CU literature and more research

is needed to examine the health effects of cannabis and CUDs that have resulted from implementation of MML and RML (Zvonarev, 2019). In summation, marijuana remains illegal under federal law, but a growing number of states have passed legislation supporting cannabis legalization. State laws aimed at legalization efforts reflect shifting societal perceptions of marijuana in the U.S.

Changing Public Perception

The legislation of MML also has changed the perception of CU in the U.S. and has influenced the cultural attitudes and motivation of adult and adolescent populations. The creation of MML has resulted in novel advertising and increased accessibility, which may drive societal perceptions of CU. Indeed, aggressive marketing to the public in legal states for medicinal and recreation usage, slanted media coverage referring to marijuana as a potential remedy for many types of difficulties, diseases, or ailments, and the ongoing debate regarding MML and RML may be sending positively skewed messages about CU to the public (McGinty, 2016). One study found that middle school students' (6th and 8th graders) exposure to advertising for medical marijuana was directly related to intention to engage in CU and intention to engage in CU one year later (D'Amico et al., 2015). Social media also has played a role in influencing adolescents and teens with one pro-marijuana Twitter handle called @stillblazingtho being placed in the top 10% of all Twitter handles followed in 2014 (Cavazos-Rehg et al., 2014).

The scientific data related to MML, RML, and CU outcomes has been slow to develop, and it could still be several years until there are more available studies detailing the risks and benefits of CU. The lack of clear scientific evidence may have led to premature conclusions that legalization would not harm society before more conclusive data has become available to inform public opinion. What is known is that most Americans continue to trend towards more socially

liberal views of CU, regardless of race, ethnicity, gender, education, religious or political affiliation (Felson et al., 2019). Changes in state CU laws have had an impact on attitudes, and legalization of cannabis has prompted substantial attitude changes based on the culture of the state, not by geographical proximity or top-down diffusion through the federal government (Hannah & Mallinson, 2018). Adults who oppose legalization has decreased from 52% in 2010 to 32% in 2019, and most adults (91%) say CU should be legal for either medical or recreational use, with 59% of adults supporting medical and recreational CU, and 32% support CU for medical use (Pew Research Center, 2019). An overall decrease in religiosity and a decline in harsh sentencing policies by law enforcement also may have contributed to more relaxed views towards CU and punishment related to CU violations (Felson et al., 2019). Changes in societal perception of cannabis may increase motivation to initiate use through formation of new norms supporting CU because of RML and MML enaction (Andersen et al., 2015). Overall, medical, and recreational marijuana have become increasingly supported by the public over the last few decades and recent laws favoring marijuana legislation in some states have reflected that shift. As more states have enacted policies in favor of both medicinal and recreational CU, the prevalence rates of usage also have shifted and will continue to change in accordance with changing statewide and federal laws.

Prevalence of CU in the U.S.

The popularity of marijuana has fluctuated throughout the last century because of the substance's federally prohibited status since 1937 (Sacco, 2014). Cannabis popularity in the U.S. has increased in recent years due to most U.S. states currently having legalized CU in some form. An examination of prevalence rates across, age, and type of cannabis consumed (recreational or medical) will provide insight into current CU in the U.S.

CU in Adult Populations

In general, it is easier to collect data on adult CU because adults are not considered members of a vulnerable population, whereas child and adolescent research participants are considered vulnerable and in need of special protections (Bracken-Roche et al., 2017). Adult prevalence rates for CU are highest among young adults ages 18 to 25 (19.8% using in the past month; CBHSQ, 2016a), however, CU also has been increasing in adults over 50, with past year CU increasing from 15.1% in 2014 to 23.6% in 2016 (Subbaraman & Kerr, 2021). In older adults ages (50-64) who engage in CU, 34.4% of females and 39.2% of males report daily or near daily use, and among elderly adults over the age of 65, 17.9% of females and 41.9% of males report daily or near daily use (Subbaraman & Kerr, 2021). Adults with medical conditions are more likely to engage in CU compared to those without medical conditions; however, CU prevalence rates decreased in older adults with medical conditions compared to older adults without medical conditions (Dai & Richter, 2019).

Regarding college students, CU currently is the most prevalent federally illicit substance on collegiate campuses with 44% of college students reporting annual CU in 2020 compared to 38% in 2015, and 25% of college students report engaging in CU in the past 30 days (Schulenberg et al., 2021). In addition, in 2020 8% of college students reporting daily or near daily CU compared to nearly 5% in 2015 (Schulenberg et al., 2021). College attendance is also a risk factor for CU initiation as college students who had never engaged in CU in high school were 51% more likely in 2015 to engage in CU in the past year compared to same age peers not attending college (Miech et al., 2017). Overall, CU prevalence rates among adults continue to increase. Along with adult prevalence rates, understanding CU in adolescents may help predict the state of cannabis use in the future.

CU in Adolescent Populations

The National Survey on Drug Use and Health (NSDUH) and Monitoring the Future (MTF) surveys have documented CU use from nationally representative samples since the early 1970s, including adolescent use. The NSDUH polled American youth from 12 years of age and older since 1971 and MTF has been polling high school seniors since 1976 and made the decision to add 8th- and 10th-graders in 1991 (Center for Behavioral Health Statistics and Quality [CBHSQ], 2015). In the U.S., marijuana is currently the most used federally illicit drug among adolescents in terms of past-month users (NIDA, 2019b), however, prevalence rates largely depend on the age of the user. For example, in 2018, 11.8% of eighth graders used cannabis in the past year whereas rates were higher for 10 graders (28.8%) and 12th graders (35.7%; NIDA, 2019b). Ease of access may contribute to increased use by older teens, given that 35% of 8th graders, 64% of 10th graders, and 81% of 12th graders said cannabis products were "fairly easy" or "very easy" to obtain (Johnston et al., 2018). It also seems that CU may be more problematic among youth than other forms of substance use. Specifically, although rates of past-year CU (37%) were comparable to past-year alcohol use (42%), adolescents are more likely to report a CUD (14%) than an alcohol use disorder (AUD; 4%; D'Amico et al., 2016). Additionally, CU is the leading cause for entering substance abuse treatment among adolescents (CBHSQ, 2018) and in 2015, 650,000 youth (12 to 17) who engaged in CU met criteria for a CUD (CBHSQ, 2018).

Overall, daily CU went up significantly since 2018 among 12th graders (7.5% in 2018 to 14% in 2019) and 10th graders (4.8% in 2018 to 9.2% in 2019; NIDA, 2019). This newer data shows a change from previous data reporting a decrease in CU as 16% of 8th graders initiated CU in 2012, but in 2016, those rates decreased to 13% (CBHSQ, 2018). Data indicates that 11%

of 8th graders, 28% of 10th graders, and 36% of 12th graders used cannabis in the past year, and daily CU rates were 1% of 8th graders, 3% of 10th graders, and 6%, of 12th graders (Johnston et al., 2019). In terms of past-month use, an estimated 22.2 million Americans 12 years of age or older have reported CU within the past month (8.3%; Center for Behavioral Health Statistics and Quality [CBHSQ], 2016a). There also is contradicting research that suggests in the past two decades CU has not increased among 12- to 17-year-olds (Azofeifa et al., 2016). This could be potentially due to self-report bias and social desirability bias in the study, and more research is needed to assess CU among 12- to 17-year-olds to clarify these findings (Azofeifa et al., 2016). In sum, prevalence rates largely depend on the age of the user; however, the data suggests that CU is a concern among both adolescents and young adults. Prevalence rates across different racial and ethnic groups also should be considered given that cultural considerations in assessment and intervention of CU and CUDs are a key component of effective treatment.

Racial Differences in CU Prevalence Rates

There also are differences in CU among various racial and ethnic groups in the U.S. Currently, Black Americans engage in CU at the highest rate among major ethnic groups (10.7%), followed by Whites (8.4%), and Hispanics (7.2%; NASEM, 2017). With regard to adolescents, the prevalence of risky CU behaviors has been steadily increasing since the 1990s with White, Native-Americans, or multiracial adolescents more likely to engage in CU compared to Black, Hispanic, or Asian adolescents (Wu et al., 2015). Contradictory findings exist, however, regarding the exact description of trends and patterns of adolescent CU due to the complexity of statewide differences in legal status and cultural shifts. For example, a more recent study by Wu et al. (2015) suggested Native-American and mixed-race adolescents had a higher likelihood of past-year CU and diagnosis of a CUD compared to Whites. In addition, Hispanics

and Native-American populations had increased chances of being diagnosed with a CUD compared to Whites (Wu et al., 2015). Another study by the American Civil Liberties Union found that Asian adolescents remain at much lower CU prevalence rates compared to other racial, or ethnic, groups (Wu et al., 2011).

With regard to adult populations, Hasin et al. (2016) reported that lifetime CUD was found to be highest among Native American adults, followed by Blacks, Whites, Hispanics, and Asians sequentially. Among young adults attending college, Hispanic and White students were more likely to report drug use (including CU) and abuse compared to Asian and Black students (McCabe et al., 2007). In 2019, among young adults, 20.8% of Native Americans reported past month CU and 11.4% reported past year daily use, compared to 26.9% and 8.2% of Blacks, 12.4% and 2.1% of Asians, and 19.8% and 6.4% of Hispanics respectively (NSDUH, 2019). One possible reason for discrepancies in the literature is that much of the research regarding ethnic and racial differences tend to categorize individuals into broad racial groups (Asian, Black, Hispanic, and White) without considering heterogeneous factors such as geographic location or population density (Unger, 2012). More longitudinal studies are needed to better understand the complexity of CU across racial and ethnicity groups over time (Lee et al., 2021).

Finally, a recent cross-sectional study analyzing surveys of U.S. adults from 2008 to 2017 who resided in a state with legalized recreational CU revealed an increased likelihood of CU across all races and ethnic groups (Martins et al., 2021). Specifically, Martins et al. (2021) found that individuals from different racial and ethnic backgrounds (including Asian Americans, Native American and Pacific Islanders, and those that reported being multiracial) all reported increased CU. Therefore, understanding ethnic and racial discrepancies regarding CU is important to

effectively provide treatment modalities to various groups. In addition, it is imperative to understand the prevalence rates of different types of CU, including medical and recreational.

Prevalence of Medicinal and Recreational Use

When considering the prevalence of CU, it is important to examine differences in medicinal and recreational use. In general, the use of cannabis-based products, both medicinally and recreationally, has been increasing in the U.S. over the past few years (Compton et al., 2016), however, recreational use continues to be the primary modality of CU in the U.S. (Schauer et al., 2016). Specifically, among adult populations engaging in CU, 89.5% used for recreational purposes compared to 10.5% using for medical purposes and slightly over one-third (36.1%) of the sample reported a mix of medical and recreational CU (Schauer et al., 2016). There are few available studies specifically examining medical CU because studies have been stymied due to lack of standardization of dosing and potency of both CBD and THC (Bridgeman & Abazia, 2017). However, a recent study specifically examining the medical CU of primary care patients who were screened for past-year usage and found that 2% had practitioner documentation, whereas 20% did not have documentation from a practitioner (Matson et al., 2021).

Prevalence of recreational CU also differs depending on the state's legal status. Goodman et al. (2020) examined CU among states with RML or MML as compared to states without legalization of cannabis. The researchers found that CU was significantly higher in states that had introduced legalization laws compared to states that had not (daily [11.3% vs 7.4%]; weekly [18.2% vs 11.6%]; monthly [25% vs 16.8%] respectively). Overall, the prevalence of all recreational CU products including concentrates, edibles, and drink is higher in states that have legalized CU (Goodman et al., 2020) and recreational use is more prevalent than medicinal use

(Schauer et al., 2016). Both medicinal and recreational CU may be prevalent on college campuses and could potentially impact student development in an individual's college attending years. The impact of CU on student development may be explained by existing theoretical perspectives on collegiate addictions, particularly Chickering's Seven Vectors of Identity Development and how this theory mediates an individual's college years with an increased risk to engage in substance use behaviors such as CU.

Theoretical Perspective and Collegiate Addictions

Cannabis is the most prevalent illicit substance used on college campuses today and usage among college students is increasing with many students reporting that they began using marijuana during their collegiate years (Suerken et al., 2014). Around 25% cannabis users reported they had not engaged in CU prior to beginning college (Pinchevsky et al., 2012). High prevalence rates, increased autonomy from parents, widespread availability on college campuses, and increased likelihood that college students will engage in CU to heighten sociability and ease emotional distress from personal and academic problems are all major concerns (Beck et al., 2009). Overall, cannabis' potential to negatively impact on the lives of college students means that it is of the utmost importance to examine problematic cannabis use among college students specifically (Suerken et al., 2014).

College Student Development and CU

Young adults entering college are often faced with a myriad of new freedoms, challenges, risks, and new stages of identity development. These issues may contribute to collegiate CU and problematic CU. There is a plethora of literature documenting college students' susceptibility to developing addictions to various substances, such as cannabis (Clements, 1999; Engs et al., 1996; Johnston et al., 2012; Wechsler et al., 2000; Yang, 2000). Collegiate students are often

individuals arriving at emerging adulthood and there are several theoretical conceptualizations that can be applied to college attending young-adults. Chickering's Seven Vectors of Identity Development provides an apt conceptualization of the intersectionality of emerging adulthood and the impact of identifying as a college student has on an individual's development (Chickering, 1969).

Chickering's Seven Vectors of Identity Theory is considered a psychosocial theory and focuses on how attending college is a significant factor in the development of an individual's identity (Chickering, 1969). Chickering's theory postulates that an individual's identity development is tied to their attempts to simultaneously mediate the stressors of the college environment with their emotional self-regulation (Ambroson, 1996). One way that individuals attempt to navigate the college environment and their emotional states is by forming and joining social groups based on their need to find a sense of self (Reifman & Watson, 2003). It is believed that young adult college-attending individuals may begin using substances due to social influences that cause a wide range of problems including social anxiety and poor interpersonal behaviors (Reifman & Watson, 2003). In addition, these social influences may cause college students to seek out other social networks based on the commonality of their chosen addictive behavior or substance, which further perpetuates addictive behaviors and tendencies (Reifman & Watson, 2003). An article by SAMHSA (2004) supports this idea by arguing that there are differences between college students with addictions and adults with addictions due to specific developmental issues, differences in values and belief systems, environmental influences, and ongoing identity development during an individual's collegiate years. These differences may suggest that college students are more susceptible to substance use and may have a higher propensity to engage in problematic use and potentially develop an addiction (Johnston et al.,

2012). Chickering's theory, as it relates to substance use among college students, has several implications for the field of counseling that are imperative for counselors working with a collegiate population to consider.

College Student Development, Substance Use, and Mental Health

Chickering's theory is applicable to counselors working in a college setting because these counselors need to be informed about how identity development during an individual's college years may overlap with propensity to engage in substance use behaviors. Specifically, college students may experience specific life transitions and stressors that increase their risk of mental health problems such as substance use (Hunt et al., 2010). In addition, students who may be more easily influenced by social pressures due to their identity development may be challenged by college environments with easily accessible sources of cannabis and other substances, and a college culture that promotes the misuse of substances (Laudet, 2008). Counselors in college settings not only need to be mindful of the risk factors on college campuses, but also must understand that there is a high comorbidity between substance use disorders and other mental illnesses such as depression and anxiety disorders that may lead to an increased likelihood of academic issues and other struggles in college (Minkoff, 2001; Perron et al., 2011). Therefore, substance use problems should be considered as a major mental health paradigm aligned with student identity development that college counselors need to be trained and ready to treat on college campuses. To recapitulate, Chickering's Seven Vectors of Identity Development Theory can provide a framework for college counselors to understand the unique intersectionality of college student development and the unique risk factors that they face in order to provide effective treatment of substance use concerns. Understanding the potential outcomes of CU is

also important for counselors to understand to have frank and informed discussions with college students about the risks involved with engaging in CU.

Potential Outcomes of CU

Over the past decade the enactment of RML and MML has led to more research regarding CU and potential impacts. As a result, there are many recent studies documenting both negative consequences and potential benefits associated with CU. Negative consequences may include physical health concerns, a propensity to exacerbate some psychiatric symptoms, and the degree of negative impact could be related to the potency of THC in the product. Some potential benefits include decreased opioid use, pain relief, and therapeutic benefits for psychiatric symptoms.

Potential Negative Consequences of CU

CU is associated with negative outcomes such as CUDs (Hasin et al., 2016), respiratory problems, lower educational and career achievement, and vehicular crashes (Carliner, 2017). A physical health concern related to chronic cannabis inhalation includes an increased risk for ischemic stroke (Thanvi & Treadwell, 2009), however, more behavioral outcome research is needed to clarify contradictory findings related to CU and strokes (Rivers-Auty et al., 2014). There also are neurological and mental-health related negative outcomes associated with chronic CU. Specific neurological disorders included cognitive dysfunction (attention, verbal, and nonverbal learning; Shrivastava et al., 2011) behavioral problems (Sorkhou, 2021), memory issues (NIDA, 2019a), and changes in the brain (Archie & Cucullo, 2019; Battistella et al., 2014).

CU is known to exacerbate symptomology of schizophrenic patients and CU can cause an acute psychotic reaction in non-schizophrenic people who are heavy users, although the

psychotic symptoms may subside as the drug effects wane (Diaz, 2017). Overall, any potential negative outcomes that individuals may experience from CU vary due to genetic variabilities. Some genetic predictors of vulnerability to adverse reactions include depression and anxiety disorders that could enable regular CU to transition to a CUD (Flórez-Salamanca, 2013). Indeed, the presence of any mental disorder may indicate genetic predictors for developing a CUD (Lowe et al., 2019).

Another potential negative consequence of CU includes amotivational syndrome, which is described as a decrease of motivation-related paradigms (self-efficacy, initiative, persistence; Lac & Luk, 2018). Also, some scholars argue that CU is a "gateway" to harder drugs, which are drugs that are highly addictive and can be injectable (Kandel, 1975; Kandel et al., 2006; Secades-Villa et al., 2015). Moreover, CU with high THC potency can induce anxiety (Patton et al., 2002) psychosis, and paranoia, (Volkow et al., 2014). Finally, CU has been shown to impair driving ability (Hartman & Heustis, 2013) and the enaction of RML is associated with increased traffic fatality rates in states with recreational CU (Kamer et al., 2020). Future research should be conducted to determine the relationship between CU and traffic fatalities to rule out potential confounders in the data (Kamer et al., 2020).

The age of exposure to CU also plays an important role in potential outcomes as adolescents may experience severe memory impairment due to CU compared to adult populations (Jouroukhin et al., 2019). Importantly, mental health outcomes are directly related to the strength of association with CU, meaning that higher frequency of use is associated with poorer mental health outcomes (Freeman & Winstock, 2015). Heavy CU (i.e., smoking marijuana 27 days in 30 days) has a significant impact on an individual's ability to learn, their memory, and ability to function in society (NIDA, 2021b). Adolescents who engage in CU often

socialize in substance using peer-groups, possibly reinforcing pressure to continue to use (Block & Ghoneim, 1993). However, it should be noted that it is difficult to compare and replicate findings from different studies because daily CU is defined differently by various authors. For example, van der Pol and colleagues' (2013) definition of "frequent use" included parameters that included usage on at least three days in a week for at least one year, whereas an earlier study by Griffin and colleagues (2002) defined "regular use" as usage at least one time per month, or more frequently. Varying definitions of terms such as use, frequent use, or regular use are problematic for researchers and readers alike, and there are multiple instances of irregular nomenclature in the CU literature (Griffin et al., 2002; Kahn, 2017; van der Pol et al., 2013). In summation, considerable evidence suggests that CU may be linked to potential negative consequences and outcomes. However, there also are noted beneficial outcomes in the literature that are associated with the consumption of cannabis-based products.

Potential Benefits of CU

In addition to potential negative consequences, research shows that there are some potential beneficial outcomes associated with CU such as decreased opioid use when engaging in CU as a pain reliving substitute (Kim et al., 2016). Increased access to CU may be related to reductions in opioid use and harmful behaviors associated with opioids (Bradford et al., 2019; Lake et al., 2019; Shi et al., 2019). Vyas et al. (2018), reported that states with MML could potentially reduce fatal opioid overdoses and lead to decreased health care costs. However, research related to the medical uses of cannabis is currently hindered by federal law and more research related to medical cannabis as a potential alternative to opioids is needed (Vyas et al., 2018).

Some scholars have argued that CU may have therapeutic benefits in managing certain symptoms such as pain and anxiety (Webb & Webb, 2014). Additionally, documented therapeutic benefits using cannabinoids found in the marijuana plant, such as CBD, have been observed (NIDA, 2021). One recent study by Cohen et al. (2019) found that cannabis-based medications and THC might have therapeutic potential against some symptoms of multiple sclerosis and chronic pain. Cannabinoids, such as CBD, are non-psychoactive and do not induce feelings of euphoria but may provide relief for somatic ailments (Hill, 2015; Martínez et al., 2020). THC also has potential medical benefits, and the U.S. Food and Drug Administration (FDA) has approved THC-based medications, for treatment of cancer patients (nausea) and for AIDs patients (appetite; NIDA, 2021).

There is documented evidence that cannabis has been used to treat inflammation, nausea, seizures, pain, mental disorders, addictions, movement problems, and Alzheimer's-type dementia (NIDA, 2021). Moreover, cannabinoids, such as CBD, also have therapeutic potential for various types of psychiatric disorders including schizophrenia, posttraumatic stress disorder, and some anxiety disorders (Khan et al. 2020). Additionally, available medical parameters for benefits include therapeutic use of CBD being effective at high doses (300–1500 mg) in treating epilepsy, anxiety, and psychosis (Arnold et al., 2020). Some chemicals in cannabis may have potentially beneficial outcomes (medical and therapeutic) and THC also is linked with medical benefits, however more research is needed regarding clear guidelines on usage of cannabis-based medication and therapeutics (Dariš et al., 2019). Understanding the potential consequences and benefits of CU can help contextualize the demographic, psychosocial, and environmental correlates of CU.

Correlates of CU

Correlates and patterns of CU are important concepts for researchers to monitor due to the rapidly changing cannabis industry. Demographic, psychosocial, and environmental factors continually evolve as more states enact RML and MML and those predictors may influence treatment paradigms for CU and CUDs in the future. Some of the known correlates of CU are demographic characteristics.

Demographic Characteristics

Several correlates of CU exist in the literature and although well studied in adolescent populations, there is much less research regarding correlates among adult users (Epstein et al., 2018). Historically, CU has been shown to slowly increase during adolescence, plateau in young adulthood, and begin to decrease in adulthood for most users (Johnston et al., 2004). However, recent findings have not followed this pattern and research of adults in their late 20s and early 30s revealed 25% to 30% of all adults currently reporting CU in the past year (Johnston et al., 2018) and 6.6% engaging in CU in the past month (Hedden, 2015). Regardless of age, males are more likely to engage in CU compared to females (Hemsing & Greaves, 2020). Specifically, higher past year use has been observed among adolescent males (29%) compared to females (24%; Johnston et al., 2004), and another study by the Substance Abuse and Mental Health Services Administration (SAMHSA) reported higher lifetime use among adolescent males (17%) than females (15%; SAMHSA, 2008). Moreover, Hasin et al. (2016) found that CUD prevalence rates are 3.5% among young adult males, which is more than double the rates in females (1.7%). Therefore, both age and gender are important demographic correlates of CU.

Another important demographic correlate of CU is the age of first use. Early age of first use (which is defined as being younger than age 13) is associated with an increased likelihood

for poorer outcomes in psychosocial, educational, and mental health paradigms compared to individuals who begin using substances older than age 13 (Kingston et al., 2017). Individuals who begin engaging in CU earlier in life are more likely to engage in use of multiple substances, use more frequently, are more likely to become intoxicated, experience more frequent episodes of intoxication, and are more likely to develop a SUD compared to individuals who begin using past the age of 13 (Richmond-Rakerd et al., 2017). Along with demographic characteristics, psychosocial correlates also are important to consider when examining CU.

Psychosocial Correlates

Psychobiological programming is determined by genetic factors and environmental influences. Adults who engage in CU may have different personality traits than those who do not use cannabis. These personality traits are based on a study by Thurstone (1934) called the Five Factor Model, which included domains of Extroversion, Agreeableness, Openness, Conscientiousness, and Neuroticism. Adult cannabis users have been found to have higher levels of Agreeableness and Conscientiousness compared to non-users (Digman, 1990; Fridberg et al., 2011). Moreover, adult CU was found to be associated with higher disorganized schizotypy and total schizotypal personality traits (Fridberg et al., 2011). Studies examining the Five Factor Model in conjunction with CU have reported mixed results, however, as another study by Blanchard et al. (2013) found that adults with a CUD presented with significantly higher levels of Excitement-Seeking and Immoderation, but lower Agreeableness, Cooperation, Dutifulness, Achievement-Striving, and Cautiousness compared to those who do not have a CUD. More research is needed examining the factors of Agreeableness and Conscientiousness in relation to CU, but it appears that certain personality traits correlate with CU.

Substance use in adolescence also is correlated with personality traits and environmental factors (Spechler, 2019). For example, the trait of novelty-seeking is highly correlated with substance use (Malmberg et al., 2012; Spechler et al., 2019). Adolescents who prefer immediate rewards over delayed rewards may also have an increased propensity to engage in substance use behaviors (Steinberg, 2008). Adolescents who prefer immediate rewards also are more prone to display insensitivities to the dangers of some drugs (Cauffman et al., 2010). Impulsive behaviors are a known factor in those who have been diagnosed with a SUD (Allen et al., 1998). Sensation-seeking behaviors also may be a correlate of CU and other substance use. This association is due to a higher likelihood to experiment with drugs and other risky behaviors in late adolescence and young adulthood (Spooner & Hetherington, 2005). Thus, psychosocial factors such as personality traits, impulsivity, and sensation seeking may be associated with CU.

Environmental Correlates

Environmental correlates of CU include increased risk among young adults who have subsistence problems. This means that individuals with low-income who have difficulty meeting their basic needs may engage in CU as a coping mechanism for poverty-related stressors (Najman et al., 2010). Familial environment also has been found to be directly related to CU and CUDs. Children who live in a home with familial problems such as divorce, family disruption, and familial conflict are more likely to engage in CU in both adolescence and young adulthood (Haug et al., 2014). Other familial risk factors for substance use included the presence of siblings who use, particularly siblings that are older (Vakalahai, 2001). Stressful, or traumatic events also are environmental correlates of concern for CU, particularly with adolescent populations (Hendin & Haas, 1985; Hyman & Sinha, 2009). Various forms of life stress also may increase the neurobiological risk of substance use (Sinha, 2008). The relationship between stress and

substance use suggests that chronic stress and stress reactivity may lead to impaired capacity for impulse control, which may increase the likelihood that an individual will experience a SUD (Sinha, 2008). Thus, many demographic, psychosocial, and environmental factors are associated with CU. The impact of chronic stress, and how an individual may become more sensitive to stress through repeated negative experiences, also may impact CU. This relationship may be best conceptualized using the Stress Sensitization Theory.

Stress Sensitization Theory

There may be a relationship between CU and stress sensitization. The connection between stress and diagnoseable mental disorders has long been studied in psychological research. In 1992, Post theorized that an individual's first experience with an affective disorder, (i.e., an illness that impacts a person's thoughts or feelings) has a higher likelihood of being preceded by major psychological stressors compared to subsequent episodes. After repeated negative experiences, individuals may become sensitized to stress and thus are more easily triggered by stressors that are not considered severe (Harkness et al., 2015). Moreover, these stressors potentially increase in severity with successive episodes of affective disorders (Harkness et al., 2015). The intention behind the development of the Stress Sensitization Model was to explore how the relationship between stress and an affective disorder may change over the course of the disorder due to stress-related factors (Post, 1992). Specifically, as individuals become more sensitized to stress through repeated experiences, the threshold to initiate a stress response may become increasingly lower with each successive episode of stress (Stroud, 2018). There also is a relationship between stress and drug-seeking behaviors. Scholars have produced research that has shown the likelihood of drug-seeking behaviors increases with acute stressors and by cues and contexts associated with substance using behaviors (Preston et al., 2018).

Researchers also have found that the presence of stress and drug cues can impact, and potentially increase, one's cravings for substances (Jobes et al., 2015). CU often is practiced as a stress-coping strategy for negative life events and trauma (Hyman & Sinha, 2009). In accordance with the Stress Sensitization Theory, the decisions a person makes often coincide with social influences and acute stress (Cingl, 2018). Although there are limited studies examining stress and social learning, research suggests that social learning behavior may not be affected by mild stressors, but more severe, or chronic stressors could potentially lead to negative outcomes (Cingli, 2018; Haushofer et al., 2015). Therefore, in light of the tenets of Stress Sensitization Theory, individuals who have experienced more lifetime stressors or who lack appropriate regulation strategies may engage in more CU and have more CU related problems. Characteristics such as one's degree of self-regulation (SR), emotion regulation (ER) as well as history of early trauma, including poverty, may be important predictors of CU.

Self-Regulation and CU

SR skills have an important neurological link to CU specifically, as well as substance use in general, given that SR skills often are lower in individuals with any type of SUD, including CUDs, compared to those who do not engage in substance use (Bakhshani, & Hosseinbor 2013). In their seminal work related to SR, Mischel and colleagues (1972) developed a delay-of-gratification modality (commonly known today as the "marshmallow test"), that measured how long a child could resist settling for one marshmallow (a smaller reward) that was available immediately in order to earn two marshmallows (a larger reward) after waiting for a longer period of time (Mischel et al., 1974). The marshmallow test suggested that children who were better at self-control had greater SR abilities and were more successful completing tasks (Gillebaart, 2018; Mischel, 2014). Baumeister and Vohs (2007) defined SR as the way in which

an individual exerts control over their attentiveness, thoughts, emotions, impulses, and behaviors. More recent studies described SR as enabling individuals to guide their thoughts, feelings, and behaviors in a purposeful manner (Kelley et al., 2019). Specific SR activities can include goal setting, strategic planning, and behavior modification paradigms (Mann et al., 2013).

With regard to substance use, researchers have linked difficulties in self-regulating emotions to SUDs (Kuntsche et al., 2007). Indeed, studies show that measures of poor SR, such as impulsiveness and affective lability, are related to adolescent substance use (Wills et al., 2011). This finding is particularly important given that adolescents are in the formative years of their neural development and poor behavioral regulation skills may contribute as potential pathways to substance use and SUDs (Wills & Ainette, 2009). Child and adolescent psychosocial problems are reflective of diverse maladaptive cognitive and limbic system functioning that impacts regulation of emotional responses (Wyman, 2010). The regulation of emotions is a core attribute of SR skills.

Difficulties with SR are problematic for many reasons, including an increased propensity to develop a SUD (Kuntsche et al., 2007). SR and emotions are neurologically connected because they both involve the exertion of top-down control process over subcortical regions associated with emotional functioning including the amygdala, prefrontal cortex, cingulate cortex, hippocampus, and the basal ganglia (Kelley et al., 2019; Phan et al., 2002). Along with predicting substance use (Wills et al., 2011), poor SR also may be related to substance relapse because executive functioning via the prefrontal cortex is theorized to play a significant role in managing substance cravings in the preoccupation stage (Koob & Volkow, 2016). The preoccupation stage is defined as the stage in which a person may begin to seek substances again after a period of abstinence (Koob & Volkow, 2010). Poor SR skills also may lead to increased

disruption of GABAergic and glutamatergic activity, which may contribute to relapse (George et al., 2012).

Regarding CU, a study by Dvorak and Day (2014) including 817 participants who were the traditional college age and older (ages ranged from 18 to 33) examined SR as a predictor of the likelihood and intensity of both CU and CUDs. The researchers found that individuals who scored higher on measures of SR had a lower likelihood of engaging in CU (Dvorak & Day, 2014). Thus, SR seems to be a protective factor against CU. Indeed, individuals who engage in CU may use SR strategies to set boundaries in their usage to try and mitigate potential negative interference with aspects of daily living (Erickson et al., 2010; Lau et al., 2015). Although some individuals engage in CU without negative consequences, individuals who experience greater life stress may be more likely to engage in CU for stress-coping purposes and are potentially at a higher risk for addiction (Hyman & Sinha, 2009).

Egerton et al. (2021) examined the interaction between implicit cannabis attitudes, SR, and negative expectancies regarding CU in adolescents with low SR and found that more positive attitudes regarding CU were associated with increased CU. Additionally, there was an association between greater levels of CU with adolescents with low levels of SR (Egerton et al., 2021). Skliamis et al. (2021) found that CU and SR rules, which are defined as both formal control measures (law enforcement) and informal cultural norms, were strongly associated frequency of use and the setting in which CU occurs. Examining SR and CU through the lens of the Stress Sensitization Theory postulates that CU may serve as a method of SR to help cope with the deleterious impact of stressful experiences on physical and mental health outcomes (Mezuk et al., 2017). Overall, SR has shown a negative relationship with CU and CUDs. Another process associated with an individual's response to stress that has been linked to CU is ER.

Emotion Regulation and CU

ER is defined as "the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions" (Gross, 1998, p. 275). The difference between SR and ER is that SR involves controlling one's behavior, emotions, and thoughts in the pursuit of long-term goals, whereas ER specifically focuses on the ability to manage one's emotions and impulses (Brockman et al., 2017; Leyland et al., 2019). More specifically, ER involves influencing emotional experiences using both internal and external processes (Morris et al., 2007), yet ER processes interact directly with SR modalities (Taipale, 2016). ER is another important predictor of CU and researchers have established a relationship between ER difficulties and substance use (Dingle et al., 2018).

There is growing evidence that CU is associated with maladaptive attempts to regulate emotional states (Garfinkle, 2017). Coping motives, specifically those tied to regulating negative emotional reactions to stress such as anxiety, fear, sadness, and anger, potentially mediate the relationship between social anxiety and severity of CU (Buckner et al., 2007). More recent studies discussed how CU might be related to the regulation of negative affective states, which can lead to maladaptive symptoms and difficulties in ER. For example, Bonn-Miller et al. (2011) examined posttraumatic stress symptom severity, difficulties in ER, and coping motives. They found that individuals who experience higher levels of stress are more likely to engage in CU, or use of other substances, as a coping mechanism and that ER deficits mediated the relationship between posttraumatic stress symptom severity and CU coping motives (Bonn-Miller et al., 2011).

A growing body of literature has linked ER deficits to SUDs. For example, a recent study by Okasha et al. (2021) examining 100 male patients chosen from the Okasha Institute of

Psychiatry who had been diagnosed with an SUD, showed that ER is a mediator for SUDs particularly when there are long durations of illness, personality traits and disorders, and high impulsivity. Another study revealed that difficulties in ER in childhood and adolescence predicted drug use and the development of SUDs in adulthood (Kober, 2014). SUDs and ER also appear to have a cyclical relationship as shown in a study of 35 adults in a residential treatment program diagnosed with a SUD compared to demographically matched controls (with a mean age of 25 years) examining the relationship between ER and SUDs (Dingle et al., 2018). The researchers found that ER is especially difficult for individuals with an SUD and this may contribute to the maintenance of substance usage (Dingle et al., 2018). Therefore, both SR and ER appear to be important in the study of CU. For example, measures of SR (self-control, sensation seeking) were better predictors of CU, while indices of emotional SR (affect, distress tolerance, and emotional instability) better predicted marijuana-related problems (Dvorak & Day, 2014). A recent study examining 241 college students who engaged in both alcohol and CU found that CU led to higher scores in emotion dysregulation and were more likely to engage in CU to alleviate negative affect (Lucke et al., 2021). Another recent study examining CU in 302 low-income, urban, Black youth (ages 10-16) found that those who abstained from CU were more effectively able to regulate their emotions (Kliewer & Parham, 2019). Moreover, Paulus et al. (2018) examined 145 adults (M = 38.5 years old) who reported daily CU and found emotion dysregulation may contribute to anxiety sensitivity and is directly associated with the severity of CU.

The ability to engage in ER has also been shown to be a core component related to stress sensitivity (Tooley et al., 2015). Regarding treatment modalities, those impacted by CUDs could potentially benefit from therapies that emphasize the development of ER skills (Garfinkle,

2017).Specifically, one study comprised of 153 participants receiving cannabis for medical reasons examined whether ER skills would be associated with problematic CU and found an interaction between high cognitive reappraisal and low emotional clarity, meaning that focusing on ER skills in treatment for CU could potentially enhance individual's decision-making abilities related to substance use and improve therapeutic outcomes (Boden et al., 2013). In summation, ER difficulties may contribute to an increased propensity to engage in CU in young adulthood as an attempt to regulate emotional states. Another important factor to consider when studying young adult CU, along with SR and ER, is the impact of Adverse Childhood Experiences (ACEs).

Adverse Childhood Experiences

Traumatic events that occur in childhood, known specifically as ACEs can impact substance abuse behaviors in adulthood. ACEs encompass 10 recognized trauma-related experiences that occur during childhood (birth to 17) in three overarching categories including abuse, neglect, and problems within the household (Chapman et al., 2007). The five types of maltreatment (encompassing the categories of abuse and neglect) are physical abuse, sexual abuse, emotional abuse, emotional neglect, and physical neglect. The five types of problems within the household are divorce, violence in the household, familial mental health problems, substance use in the home, and incarceration of a family member (Dube et al., 2003; Felitti et al., 1998). ACEs are linked to Stress Sensitization Theory because ACEs may serve as the early stressors that can lead to increased sensitivity to stress and may lower an individual's adaptive threshold for stressors (Manyema et al., 2018).

The original ACEs study conducted by the Centers for Disease Control and Prevention (CDC) and Kaiser Permanente (1997) examined over 17,000 individuals' childhood experiences

and compared those experiences to their health status and behaviors at the time of the survey. The researchers found a direct link between childhood and adolescent trauma and a wide range of potential negative outcomes in adulthood including chronic disease, incarceration, and employment challenges, all of which had an increased likelihood of occurring in individuals who had higher numbers of ACEs (Felitti et al., 1998). Importantly, traumatic experiences are counted as ACEs if there is not an attuned adult to buffer the consequences of the trauma on the child (Gladden et al., 2014). Specifically, research has shown that positive adult relationships potentially mediate against a range of mental health and substance abuse outcomes associated with ACEs (Breedlove et al., 2020; Brinker & Chervu, 2017; Von Cheong et al., 2017). In addition, when adults form safe, stable nurturing relationships with children who have experienced trauma the children are more likely to have positive health outcomes (Betthel et al., 2019).

More adverse experiences have been recognized since the original ACEs study. For example, researchers recently identified food insecurity, or diminished or unreliable household availability of adequate, nutritious food sources as an ACE (Jackson et al., 2019). Other potential ACEs include experiences not suffered in the home, but rather in the school environment such as peer victimization and bullying (Rivara & Le Menestrel, 2016). Other forms of adversity described in the literature that also are being considered as potential future ACEs include loss of a loved one in childhood, frequent relocations, accidents, childhood illness, childhood injury, exposure or forced participation in pornography, sex trafficking, natural disasters, kidnapping, torture, impacts of war, refugee camps, and being impacted by a terrorist-related attack (Dube et al., 2010; Kessler et al., 2010). Additionally, some scholars have suggested that physical discipline (spanking, hitting with an object such as a belt, making a child eat soap or other orally

unpleasant substances), poverty, neighborhood or community violence, and parents engaging in risky behaviors (such as gambling problems) should qualify as ACEs (Afifi et al., 2020).

Research regarding topics related to ACEs currently are still ongoing, and new potential ACEs possibly could be added in the future. However, to be included in the ACEs list, an experience must meet specific criteria, and be validated by research. At this point, the original 10 ACEs are well researched, and an association exists between ACE scores and substance use.

ACEs and Substance Use

ACEs are strongly related to the development and prevalence of substance misuse and SUDs (Bryant et al., 2020). Recent studies have shown that individuals who experience a greater number of ACEs were found to be at increased risk for addictive behaviors (Duke, 2018; Forster, et al., 2018; Forster, et al., 2019). Specifically, Duke et al. (2018) reported that ACEs may inform timing and content of substance use prevention and intervention activities directed at youth. With each additional ACE, the likelihood of early initiation to use illicit substances increases (Quinn et al., 2016). In a study by Dube et al. (2003) that used a retrospective cohort model of 8,613 adults, results indicated that the presence of each ACE in childhood and adolescence increased the likelihood of early substance use initiation 2- to 4-fold.

In addition, familial relationships also play a significant role as parents of youth who experience abuse are more likely to use substances (Becci et al., 2015). The usage of substances in the home is a particularly traumatic exposure as youth who observe substance use in their home environment by trusted caregivers may be more likely to model and engage in similar behaviors (Lander et al., 2013). Moreover, there is a clear connection between ACEs and substance use based on neurobiological evidence. Early childhood stress can impact the brain and lead to dysfunction in multiple regions including the hippocampus, amygdala, media

prefrontal cortex, and the presence of ACEs also can impact the emotional programming of the brain (the limbic system) that regulates anxiety and mood (Anda et al., 2006). Stress reactivity, as a result of ACEs, may be linked to poorer impulse control and impaired cognitive function, which can lead to an increased propensity to engage in substance use (Lovallo et al., 2013).

Substance use and SUDs impact development, however, SUDs in some marginalized adolescent groups, including those with ACEs, potentially creates further challenges to effectively transition into adulthood (Kim et al., 2013). An example of a marginalized group that is impacted by both substance issues and ACEs are those who identify as LGBTQ+. Gay and bisexual males with ACES are six and a half times more likely to use illicit drugs (Brennan et al., 2007), and were more likely to have used illicit drugs in the last six months (Kalichman et al., 2004). This finding may be because in the U.S., LGBTQ+ individuals still face discrimination and poorer health outcomes, and LGBTQ+ adolescents often are subjected to bullying and peer victimization tactics (Hafeez et al., 2017).

Another consideration is that ACEs and substance use might differ based on race and ethnicity. One study showed that there was a large ethnic variation between ACE exposure and substance use (Forster et al., 2019). Specific ACEs related substance use patterns across various racial and ethnic groups include increased alcohol and CU among Blacks with ACEs (Mersky et al., 2013), a higher likelihood of alcohol use among Koreans with ACEs (Kim, 2017), and a higher propensity to engage in substance use among Hispanics with ACEs (Allem, 2015). Asian/Pacific Islanders have also demonstrated increased polysubstance use as ACE scores increase and higher ACE scores have been shown to be connected to a higher likelihood of prescription medication abuse among non-Hispanic Whites (Kelly et al., 2013; McCabe et al., 2007; Mohler-Kuo et al., 2003). The impact of ACEs on different races and ethnic groups may

include other traumas associated with their cultural identities. ACE-related traumas also can be antithetical to some cultural beliefs and potentially violate group oriented cultural norms (Triandis et al., 1990). For example, in collectivistic cultures such as the Hispanic and Latinx community, being impacted by ACEs might have a particularly influential role in substance use decisions because traumatic events that occur in childhood are antithetical to group oriented cultures, and thus may lead to greater trauma, or distress (Allem et al., 2015; Arnett, 2003).

Forster et al. (2018) found that variability in ACE-related substance use patterns across ethnic groups underscores the need for more research that advances understanding of sociocultural influences. Cultural groups that have faced oppression and marginalization such as the Native-American populations have a high proportion of ACEs, specifically among Native-American females (Brockie et al., 2015). De Ravello et al. (2008) studied ACEs in incarcerated Native American females and results showed 75% of participants were exposed to ACEs. Marginalized subpopulations that also are impacted by ACEs and struggle with substance use and transitioning into adulthood include children in foster care (Hambrick et al., 2016), suicidal youth (Sachs-Ericsson et al., 2016), ethnic minorities (Burnette & Figley, 2017), and youth with co-morbid psychotic symptomology (Dvir et al., 2013). In summation, because marginalized groups have suffered inequities in the U.S., they may be more likely to experience ACE-related trauma, which can increase the risk of substance use in adulthood. Similar to the relationship between ACEs and substance use in general, emerging literature suggests that cannabis-based products are a substance that also is associated with traumatic events in childhood.

ACEs and CU

There is evidence that suggests childhood trauma may be linked specifically to engaging in CU in adolescence and adulthood. A recent study by Richard et al. (2021) of 6,304 students

aged 12 to 18 *(M* =14.75, *SD* = 1.76) assessed ACEs, substance use behaviors, perceptions of harm, and perceived peer and parental attitudes towards substance use. The authors found that peer and parental attitudes partially mediated the relationship between ACEs and past month CU, meaning individuals who experienced ACEs were at a higher risk of engaging in CU, and those with more ACEs and more accepting peer and parent attitudes engaged in more CU. In addition, CU may be associated with several adverse experiences and risk behaviors during childhood as demonstrated in a recent study by Folk et al. (2021). The researchers surveyed first-time justice-involved youth (*n* = 271) and found that exposure to more ACEs predicted CU, among other substance use, and psychiatric outcomes among participants (Folk et al., 2021).

ACEs also are directly associated with early age CU, as demonstrated in a recent study by Fusco et al. (2021), using a community sample of 185 low-income young adults. The researchers found that roughly a third of those who experienced multiple ACEs in childhood reported frequent CU (Fusco et al., 2021). Finally, a study by Abajobir et al. (2017) using a sample of 2,526 participants in the Mater Hospital-University of Queensland Study of Pregnancy showed that childhood physical abuse predicted CU, and maltreatment in childhood predicted early age of onset of CUDs. Gender also may play a role in the relationship between ACEs and CU as ACEs appear to be more strongly related to substance use among females compared to males and researchers have found ACE exposure to be directly associated with female CU (Cunradi et al., 2020). Overall, ACEs can be a potential source of stress that can make individuals more apt to cope via CU, and more likely to develop a CUD as a result of maladaptive coping. Another potential stressor that can influence CU, and is related to ACEs, is childhood poverty.

Childhood Poverty

Socioeconomic status (SES) is broadly described by the APA as the communal standing, or classification, of both individuals and groups financially, socially, or culturally, and is considered an important factor related to the behaviors and functions of individual and groups throughout their lifetime (APA, 2007). SES is traditionally measured at the individual, family, or household level, which are referred to as the "big three" indicators of SES (APA, 2007; Berzofsky et al., 2015; National Center for Education Statistics [NCES], 2012). SES also can be used to describe both individual and groups' access to other types of resources including financial, social, and cultural pedagogies (APA, 2007; NCES, 2012; Shavers, 2007). Thus, there is a plethora of socioeconomic factors that can be considered when conceptualizing SES, such as socioeconomic positioning, social disadvantage, and socioeconomic deprivation (Berzofsky et al., 2015).

It currently is understood that there is no universal standard to assess SES, and the approach often used is relative to the model, research design modalities utilized, and available data (Braveman et al., 2005). However, the U.S. federal government does provide a poverty threshold each year as a benchmark for financial poverty. In 2020, the financial poverty benchmark was $13,465 for one person under 65 years old, and $12,413 for an individual over 65 (U.S. Census Bureau, 2021). For two people, the benchmark for financial poverty was $17,413 for individuals under 65 years old, and $15,659 for individuals over the age of 65 (U.S. Census Bureau, 2021). The financial poverty benchmark increased slightly in 2020 compared to 2018, possibly due to inflation, as the 2018 poverty threshold in the U.S. was $12,140 for one person and $25,100 for a family of four (APA, 2019).

U.S. rates of poverty are substantially higher than other developed nations (Organization for Economic Co-operation and Development [OECD] Data, 2019). Over 15 million children in the U.S. are impoverished and child poverty is considered a major social concern (McCarty, 2016). Around one in five children in the U.S. live in poverty and childhood poverty is associated with negative physical and mental health outcomes that can affect individuals not only in childhood, but into adulthood as well (Dooley et al., 2020). With regard to SES among young adults attending college, approximately 13% of 2-year college students and 11% of 4-year college students came from food-insecure families in 2015 (Blagg et al., 2017). A recent study by the Pew Research Center (2019) found that 31% of undergraduates were in financial poverty, up from 29% in 2016 and 21% in 1996. Another recent study of 43,000 students at 31 community colleges and 35 four-year universities in 20 states revealed that 36% of college students suffered from food insecurity and 36% had housing insecurities (Goldrick-Rab et al., 2018). Thus, histories of poverty impact a substantial number of college students.

Research has shown that childhood poverty is associated with chronic stress and stress sensitization (Kim et al., 2013). It is understood that low SES families are more likely to experience higher degrees of stress compared to high SES families, particularly in areas related to finances, social relations, employment, and overall health indices (Senn et al., 2014; Reiss et al., 2019; Weyers et al., 2010). Moreover, impoverished children are more likely to experience a disruption of emotional responses and an increase in sensitivity of the amygdala to negative emotional states (Hackman et al., 2012; McEwen & Gianaros, 2011). Specifically, poverty may impact the development of executive function and systems that control ER and attention (Blair et al., 2012). Furthermore, childhood poverty is associated with ACEs. Indeed, research suggests

that poverty is comorbid with ACEs, meaning that a child born into poverty is more likely to experience ACEs than a child in a more affluent environment (Allen & Donkin, 2015).

Simply put, childhood adversities exist in economically insufficient families because these families are subject to more unfavorable outcomes than economically sufficient families (Walsh et al., 2019). In addition, there is a connection between childhood adversities related to poverty and a greater propensity to experience negative outcomes in adulthood, meaning poverty could itself be considered an ACE (Hughes & Tucker, 2018). Chronic stress due to repeated exposure to childhood adversities may impair self-control leading to poorer responses to stress and greater vulnerability to abusing substances such as cannabis (Wolff et al., 2021). Therefore, understanding the unique relationship between childhood poverty and substance use, specifically CU, can provide useful information to implement interventions and understand potential outcomes.

SES and Substance Use

Research examining the relationship between SES and substance use reveals that low SES is associated with more substance use among teenage users including increased alcohol, cigarette, and cocaine use (Humensky, 2010). However, some researchers suggest that substance use may be higher among high SES adolescents, particularly alcohol (Martin & Pritchard, 1991). One possible explanation for higher rates of substance use among high SES adolescents is that high SES parents may have more tolerant attitudes regarding substance use compared to lower-SES parents (Luthar & Goldstein, 2008).

The magnitude of the relationship between substance use and SES also may differ across age groups and consumption patterns. For example, lower SES was associated with CU in young adults transitioning from high school (Kirst et al., 2014). The relationship between adolescent

substance use and poverty is cyclical as adolescent substance use is associated with decreased educational attainment and decreased productivity in the work force (Renna, 2007). Therefore, adolescents who use substances early in life are more likely to have economic difficulties as adults (Etnner et al., 1997; Renna, 2007).

In addition, CU may negatively impact potential future SES by diminishing cognitive functioning and motivation that impacts educational and occupational goals (Thompson et al., 2019). CU can lead to risky behaviors of usage that may compromise academic achievement, or by creating health problems that are incompatible with educational and occupational success commonly associated with higher SES (Fergusson & Boden 2008; Scholes-Balog et al., 2016; Zhang et al., 2016). Indeed, Davenport and Caulkins (2016) found that around 29% of those who engage in CU in the U.S. had a household income below $20,000. They also found that nearly 15% of those who engage in CU spend approximately one quarter of their income on cannabis products (Davenport & Caulkins, 2016).

Moreover, mental health problems associated with CU might be influenced by poverty, as a recent study by Carrà et al. (2018) found that the relationship between severe mental illness and CU is influenced by low SES status. However, research regarding the relationship between substance use and income-level has produced mixed findings. For example, low SES adolescents are more likely to engage in substance use, whereas adults with higher SES are more likely to use substances (Bellis et al., 2007; Goodman & Huang, 2002). Another study of 1,203 young adults found that individuals with high familial SES were most like to engage in alcohol use and CU (Patrick et al., 2012). Therefore, given the mixed findings, more research is needed to clarify the relationship between childhood SES and CU among young adult populations. One method to

effectively measure an individual's childhood SES is by examining whether or not they received free/reduced lunch while enrolled in the public education system.

Free/Reduced Lunch Status and Substance Use

The National School Lunch Program (NSLP) was created to help low-income, school-aged children, by providing nutrition assistance and this program is used in over 100,000 schools in the U.S. (Coleman-Jensen, 2014). School-aged children are eligible for free lunches in the NSLP if their family's monthly household income is 130%, or under, the federal poverty threshold. Students are eligible for reduced-priced lunches that cannot cost more than 40 cents per meal if their familial household income is between 130% and 185% of the poverty threshold (Rosso & FitzSimons, 2016).

Free/reduced lunch status has been used as a marker of poverty in several research studies. For example, a study by Pentz and Riggs (2013) examined the relationship between executive control functioning to substance use, physical activity, and exercise by measuring SES using free/reduced lunch status. Barrett et al. (2015) also used free/reduced lunch as a marker for poverty in their study of 34,414 female juvenile offenders and noted that eligibility for free/reduced lunch was an indicator of familial socioeconomic status. Thus, free/reduced lunch status or participation in NSLP can be an appropriate means of measuring childhood poverty. Free/reduced lunch has been shown to be associated with greater substance use. For example, a large study with a sample of 126,868 adolescents revealed that those who received free/reduced lunch were almost twice as likely to engage in cigarette use and 1.3 times as likely to engage in e-cigarettes use compared to those who did not receive free/reduced lunch (Jensen, 2018). Free/reduced lunch status also is related to increased CU. A study by Thrul et al. (2019) of 583 participants found that CU increased the risk of developing prescription opioid misuse and

opioid use disorder among an adult sample in which 411 (70.5%) reported that they had free/reduced lunch status as a child. A recent study by Lee et al. (2021) with a sample of 132,555 (34.5% received free or reduced lunch) supported use of an instrument known as the CRAFFT that demonstrated sensitivity among individuals with low socioeconomic status indicators such as free/reduced lunch status. Overall, there is a clear association between free/reduced lunch status and substance use, yet more research is needed related to CU specifically among young adult populations.

Need for the Current Study

The presence of early-life adversities may potentially impact how an individual responds to stressful life events, which in turn, can impact a person's mental health across the life span (Cheong et al., 2017). Stress Sensitization Theory suggests that early adversity and stress in later life and poor health outcomes are related (Manyema et al., 2018). One potential response to stress in young adulthood is substance use (King & Chassin, 2008). Specifically, the prolonged activation of the stress response system can disrupt an individual's ability to function effectively and can lead to maladaptive coping responses, such as using substances like cannabis (NASEM, 2019). The relationship between stress and CU has been established and there is evidence that marijuana is commonly used as a stress-coping strategy (Hyman & Sinah, 2009). Thus, early life stress may contribute to an increase in stress sensitivity, which can lead to experimental CU, problematic CU, and potential addiction later in life (Brodbeck et al., 2007).

Identifying and assessment of addiction are areas that many mental health professionals report a lack of training to perform accurately (Chandler et al., 2011. For example, in one study, school counselors reported lower confidence in identifying students with substance use concerns (Burrow-Sanchez & Lopez, 2009). Another study of mental health counselors found the need for

improved training of counselors to effectively provide substance abuse counseling services (Crozier & Gressard, 2005). Counseling is not the only mental health field that struggles to provide effective addictions counseling as one study found that 89% of 144 psychologists perceived their graduate training as inadequate preparation for practice (Celluci & Vik's, 2001). Renner (2007) also found that psychiatrists reported the belief they are not sufficiently trained to provide services for substance use disorders. Counselors who are trained in, and do provide, substance abuse counseling are at a high risk for burnout in the field because their clients are often difficult to work with (Garner et al., 2007; McNulty et al., 2007). In addition, many clients reported major health concerns that might impact motivation for treatment and a high propensity to have co-occurring mental health disorders when compared to the general population (Ducharme et al. 2007; Oser et al., 2013). Counselors, and the mental health field as a whole, struggle to adequately assess for addictions, treat substance use concerns, and prevent burnout in the field. This is problematic, particularly due to drugs such as cannabis having a wide litany of potential outcomes that could impact treatment and overall quality of life. This study will address that specific need by providing an updated depiction of how college students are using cannabis-products in 2022, and during the COVID-19 pandemic. In addition, this study will also highlight which emotional and self-regulatory paradigms may be of interest to counselors, and counselor educators to provide interventions for substance using clients. In summation, mental health professionals have reported a lack of effective training, and confidence in assessing addictions.

There are many factors that could predict young adult CU, yet from the Stress Sensitization Theory perspective, ER, SR, ACEs, and childhood poverty may be particularly significant. Specifically, according to the Stress Sensitization Theory chronic stressors may result in greater sensitivity to stress over time, and ER, SR, ACEs, and childhood poverty all are

negatively correlated with chronic stress. In addition, researchers have demonstrated the link between substance use and ER (Moffitt et al., 2011), SR (Bakhshani & Hosseinbor (2013), ACEs (Douglas et al., 2010), and childhood poverty (Lee et al., 2013), however, no one has examined ER, SR, ACEs, and childhood poverty simultaneously as predictors of CU to investigate the unique and shared variance of the variables. Thus, this study seeks to address this gap by examining the extent to which ER, SR, ACEs and childhood poverty predict CU in young adult college students.

Chapter Summary

Marijuana is the colloquial name for the dried leaves of the *Cannabis sativa* plant (Leggett, 2006). Marijuana consumption elicits a psychoactive response that acts on the brain and can alter mood or consciousness and has the potential to lead to addiction among some users (Stangor, 2014). Attitudes and laws regarding CU have continued to shift in recent decades. Currently 36 states, the District of Columbia, and Guam have enacted MML laws, and 19 MML states also have enacted RML (Anderson & Rees, 2021; D'Amico, 2017). The shift in legislation over the past decade may be, in part, due to changing societal perceptions in the U.S. Opposition to some type of legalization has decreased from 52% in 2010 to 32% in 2019, with most individuals (91%) saying CU should be legal in some form (Pew Research Center, 2019). Specifically, 59% of individuals are in favor medical and recreational CU, while 32% support CU solely for medicinal purposes (Pew Research Center, 2019). Marijuana research has documented potentially beneficial outcomes to CU and THC and CBD also are linked with medical benefits, however more research is needed in this area (Dariš et al., 2019). CU also has potential negative outcomes including CUD, respiratory problems, lower educational and occupational achievement, and increased risk for highway accidents and other poor physical and

mental health outcomes (Carliner, 2017; Hasin et al., 2016). Therefore, in light of the prevalence of CU, it is important to examine potential predictors.

Stress Sensitization Theory posits that individuals may become more sensitive to stressors with each successive episode and are more easily triggered by lower levels of stress over time (Post, 1992). The Stress Sensitization Theory suggests that ACEs may increase the risk of stress sensitization and coping through CU specifically due to CU's calming properties and greater cultural acceptance (Cuttler et al., 2018; Hathaway et al., 2011). SR also is inversely associated with CU as those with a CUD, or SUD, typically have poorer SR skills compared to those who do not engage in substance use (Bakhshani, & Hosseinbor 2013). ER also is associated with CU and maladaptive attempts to regulate emotional states (Garfinkle, 2017). Specifically, ER is difficult for individuals with any type of SUD, such as a CUD, and has the propensity to contribute to the maintenance of substance usage (Dingle et al., 2018). Another potential stressor that could link to CU is childhood poverty, yet the relationship between poverty in childhood and CU currently is not fully understood. However, there are many ways to measure poverty, one of which is free/reduced school lunch status in childhood (Lee et al., 2021). It is well documented, however, that poverty is linked to ACEs, chronic stress and stress sensitization, and some forms of substance use. Therefore, there is a need to examine childhood poverty and problematic CU specifically.

Based on the review of the literature, there is a gap in examining the predictive role of four variables (ER, SR, ACEs, and childhood poverty as measured by free/reduced lunch status) simultaneously with regard to problematic CU. This study aims to fill that gap and provide information that can aid in designing interventions for those with addictions that incorporate paradigms focused on treating not just the addiction, but also the underlying mechanisms that

may potentially mediate, or propagate, the propensity to develop an addiction. Understanding predictors of CU and how those predictors interact may shed light on how the interplay of specific variables can lead to the development of problematic CU and CUDs, and what intervention modalities may be necessary to treat, or prevent, the development of an addiction to cannabis. Furthermore, better understanding the relationship between childhood trauma and addiction in adulthood could potentially inform interventions in childhood and adolescence to increase SR and ER to buffer against the deleterious effects of ACEs.

CHAPTER THREE

METHOD

The purpose of this study was to explore how ER, SR, ACEs, and childhood poverty predict problematic CU in traditional-aged college students. This chapter provides detailed information about the methods including approach, design, sample, data collection, data analysis, and methodological strengths and limitations as well as issues related to human subject protection. The theoretical framework for this study is the Stress Sensitization Theory, which posits that individuals may become more sensitive to stressors with each successive stressful episode and are more easily triggered by lower levels of stress over time (Post, 1992). Therefore, being more easily triggered by stressors may result in individuals being more likely to maladaptively cope with substances such as cannabis (Buckner et al., 2007).

Due to the high prevalence of CU among college students, it is important to examine potential predictors of usage. Understanding how predictors of CU interact may reveal more information about risk factors associated with collegiate CU problems. Based on the review of the literature, there is a gap in examining the predictive role of four variables (ER, SR, ACEs, and childhood poverty as measured by free/reduced lunch status) simultaneously with regard to problematic CU. Understanding the relationship between childhood trauma, emotion and self-regulation, poverty in early life, and addiction in adulthood could potentially inform interventions to prevent CU problems or more effective treatment strategies for clinical work with college students who use cannabis. Additionally, the COVID-19 pandemic has potentially altered the manner in which traditional-aged college students engage in CU (Chong et al., 2022). Although research is limited, there is evidence that traditional-aged college students may

currently be engaging in CU at greater frequencies and in more social isolation compared to before the pandemic began, which is concerning because it potentially may increase the risk of problematic CU, addiction, or the potential for cannabis to act as a gateway drug for other substance (Williams, 2020). Therefore, exploring differences in CU methods, frequency, and social patterns of CU in traditional-aged college students by comparing their use at a timepoint before the COVID-19 pandemic to present day could potentially inform more effective intervention efforts.

Research Questions and Hypotheses

This study was designed to answer the following research questions:

RQ1: To what extent do ER, SR, ACEs, and childhood poverty predict problematic CU in traditional-aged college students after controlling for gender, race/ethnicity, and age? The alternative hypothesis for this research question was that lower ER, SR, and higher ACEs and childhood poverty is more likely to predict problematic CU in traditional-aged college students after controlling for gender, race/ethnicity, and age.

RQ2: Do significant differences in CU methods, frequency, and social patterns of CU in traditional-aged college students exist from a timepoint before the COVID-19 pandemic compared to present day? The alternative hypothesis for this research question was that COVID-19 has led to more CU via vaping, a higher frequency of CU, and more isolated CU when compared to a timepoint before the start of the COVID-19 pandemic.

Research Design

The type of research design used for this study was predictive correlational research utilizing a hierarchical regression analysis. A quantitative approach was appropriate for addressing the research questions given the goal of generalizing the findings and focusing on the

relationships among variables. The use of quantitative methods for data collection and analysis make generalization possible (Eyisi, 2016). Using a regression was the best approach for this study because regression should be used when the goal is to identify the strength of the relationship between two or more independent variables (IVs) and one dependent variable (DV; Schneider et al., 2010). Specifically, a hierarchal regression analysis was the best regression model to use because it allowed for an examination of incremental validity and for evaluating the contributions of predictors compared to previously entered IVs as a means of statistical control (Lewis, 2007). Utilizing a hierarchical regression is different than a standard correlation because a regression analysis is used to make predictions in scientific literature (Palmer & O'Connell, 2009). Also, because this study sought to analyze variance of a criterion variable (DV) that is being explained by predictor variables (IVs) that are correlated with each other, a hierarchal regression was suitable (Pedhazur, 1997). Finally, a hierarchical regression was an optimum choice for this study because the order of variable entry into the analysis was based on theory (Lewis, 2007).

Participants

Participants were recruited from a large university in the Southeast with a minimum necessary sample of 115 participants. A statistical a priori power analysis using G*Power was performed for sample size estimation of the first research question. The desired effect size for this study was medium using Cohen's (1988) criteria. Specifically, with an effect size of .15, an alpha of .05 and power at 0.80, the projected sample size needed was 115 participants. For the second research question, a statistical a priori power analysis using G*Power also was conducted for sample size estimation with an effect size of .15, an alpha of .05 and power at 0.80, the projected sample size needed was 28 participants. Thus, I aimed to obtain a sample size of 250

participants to account for missing data or incomplete surveys and to ascertain variance in the dependent variable (i.e., CU problems).

To participate, students needed to be enrolled as full-time undergraduates at the university and at least 18 years of age. This study utilized a college student population as the targeted sample. The rationale for the participant selection is that some deleterious effects of chronic stress and ACEs may not become apparent until adulthood (Manyema et al., 2018). Evidence suggests that an increasing number of ACEs corresponds to worsening physical and mental health outcomes in early adulthood, particularly between ages 19-28, which is the age range in which traditional students attend college (18- to 24; Bellis et al., 2018; Markle, 2015). Additionally, CU is prevalent among collegiate populations given that in 2020, 8% of college students reported daily or near daily CU (Kalmakis & Chandler, 2015; Schulenberg et al., 2021). The current study sought to examine traditional-aged college students between the ages of 18 and 24 (Markle, 2015). Although all students who met the inclusion criteria were invited to participate (enrolled as a full-time undergraduate student and at least 18 years of age), only those aged 18-24 were included in the study.

Instrumentation

Demographics

To collect the data, I utilized a demographics questionnaire assessing participants' age, year in school, credit hours in school, gender, race/ethnicity, sexual orientation, familial income-level during childhood, and questions related to CU (e.g., if participants ever used cannabis products, age of first use, if participants were currently engaging in CU, past 30 day CU, preferred methods of use, and changes in patterns of use since the COVID-19 pandemic began).

To assess poverty during childhood, participants reported if they received free/reduced lunch during K-12 schooling. Participant demographics were coded as follows: (lunch status: no = 0, yes = 1, unsure = 2). Gender was coded as follows: (male = 1, female = 2, trans = 3, nonbinary = 4, other = 5). Sexual orientation was coded as follows: (prefers opposite sex partners = 1, prefers same sex partners = 2, prefers both opposite sex and same sex partners = 3, other = 4). Year in school was coded as follows: (freshman = 1, sophomore = 2, junior = 3, senior = 4, fifth year or older = 5; high school student taking college courses = 6). Demographic variables included in the regression analysis were dummy coded with the largest group serving as the reference group.

In addition to the demographic questionnaire, I utilized the Marijuana Problem Index (MPI; White et al., 2005; White & Labouvie, 1989) to measure problematic CU. To assess ER problems, I used the Difficulties in Emotion Regulation Scale – Short Form (DERS-SF; Kaufman et al., 2016). To measure SR, I utilized the Short Self-Regulation Questionnaire (SSRQ; Carey et al., 2004). To measure ACEs, I utilized the ACE Questionnaire (ACE-Q; Felitti et al., 1998).

Marijuana Problem Index (MPI)

The MPI is a 29-item questionnaire adapted from the Rutgers Alcohol Problems Index (RAPI; White et al., 2005; White & Labouvie, 1989). The MPI has been widely used as an assessment measure for problematic CU in collegiate samples (e.g., Cloutier et al., 2022; Lisdahl et al., 2018). Although the MPI has been widely used in addictions literature, various nomenclature exists for this scale and it has been called different names in several studies including the Rutgers Marijuana Problem Index Esposito-Smythers et al., 2011; White & Labouvie, 1989), MPI (Blevins et al., 2018), and Marijuana Problem Inventory (Vandrey et al.,

2005). The prompt for each item on the MPI asks "How many times did the following things happen to you while you were smoking marijuana or because of your marijuana use during the last year?" Example items on the MPI include: *"Felt that you needed more marijuana than you used to use in order to get the same effect"* and *"missed out on other things because you spent too much money on marijuana."* Response options on the MPI are as follows: *"Never", "1-2 times", "3-5 times", "6-10 times",* and *"More than 10 times."* The MPI has demonstrated strong reliability as the Cronbach's alpha level for the total sample was found to be .93 (Cloutier et al., 2022). The 29-item MPI has participants rate each item on a 0–4 scale and yields one total scale score. Higher scores generally indicate more serious problems with marijuana.

Difficulties in Emotion Regulation Scale – Short Form (DERS-SF)

I assessed ER among the sample by using the DERS-SF (Kaufman et al., 2016). The DERS-SF is an 18-item self-report measure that will be used to identify ER difficulties in four dimensions: (1) awareness and emotional understanding, (2) emotional acceptance, (3) ability to engage in goal-oriented behaviors and not engage in impulsive behavior when experiencing a negative emotional state, and (4) the ability to use ER strategies that are perceived by the individual as effective. The DERS-SF is a revised version of the original DERS (Gratz & Roemer, 2004), a 36-item self-report checklist that has six subscales with five to eight items each. The short form will be used to reduce the total time it takes to complete the survey without reducing reliability. Scores on the DERS-SF yielded a strong correlation to the full DERS measure, ranging from .90 to .98 and reflecting 81–96 % shared variance (Kaufman et al., 2016). The full measure with all six subscales will be used (i.e., strategies, non-acceptance, impulse, goals, awareness, and clarity). Limited access to emotion regulation strategies (STRATEGIES) is defined on the DERS-SF as the belief that there is little one can do to regulate oneself once

upset. Nonacceptance of emotional responses (NONACCEPT) is defined as the inclination to have a negative secondary or non-accepting reaction to one's own distress. Impulse control difficulties (IMPULSE) is defined as problems controlling one's behavior when experiencing negative emotions. Difficulty engaging in goal-directed behavior (GOALS) is defined as problems concentrating and/or accomplishing tasks when experiencing a negative emotional state. Lack of emotional awareness (AWARENESS) is defined as a deficit of awareness or inattention to emotional responses, and lack of emotional clarity (CLARITY) is defined as how aware an individual is about their emotions and is clear about their emotions (Hallion et al., 2018). Items on the DERS-SF correspond with five- point Likert-type scales (1 = *Almost Never*; 5 = *Almost Always*) with higher scores indicating more difficulties with emotion regulation (Kaufman et al., 2016). The directions for the DERS-SF state, "Please indicate how often the following apply to you**."** Example items from the DERS-SF include, *"When I'm upset, I have difficulty focusing on other things",* and *"I have difficulty making sense out of my feelings"*. The DERS-SF was found to have acceptable internal consistency in a recent study with alpha levels ranging between .76 to .90 for scores on the six subscales (strategies, non-acceptance, impulse, goals, awareness, and clarity) and good internal consistency for scores on the full instrument (α = .93; Bjureberg et al., 2016). In the current study, subscale scores, rather than the total score, was used.

Short Self-Regulation Questionnaire (SSRQ)

The SSRQ (Carey et al., 2004) is a 31- item self-report measure. Carey et al. (2004) defined SR as the ability to regulate one's behavior in order to achieve desired future outcomes. Items on the SSRQ correspond with a five- point Likert-type scale (1 = *Strongly disagree*; 5 = *Strongly agree*) with higher scores indicating more self-regulation. The SSRQ is derived from

the original Self-Regulation Questionnaire (SRQ) developed by Brown et al. (1999). The SRQ was normed on undergraduate college students (N = 391; 55% women) from two consecutive semesters (n_1 = 208; n_2 = 183; Carey et al., 2004). Neal and Carey (2005) reported that the SSRQ has two distinct factors: impulse control and goal setting. The directions for the SSRQ are as follows: "Please answer the following questions by circling the response that best describes how you are. Remember, there are no right or wrong answers." Example items on the SSRQ include: "*Once I have a goal, I can usually plan how to reach it*," and "*As soon as I see a problem, or challenge, I start looking for possible solutions*." The SSRQ has been shown to strongly correlate with the original 63-item SRQ (r = .96) and demonstrated good internal consistency (α = .92; Neal & Carey, 2005). A recent study by Chen and Lin (2018) utilized the SSRQ with a national sample of Taiwanese college students (N = 1,988). The researchers reported Cronbach's alpha scores ranging from .803 to .875, and the reliability of all full measure scores in the sample was .908 indicating satisfactory internal consistency (Chen & Lin, 2018). The measure has one total score calculated by summing the individual items. Higher scores indicate a higher level of self-regulating one's behavior in order to achieve goals.

ACE Questionnaire (ACE-Q)

The ACE-Q was developed by Felitti and colleagues (1998) and is a 10-item scale designed to measure health outcomes in adulthood that are associated with childhood maltreatment and adverse parental behaviors. The original ACE-Q was normed on 13,494 adults who had completed a standardized medical evaluation at a large health maintenance organization (HMO; Felitti et al., 1998). More recent studies have used the ACE-Q with college students and found that ACEs influence a range of unhealthy outcomes (Windle et al., 2018). The questionnaire assesses participants' recollection of exposure to several types of abuse including

psychological, physical, and sexual experiences. The ACE-Q also measures indices of household dysfunction including domestic violence, substance use, and incarceration of a household member before age 19. Example questions on the ACE-Q include *"Were your parents ever separated or divorced?"* and *"Did a household member go to prison?"* Items on the ACE-Q are measured with *"yes"* or *"no"* responses and a total score of the number of *"yes"* responses is calculated to derive the participants' total ACE score. The ACE-Q has two subscales, childhood abuse and exposure to household dysfunction, yet a summed total score was used for this study. The ACE-Q has demonstrated adequate internal consistency in a recent study ($\alpha = .88$; Murphy et al., 2014). Higher scores indicate more ACEs and higher risk for associated problems.

Procedure

I obtained approval from the university's institutional review board to conduct this study. University students were qualified to participate in the current study if they identified as full-time undergraduate college students and at least 18 years of age. Data collection occurred on the university's campus in classrooms. Participants were recruited using a standardized oral recruitment script (see Appendix). The survey was administered in person via a paper survey. This study utilized convenience sampling of professors at the university based on diversity of disciplines and class enrollment.

I selected and emailed professors and requested 30 minutes of class time to administer the survey. After receiving consent to collect data in their classrooms, I scheduled a day and time to visit each classroom and administered the survey in-person**.** The rationale for using convenience sampling was that it allowed me to obtain basic data to identify trends without the complications of using a randomized sample (less expensive, more efficient, and simpler to execute; Jager et al., 2017). In addition, the use of convenience samples in developmental sciences appear to be

the norm as one study found that convenience sampling is over 16 times more likely to be used than probability sampling (Bornstein et al., 2013).

The questions in the demographics questionnaire that were used to assess eligibility for the current study included: 1) are you currently enrolled as an undergraduate student at the university?, 2) are you full time or part time?, and 3) what is your age? Individuals who did not meet inclusion criteria were encouraged to forego the remainder of the survey and work quietly on coursework for the duration of data collection. This study used a consent document without a signature due to the sensitive nature of the items related to cannabis use, ACEs, and childhood poverty. The hope was that the lack of a signed consent encouraged more honest and accurate responses. Instead of signing the document, the students indicated their consent by completing the survey. Survey records were kept by assigning each submitted packet with a random three number code.

Participants were then asked to fill out a series of five questionnaires (i.e., demographics, DERS-SF, SSRQ, ACE-Q, and MPI). The total accumulation of questionnaires took approximately 30 minutes to complete. Participants were instructed to ask any questions they may have had before the study began. Participants completed the measures in the following order: a demographics questionnaire, the DERS-SF, SSRQ, ACE-Q and MPI. Lastly, participants had the opportunity to enter a drawing to win a gift card in the amount of $20 per class. Specifically, I informed students in each class that one participant was to be randomly selected from a drawing to receive a gift card upon completion of the survey. Participants were informed that they had the option to write their name on an index card and put the card in a box after the survey had been completed and turned in to the researcher. Students were informed not to enter their name into the raffle until after they complete the survey. When the last student submitted

their survey, I drew a name from the raffle box and gave the selected student the $20 gift card. After data collection in each class, I recorded the number of completed surveys obtained. Surveys were then stored in a secure location and kept in a secure storage device with two locks.

Data Analysis Plan

A hierarchical regression data analysis was intended to answer the first research question in the current study. The rationale for this analysis was that this study examined the relationship between nine tested predictors (i.e., DERS-SF [strategies, non-acceptance, impulse, goals, awareness, and clarity], SSRQ, ACE-Q and free/reduced lunch status) and 21 total predictors (consisting of dummy coded demographic variables). Evidence supporting the use of regression models for addictions studies and ACEs is a recent study by Mekonnen et al. (2020) in which multivariate linear regression models were used to estimate child depression severity by retrospective ACE count. Another study utilized hierarchical regression analyses to explore the association between ACEs, internalizing, and externalizing problems in young adulthood (Van Duin et al., 2019). Hierarchical regression models are used in two primary ways in scientific literature: prediction and explanation (Palmer & O'Connell, 2009). In this study I intended to use a hierarchical regression to predict problematic CU.

In the first step of the regression analysis, I intended to input demographic variables including age, gender, and race/ethnicity. This step would reveal the amount of variance in problematic CU accounted for by demographic variables. In the second step of the regression, I intended to input the DERS-SF, SSRQ, ACEs, and free/reduced lunch status. Each of the variables in the second step were informed by the Stress Sensitization Theory, which postulates that chronic stress weakens an individual's ability to respond to stress and causes them to be more easily triggered by stressful episodes. By controlling for demographic variables in step one,

my aim was to determine whether my variables of interest explained a statistically significant amount of variance in problematic CU after accounting for demographic variables. Using the regression model, I intended to assess the extent to which the DERS-SF, SSRQ, ACEs, and free/reduced lunch uniquely predicted problematic CU among traditional-aged college students. Due to the nature of my data and number of participants who did not report cannabis use, the linear regression was no longer optimal. Instead, I used a logistic regression, which will be explained in Chapter Four.

For the second research question, I used a Wilcoxon signed-rank test. The rationale for this analysis was that this question compared two related, or matched samples on the same items with ordered categorical responses related to CU frequency (CU frequency [daily, weekly, monthly, yearly, other]. I also used a McNemar's test to assess non-ordered categorical responses related to methods of CU [inhalation, oral, topical, other], and social patterns of CU when compared to a timepoint before the start of the COVID-19 pandemic [alone, with one-two others, in a group]). A Wilcoxon signed rank-test can be used for ordered categorical variables without a numerical scale and can be used to compare two repeated or correlated data (Kim, 2014). A Wilcoxon signed rank-test has been used on studies related to cannabis including one study in which a Wilcoxon signed rank test was performed on patients using cannabis to treat the effects of cancer and their baseline symptom scores and symptom scores averaged over four months (Anderson et al., 2019). The McNemar's test is appropriate as it is used to analyze potential differences between a dichotomous dependent variable and matched, or related groups (Fagerland et al., 2013). Although there is evidence that supported my selected data analysis this study is not without limitations that should be acknowledged and discussed in detail.

A Priori Limitations

One limitation of this study was that the data was gathered from only one university. The sample population from this university was constrained by the sociodemographic background of students attending this university and may be less common in social sciences than conventional convenience samples (Jager et al., 2017). Homogenous convenience sampling may be more beneficial than conventional convenience sampling because the target population, and not simply the sample population, was a specific sociodemographic subgroup (participants from university in the southeast; Jager et al., 2017). Furthermore, since convenience sampling was utilized, the study did not have the benefits of randomized sampling. Another potential limitation is the reliance on self-report data from students, thus accuracy cannot be verified. It is important to note that individual responses to surveys about illicit substance use tend to underreport their consumption (Harrison & Hughes, 1997). When using survey research on substances and substance use, the questions that are asked may tap into lack of approval from society, illegal behaviors, and potentially socially marginal attitudes, which could have potentially led to inaccurate reporting and bias in survey estimates. However, self-report data is still considered valid and an effective tool in addictions studies with one study showing that self-reports are valid, with a 97% agreement between verbal report and laboratory data for alcohol, 93% for cocaine, and 84% for marijuana (Brown et al., 1992).

Chapter Summary

The purpose of this study was to explore how ER, SR, ACEs, and childhood poverty predict problematic CU in traditional-aged college students. Stress Sensitization Theory posits that individuals may become more sensitive to stressors with each successive episode and are more easily triggered by lower levels of stress over time (Post, 1992). Participants were recruited

from one university in the Southeast with a total desired sample size of 250. I obtained the data from full-time, traditional-aged, undergraduate students. Although all students who met the inclusion criteria were invited to participate (enrolled as a full-time undergraduate student and at least 18 years of age), only those aged 18-24 were included in the study. This study utilized a demographics questionnaire assessing participants' age, year in school gender, credit hours in school, race/ethnicity, sexual orientation, familial income-level during childhood, if participants ever used cannabis products, age of first CU, usage in the past 30 days, preferred methods of use, and changes in patterns of use since the inception of COVID-19. A hierarchical regression was intended to answer research question one, yet due to the dataset, a logistic regression was employed. Regarding the second question, I sought to explore differences in CU methods, frequency, and social patterns of CU in traditional-aged college students by comparing their use at a timepoint before the COVID-19 pandemic to present day. I used a Wilcoxon signed-rank test because this data in was ordinal categorical data (never, yearly, monthly, weekly, daily), and I used the McNemar's test to assess two related categorical responses, primarily ingested cannabis (before and current) and in a group (before and current) and because the McNemar's test is used to compare two related, or matched samples on the same items with categorical responses. I did not test all of the categories listed here in the Wilcoxon and McNemar's non-parametric tests.

CHAPTER FOUR

RESULTS

This chapter examines the results from the data analytic techniques performed. Specifically, this study examined the relationship between problematic CU, emotion dysregulation, self-regulation, ACEs and childhood poverty, changes in CU due to COVID-19, and lifetime CU. Before conducting my primary analysis, I first calculated descriptive statistics for each study variable. It is important to note that 35.7% of participants (n = 41) reported past 30-day CU and 67% of participants (n = 77) reported lifetime CU.

The present Chapter describes the demographic characteristics of the sample, the reliability coefficients for the instrumentation used in the study, and the results of the analyses performed to test each research hypothesis.

Description of the Sample

A total of 134 survey packets were distributed to students in undergraduate classes at a university in the Southeast and by using a research pool at the same university. 83 participants were gathered from classrooms and 51 participants were gathered using the research pool. Of the 134 potential participants, 115 met the inclusion criteria and were included in the analysis. Excluded participants were outside the age parameters (18-24; n = 15) or were enrolled in less than the number of hours required for full time enrollment status (12 hours; n = 3). One participant (n = 1) only completed the demographics section of the survey and was not included in the analysis. The average age of the sample population was 20.57 (SD = 1.292). The complete demographic data of the sample is detailed in Table 1.

Table 1
Demographic Data of Sample (N=115)

Variable		M	F	Total
TOTAL		32	83	115 (100%)
YEAR	Freshman	5	15	20 (17.4%)
	Sophomore	1	15	16 (13.9%)
	Junior	7	24	31 (27.0%)
	Senior	17	28	45 (39.1%)
	Fifth+	2	1	3 (2.6%)
RACE				
	Asian	5	11	16 (13.9%)
	Combined	8	13	21 (18.3%)
	White	19	59	78 (67.8%)
LUNCH STATUS				
	No	23	63	86 (75%)
	Yes	9	20	29 (25%)
LIFETIME CU				
	No	9	23	32 (28%)
	Yes	29	54	83 (72%)
CREDIT HOURS				
	10-13	17	45	62 (53.9%)
	14-16	9	33	42 (36.5%)
	16+	6	5	11 (9.6%)
PAST 30 DAY CU				
	No	16	56	72 (62.6%)
	Yes	16	25	41 (35.7%)

Note. F = Female; M = Male; CU = Cannabis Use

As depicted in Table 1, the majority of participants were female (*n* = 83, 69%), in their senior year of college (*n* = 45, 39.1%), and Caucasian (*n* = 78, 67.8%). The majority of participants (*n* = 62, 53.9%) reported taking between 10-13 credit hours, and 86 (75%) reported that they did not receive free or reduced lunch during their K-12 education. With regard to race and ethnicity, a "combined" variable was created including participants identifying as Hispanic, Black, or Other due to inadequate sample sizes as independent variables in the regression analysis. The combined variable (*n* =21) was comprised of six participants who marked their race/ethnicity as "Other," five participants who identified as Hispanic, and 10 participants who identified as Black.

Regarding CU, the average age of first time CU was 16.89 (*SD* = 3.16). Moreover, 41 participants (35.7%) reported CU in the past 30 days, and 77 (67%) participants reported lifetime CU. Of the 76 participants who reported a preferred method of CU (one participant who reported lifetime CU did not report a method of use because they no longer used), 44 (38.3%) endorsed smoking, 19 (16.5%) endorsed ingesting, 3 (2.6%) endorsed topical use, and 10 (8.7%) endorsed vaping. Of the 115 total participants in the sample, 64 reported how often they used cannabis products with 9 (7.8%) reporting daily use, 11 (9.6%) reporting weekly use, 11 (9.6%) reporting monthly use, 29 (25.2%) reporting using a few times per year, and 4 (3.5%) reporting other.

Descriptive Statistics of Instruments

Each participant completed the survey packet comprised of the demographic questionnaire, DERS-SF, SSRQ, ACE-Q, and MPI, totaling 107 items. I examined the internal consistency of the scores of each measure. Cronbach's alpha levels were as follows: MPI: .95, SSRQ: .93, ACE-Q: .71, DERS-SF (Strategies): .77, DERS-SF (Clarity): .70, DERS-SF

(Awareness): .82, DERS-SF (Non-Acceptance): .77, DERS-SF (Impulse) .91, and DERS-SF (Goals) .92. Reliability scores for the variables of this study were each above .70, the recommended level for social science research (Field, 2018). The mean MPI score for the sample was 6.96 (*SD* = 13.29) and mean ACE-Q score was 1.47 (*SD* = 1.69). The complete descriptive statistics of the instruments are provided in Table 2.

Table 2
Descriptive Statistics of Instruments

Instrument/Subscale	M	SD	# of Items
MPI	6.96	13.29	29
SSRQ	113.03	16.6	31
DS	6.30	2.58	3
DN	7.49	2.51	3
DI	5.26	2.76	3
DG	9.71	3.14	3
DC	6.10	1.91	3
DA	5.70	2.13	3
ACE-Q	1.47	1.69	10

Prior to addressing the primary research questions in the study, I conducted a correlation matrix examining the relationships between MPI, SSRQ, ACE-Q, free/reduced lunch status, and DERS-SF subscales. The purpose of this matrix was to assess the relationship between study variables and rule out the existence of multicollinearity. Results indicate that several of the scales were significantly correlated, yet correlations were modest, and multicollinearity was not a concern in subsequent analyses (see Table 3).

Table 3
Correlation Matrix of all Study Variables

	MPI	F/R	SR	ACE	DG	DC	DA	DN	DI	DS
MPI	-	-	-	-	-	-	-	-	-	-
F/R	0.19	-	-	-	-	-	-	-	-	-
SR	-.307**	-.171	-	-	-	-	-	-	-	-
AC	.101	.124	-.199*	-	-	-	-	-	-	-
DG	.155	.040	-.309**	.148	-	-	-	-	-	-
DC	.211*	-.042	-.478**	.088	.374**	-	-	-	-	-
DA	.235*	.024	-.319**	-.020	-.044	.308**	-	-	-	-
DN	-.110	0.95	-.305**	.151	.405**	.420**	-.006	-	-	-
DI	.129	.112	-.429**	.064	.330**	.458**	.033	.334**	-	-
DS	.173	.064	-.522**	.201*	.508**	.620**	.135	.562**	.671**	-

Note. All reliability coefficients were calculated using Pearson's R. MPI = Marijuana Problems Index; F/R Lunch = Free/Reduced Lunch; SSRQ = Short Self-Regulation Questionnaire (SSRQ); ACE-Q = Adverse Childhood Experiences Questionnaire; DERS-SF (Goals) = DG; DERS-SF (Clarity) = DC; DERS-SF (Awareness) = DA; DERS-SF (Non-Acceptance) = DN; DERS-SF (Impulse) = DI; DERS-SF (Strategies) = DS.
$N = 115$
* $p < .05$. ** $p < .01$.

Research Hypothesis One

The first research hypothesis, that a statistically significant portion of variance in college student self-reported CU behavior would be explained by ACEs, self-regulation, free/reduced lunch status, and the six emotion dysregulation variables above and beyond the amount of variance explained by demographic predictor variables, was planned to be addressed using a hierarchical multiple regression analysis. However, due to the participant responses regarding the MPI, a hierarchical regression was not a suitable analysis for this research question. Specifically, the MPI had several assumption violations for the linear regression due to the fact that about half

of the sample did not endorse any problems with marijuana. Thus, the relationship between the IVs and the DV was not linear, there was multicollinearity in my data using the MPI as a DV, and the variance of the residuals was not constant. Therefore, a binary logistic regression was chosen to address research question one, which required dummy coding MPI items (1 =Yes [endorsing any problems caused by marijuana], 0 = No [endorsing no problems caused by marijuana]).

Analysis of Assumptions

Linearity of the Logit. The results for linearity of the logit were conducted using the Box-Tidwell check. The results of the regression showed that the assumptions of linearity were not violated for each of the interactions using MPI as the DV. SSRQ*lnSSRQ (p= .323); ACE*lnACE (p = .327); DERS-Clarity*lnDERS-Clarity (.907); DERS-Goals*lnDERS-Goals (p =.170); DERS-Impulse*lnDERS-Impulse (p = .752; DERS-Non-Acceptance*lnDERS-non-Acceptance (p = .453); DERS-Awareness*lnDERS-Awareness (p = .647); DERS-Strategies*lnDERS-Strategies (p = .406).

Absence of Multicollinearity. All of the independent variables had low risk tolerance levels ranging from .32 to .92 (SSRQ = .60; ACE = .91; Lunch Status = .92; DERS-Awareness = .78; DERS-Strategies = .32; DERS-Non-Acceptance = .64; DERS-Impulse = .51; DERS-Goals = .70; DERS-Clarity = .51). Hosmer and Lemeshow (2000) suggest that variables that have tolerance values lower than .20 be used with caution and because all variables were higher than .20 multicollinearity was not a concern for this analysis.

Ratio of Cases to Variables. Upon inspection of the cleaned dataset, the small cell counts for ethnic minorities, particularly Black (n = 10) and Hispanic were a concern (n = 5). These groups have been historically underrepresented in scientific literature and in university

settings (National Action Council for Minorities in Engineering, 2013), therefore, these racial groups were combined with the multiracial group to form the Combined variable in order to have a greater power and a minimal number of 10 in each cell as recommended by Tabachnick and Fidell (2013).

Independence. Logistic regression also requires that the dependent variable only have mutually exhaustive categories that are mutually exclusive of each other. This requirement was met since participants are coded is either endorsing CU problems or not endorsing CU problems based on their responses to the MPI. In addition, each of the participants responses are based on their own unique experiences with cannabis, and therefore there was no dependency of responses.

Primary Analysis

This binary logistic regression utilized two blocks in the analysis. Block one included the following demographic variables: 1) Age, 2) Gender, and 3) Race/Ethnicity dummy coded for Asian, Combined, and White, with the DV being a categorical variable of marijuana use problems, yes or no. The second block included the addition of the following variables: free/reduced lunch status, ACEs, six DERS-SF subscales (Goals, Clarity, Awareness, Non-Acceptance, Impulse, Strategies), and SSRQ. Both steps of the binary logistic regression analysis were nonsignificant. Specifically, the omnibus test of coefficients for step one reported X^2 = 7.641, df = 4, n = 115, p =.106. In addition, the Hosmer and Lemeshow Test (HL) for step one was significant (p = .048) indicating that the data does not fit the model. The results of binary logistic regression analysis of the data in step two showed that the full logistic regression model containing all 14 predictors also was not statistically significant, X^2 = 19. 213, df = 13, n = 115, p

= .117 indicating that the independent variables did not significantly predict marijuana use problems. The HL for step two was $p = .275$.

Research Hypothesis Two

To address the second research hypothesis, that significant differences in CU methods, frequency, and social patterns of CU in traditional-aged college students exist from a timepoint before the COVID-19 pandemic compared to present day, I utilized a Wilcoxon signed-rank test and two McNemar's tests. Specifically, I employed a Wilcoxon signed-rank test to address CU frequency (none, a few times per year, monthly, weekly, daily) before the pandemic compared to present day. The Wilcoxon signed-rank test revealed that CU frequency did not significantly change from the current phase of the pandemic ($Mdn = 1.00$, $n = 65$, $p = .953$) compared to before it began ($Mdn = 0.00$, $n = 115$). This means, there were no changes in the frequency of CU among college students before the pandemic compared to now.

Due to the way the questions were posed, the Wilcoxon signed-ranked test was not appropriate to analyze methods and social patterns of CU. The Wilcoxon's signed-rank test requires ordinal data which was not presented for the items examining methods or social patterns of CU. Therefore, the McNemar's test is a superior non-parametric test to use for this data because the McNemar's test checks for any difference in distribution using a binary case of related responses. Specifically, the McNemar's test is used to analyze potential differences on a dichotomous dependent variable between two related groups (Fagerland et al., 2013).

To accurately analyze methods and social patterns of CU, I used a McNemar's test by dummy coding one specific method of CU (i.e., ingesting) and one social pattern (i.e., in a group). These specific responses were chosen after running frequency and descriptive analyses to assess the largest changes among responses from before the pandemic to present day. To perform

the McNemar's tests, I dummy coded the variables so that those who primarily ingested cannabis were coded as one and all others were coded as zero. Next, I compared this dichotomous response (paired) before the pandemic to the current phase and found that primarily ingesting cannabis increased from 5 (4.3%) to 18 (15.7%). The McNemar's test showed that the two proportions were significantly different (p = .001, 2 tailed) when comparing ingestible cannabis use. This means that significantly more participants were using ingestible cannabis products at the current timepoint compared to before the pandemic began.

Regarding social use patterns, 39 (33.9%) participants reported group CU before the pandemic compared to 25 (21.7%) group CU during the current phase of the pandemic. The McNemar's test showed that the two proportions were significantly different (p = .011, 2 tailed) when comparing group CU before the pandemic to group CU during the current phase of the pandemic. This means that significantly fewer participants were using cannabis in a group at the current timepoint compared to before the pandemic began.

Secondary Analysis

Due to problems with the logistic regression model using the binary MPI (yes/no) as the DV, a second binary logistic regression was run using lifetime CU as the DV (used cannabis in lifetime = 1, never used cannabis = 0). The rationale for conducting a secondary analysis using lifetime CU as a categorical DV was that more students acknowledged lifetime CU compared to problematic CU. The same demographic variables were included in step one of the logistic regression and the same nine predictor variables were included in step two. The results are shown in the table below (Table 4).

The following demographic variables were entered into the regression in the first step: 1) Age, 2) Gender, and 3) Race/Ethnicity (dummy coded for Asian, Combined, and White). The omnibus test of coefficients for step one was not significant (X^2 = 6.055, df = 4, n = 115, p = .195), meaning that demographic variables did not significantly predict lifetime cannabis use among traditional aged college students. The HL for step one was p = .304.

Table 4 *Regression Model*	***B***	***SE***	**Wald**	***p***	***OR***	***95% CI***
Step 1: Demographic Variables						
Gender	.176	.476	.137	.362	1.156	[.469, 3.030]
Age	.145	.159	.831	.362	1.156	[.846, 1.580]
Asian	-.314	.561	.314	.575	.730	[.242, 2.194]
Combined	1.241	.674	3.393	.065	3.458	[.924, 12.947]
Step 2: Total Scores						
Gender	.793	.587	1.822	.177	2.209	[.699, 6.984.]
Age	.144	.191	.572	.450	1.155	[795, 1.678]
Asian	-.753	.708	1.132	.287	.471	[.118, 1.885]
Combined	1.394	.823	2.692	.090	4.030	[830, 20.227]
ACE-Q	.499	.184	7.384	.007**	1.647	[1.149, 2.360]
Lunch Status	.116	.622	.035	.852	1.123	[.332, 3.801]
SSRQ	-.044	.020	4.588	.032*	.957	[.920, 996]
DS	-.395	.183	4.665	.031*	.673	[.470, 964]
DN	.031	.122	.063	.802	1.031	[.812, 1.309]
DI	.054	.134	.161	.688	1.055	[.812, 1.372]
DG	.162	.093	2.996	.083	1.176	[.979, 1.412
DC	.193	.180	1.157	.282	1.213	[.853, 1.725]
DA	-.225	.137	2.692	.101	.798	[.610, 1.045]

Note. DERS-SF Strategies = DS, DERS- SF Non-Acceptance = DN; DERS-SF Impulse = DI; DERS-SF Goal = DG; DERS-SF Clarity = DC; DERS-SF Awareness = DA

N = 115
* p < .05. ** p < .01.

Step two of the logistic regression model included the demographic variables of step one as well as free/reduced lunch status, ACEs, six DERS-SF subscales (Goals, Clarity, Awareness, Non-Acceptance, Impulse, Strategies), and the SSRQ. The omnibus test of coefficients for step two was significant: X^2 = 30.790, df = 13, n = 115, p = .018. The results of Cox & Snell, and Nagelkerke R squared estimates in step two indicated that the whole model explained between 20% and 28% of the variance of lifetime CU. Table 4 depicts the standardized beta coefficients of the study variables. Analysis of beta coefficients revealed the following significant variables

in the model: ACEs (β = .50, *SE* = .18, Wald = 7.40, $p < .01$, OR = 1.65, *95% CI* = [1.149, 2.360]), Self-Regulation (β = -.04, *SE* = .02, Wald = 4.60, $p < .05$), OR = .96, *95% CI* = [.920, .996]), and difficulty with emotion regulation strategies (β = -.39, *SE* = .18, Wald = 4.67, $p < .05$), OR = 1.03, *95% CI* = [.470, .964])

The results of the binary logistic regression analysis in which lifetime CU was the outcome variable indicated that college students with low self-regulation scores, high emotional dysregulation of strategies scores, and more ACEs are more likely to have engaged in lifetime CU.

Chapter Summary

The purpose of this chapter was to examine the results from the data analytic techniques performed. Specifically, this study examined the relationship between problematic CU, emotion dysregulation, self-regulation, ACEs and childhood poverty, changes in CU to COVID-19, and lifetime CU. Participants completed the survey packet comprised of the demographic questionnaire DERS-SF, SSRQ, ACE-Q, and MPI, totaling 107 items.

Due to the nature of participants' responses, a hierarchical linear regression was not the appropriate analyses to address the first research question. Specifically, the MPI had several assumption violations including the relationship between the IVs and the DV was not linear, there was multicollinearity in my data using the MPI as the dependent variable, and the variance of the residuals was not constant. Therefore, a binary logistic regression was chosen for research regression one, which required dummy coding MPI items (1 =Yes problems, 0 = No problems). Both steps of the binary logistic regression analysis were not significant, which indicated that the independent variables did not significantly predict cannabis problems among traditional-aged college students.

For the second research question, the Wilcoxon signed-rank analysis comparing CU frequency before COVID-19 and during the current phase of the pandemic showed that CU frequency was not significantly different. This means, there were no changes in the frequency of CU among college students before the pandemic compared to now. The McNemar's test showed a significant difference when comparing the number of students who primarily ingested cannabis products from before COVID-19 to currently, in which more college students use cannabis via ingestibles in the present day. Regarding group CU before COVID-19 and during the current time point in the pandemic, a McNemar's test was also used and revealed that the two proportions were significantly different. This means that significantly more participants used cannabis in a group prior to the pandemic compared to now. In summation, results of the second research question revealed no significant differences in CU frequency among college students before the pandemic compared to now, a higher amount of ingestible CU currently when compared to the pandemic, and less CU in groups currently compared to before the pandemic. Finally, I conducted a secondary binary logistic regression model in which the predictive nature of all study variables was assessed in relation to lifetime CU. Results indicated that more ACEs, lower SR, and greater difficulty with ER strategies predicted lifetime CU in the current sample.

CHAPTER FIVE

DISCUSSION

Past addictions research has explored the relationship between ER (Moffitt et al., 2011), SR (Bakhshani & Hosseinbor 2013), ACEs (Douglas et al., 2010), and childhood poverty as measured by free/reduced lunch status (Lee et al., 2013), individually as related to CU. The current study is important because it may be one of the first studies to examine these variables simultaneously with regard to CU problems among a collegiate sample. Indeed, there may few studies that have simultaneously examined the predictor variables of interest (ER, SR, ACEs, and childhood poverty as measured by free/reduced lunch status) in relation to CU problems among college students. Thus, the primary purpose of this study was to extend prior research by examining several important variables simultaneously to explore shared variance in collegiate CU problems.

In addition, COVID-19 has potentially impacted CU among full-time undergraduate students (Chong et al., 2022), thus this study may be one of the first to explore changes in CU methods, frequency, and social patterns in traditional-aged college students due to the pandemic. Specifically, this study compared participants' CU at a timepoint before the COVID-19 pandemic to present day, which could potentially inform intervention efforts that include CU factors related to COVID-19. In the following chapter, I will discuss the current research findings, how these findings relate to prior research, implications of the findings, the limitations of this study, and suggestions for future research endeavors.

Summary of the Sample

The 115 participants in this study were comprised of full-time undergraduate students in emerging adulthood between the ages of 18 and 24 (Markle, 2015). As this developmental period has been found to have the highest prevalence of CU, (with one study reporting 19.8% using in the past 30-days [CBHSQ, 2016a]), it was appropriate to sample students within this age range for the current study. The majority of participants in the current study were female, in their senior year of college, White, taking between 10-13 credit hours, and had reported lifetime CU. The ratio between male and female participants in this study (28% male, 72% female) was more disproportionality female when compared to the ratio of the University (42% male, 58% female). However, the proportion of ethnic minority participants in the study (32.2%) was higher than the total university ethnic minority enrollment (27%). About a quarter of participants (n = 29; 25%) reported receiving free/reduced lunch during their K-12 education. This is lower compared to the state average of free/reduced lunch in Georgia in 2021 (45.3%; Georgia Department of Education, 2021).

Preliminary Analyses

Cannabis Use Among College Students

The lifetime and 30-day CU prevalence rates of this study are important information to shed light on the current state of CU on college campuses. The prevalence of lifetime use in the current study (67%) is higher than previous studies examining college student lifetime use (46.6%; Suerken et al., 2014). With regard to past 30-day use, the prevalence rate in the current study (35.7%) is higher than a recent study by Johnston et al. (2019), which reported that 25% of college students reported CU in the past 30 days. This means that lifetime CU rates as well as past 30-day CU may be higher on college campuses than previous studies have reported. The

average age of first-time CU in the current sample was 16.9, which is similar to the age of first use that was reported in previous studies (15.8; Clark et al., 2013).

Correlations Between Study Variables

This study had several correlations between the primary variables. Specifically, MPI scores were significantly, negatively correlated (-.307**) with SR, which means that individuals who have lower SR scores are more likely to have problems associated with CU. This may potentially be due to a lack of ability to regulate CU leading to greater likelihood of problematic CU or using CU as a means to self-regulate because individuals may not have the skills themselves. MPI scores were also significantly, positively correlated with two DERS-SF subscales, namely clarity (.211*) and awareness (.235*). This means that individuals with more difficulty understanding which emotions they are experiencing are more likely to have problems with CU, as are individuals who have a higher degree of inattention to their emotional responses (Kaufman et al., 2016).

With regard to childhood trauma, ACEs was significantly, negatively correlated (-.199*) with SR, which means that individuals with childhood trauma have a greater likelihood of having weaker SR skills compared to those who have not experienced childhood trauma. ACE scores also were significantly, positively correlated with DERS-SF Strategies (.201*), which suggests that when an individual has experienced ACEs, they are more likely to have more limited access to ER strategies.

SR was significantly, negatively correlated with all the DERS subscales, which means that there is a relationship between having lower SR scores and experiencing more difficulty in every facet of ER as conceptualized by the DERS-SF. Specifically, DERS-SF Goals and SR (-.309**) was significantly, negatively correlated which means that individuals with lower SR

skills may have greater difficulty engaging in goal-directed behavior. DERS-SF Clarity and SR (-.478**) were significantly, negatively correlated which suggests that individuals with lower SR skills are more likely to be unclear about which emotions they are experiencing, particularly in times of emotional stress. DERS-SF Awareness and SR (-.319**) was significantly, negatively correlated which shows that individuals with lower SR skills may have greater difficulties with emotional awareness. DERS-SF Non-Acceptance and SR (-.305**) were significantly, negatively correlated which suggests that individuals with lower SR scores are more likely to have a negative reaction to one's own or others' emotional responses. DERS-SF Impulse and SR (-.429**) were significantly, negatively correlated which means that lower SR scores may result in greater difficulty with impulse control. SR scores were significantly, negatively correlated with DERS-SF Strategies (-.522**), which means individuals with lower SR skills may have a higher degree of limited access to ER strategies.

Logistic Regression Assessing CU Problems

Demographic Predictors of CU Problems

For research question one, a preliminary analysis was conducted and the relationships between the study variables were examined. The results revealed that both steps of the logistic regression model were not significant. The first step contained demographic predictor variables and the omnibus test was not significant. Therefore, demographic variables did not significantly predict whether college students would experience problems related to their CU. Although previous research has demonstrated a connection between race (NASEM, 2017), gender (Subbaraman & Kerr, 2021), and age (particularly among traditional-aged college students [18-24; Schulenberg et al. 2021]) with CU problems, the current study did not replicate these findings.

Primary Predictors of CU Problems

For the full model of research question one, the omnibus test of coefficients for step two reported $X^2 = 21.998$, df = 13, $n = 115$, $p = .055$. Thus, all the variables in the model (demographic and primary variables) did not significantly predict CU problems among participants in my study.

These findings are contrary to my hypothesis and other prior findings that suggested ACEs (Folk et al., 2021)., ER (Garfinkle, 2017), SR (Dvorak & Day, 2014), and free/reduced lunch status (Thrul et al., 2019), predicted CU problems. There are several reasons that might explain why these predictors were non-significant in the current study. First, student perception on what constitutes a problem caused by cannabis could have impacted participants' responses. Specifically, students may be in the precontemplation stage of change of the Transtheoretical Model (TTM) and not see CU as a problem or are unaware of their problem's association with CU (Prochasaka & Diclemente 1983). Second, traditional-aged undergraduate college students may have only been engaging in CU for two to four years and thus may not be experiencing problems yet or may not be attributing problems in their life to their CU. Finally, student perceptions and social attitudes of CU on college campuses may make it more difficult for students to recognize their problems as associated with CU. Therefore, college counselors should attempt to provide easily accessible information about the risks of CU to all students which may help students recognize potential CU problems and propagate the understanding among college students that college counselors can provide help in treating issues associated with problematic CU.

Although problematic CU was found to be a nonsignificant model, it does raise interesting questions regarding undergraduate college student perception of CU and CU

problems. One possible explanation for why students did not report CU problems may be the more liberal societal views regarding cannabis on college cannabis that do not commonly include a discussion of problems associated with cannabis as the U.S. continues to trend towards more accepted views of CU, regardless of race, ethnicity, gender, education, religion, or political affiliation (Felson et al., 2019). Another recent study by McKenzie et al. (2021) reported that students' attitudes and social norm perceptions were strongly related with the intention to engage in CU meaning that students who choose to engage in CU may have potential biases in favor of CU that hinder their objectivity regarding potential CU problems. These social norms on college campuses may inform increased CU on college campuses and may explain how students who engage in frequent CU may not have the perception that they potentially have problems related to CU.

CU Differences Before COVID-19 to Present Day

The second research question examined differences in CU from before COVID-19 to the present day. The significant findings of the second research question included decreased group CU currently compared to before the pandemic, and increased ingestible CU currently compared to before the pandemic. The analysis examining changes in CU frequency from before the pandemic to present day were not significant. These findings mean that certain forms of CU (ingestibles) may be more used now, potentially because of less social opportunities during the COVID-19. Indeed, the study's findings suggest that group CU has decreased during the pandemic, but the overall frequency of CU has not been impacted by COVID-19 and individuals who were using cannabis before the pandemic may still be using currently.

CU Frequency

The second hypothesis of this study examined lifetime CU frequency (Daily, Weekly, Monthly, A Few Times Per year, and None) before and during the current timepoint of the COVID-19 pandemic. There were no significant changes (p = .953) in frequency of CU before and after the pandemic, meaning, CU remained stable across the pandemic. However, it is interesting to note that 54 participants (47%) reported CU before the current pandemic compared to 60 (52.2%) during the current phase of the pandemic. Although there was not a significant difference in frequency of CU among colleges students before the pandemic compared to present day, the use of cannabis is trending up. Although prior research from before the onset of COVID-19 suggests individuals may be engaging in CU at greater frequencies, (Williams, 2020), data comparing CU before the pandemic to current day is scarce. However, one recent study by Imtiaz et al. (2022) of adults residing in Canada who spoke English (n = 6,021) reported that daily CU did not change in the overall sample or various population subgroups during the pandemic, which mirrors the current findings.

College student CU was not occurring more frequently due to the pandemic as hypothesized. Instead, college student CU in this study was stable, meaning the pandemic did not make it harder to obtain cannabis or make them more likely to use more frequently. The rationale for why frequency of collegiate CU has not changed from the onset of the pandemic until today may be related to how participants accessed cannabis products. For example, this study took place in a state that does not have legal cannabis products. Therefore, cannabis is not sold at stores that may be regulated, affected by closings, or quarantining due to the pandemic meaning students methods of obtaining cannabis prior to the pandemic likely are still available currently.

Social CU

Given the number of participants in each cell related to social patterns of CU, I only ran the McNemar's test on changes in group CU before the pandemic compared to now. Results from the second research question demonstrated that engaging in CU while in a group has decreased significantly (p = .011) from before the pandemic to the current timepoint. Specifically, 39 participants reported group CU before the pandemic and 25 reported group CU at the current timepoint. This finding demonstrated a potential change in the landscape of CU on college campuses that aligns with a previous study suggesting that COVID-19 may have altered traditional-aged college student CU (Chong et al., 2022) and that college students may be engaging in more socially isolated CU (Williams, 2020). This trend may be due to COVID-19 impacting gathering of large groups and social activities. It appears that CU was often engaged in socially before the pandemic, and now, fewer students are using cannabis in a group. This is an important finding because it suggests that cannabis may be viewed not only as a social drug, but also a drug for recreational use alone, or with a few others. This finding may also shed light on how students have tried to follow social distancing rules without compromising their CU and students may have accomplished this is by deciding to simply use less in groups. Another explanation is that students may be willing to use in large social settings during the pandemic, however, because those opportunities have become more limited, they simply have not had the opportunities for group CU compared to before the pandemic began.

CU Methods

In order to assess significant differences in CU methods prior to the pandemic compared to now, a McNemar's test was used to assess differences in the number of students who primarily ingested cannabis compared to other methods of use. Ingestible CU refers to food products containing cannabis extract (i.e., edibles). The McNemar's test was significant,

meaning that more ingestible cannabis products are being used now compared to before the pandemic began. Although this data was gathered from a University in the Southeast that does not have legalized recreational or medicinal cannabis, there is research in states where CU is legal for recreational/medicinal uses that attest to the growing popularity of edible cannabis products. For example, in 2014, 45% of the total cannabis sales in the state of Colorado were attributed to ingestible CU products including baked goods, candies, gummies, chocolates, lozenges, and beverages (Brohl et al., 2015). It is also important to note that ingestible CU products may be underrepresented in studies assessing cannabis sales, because ingestible CU products can be created in homes, or by other unregulated methods, and may not accurately reflect the proportion of cannabis sold as edibles (Barrus et al., 2016). Thus, the results of this study mirror more national trends in CU methods.

This is one of the first studies to examine CU during the COVID-19 pandemic and suggested that ingestible CU has increased during the pandemic, which may be due to several reasons. First, social CU has changed during the pandemic meaning that individuals are less likely to engage in group CU in the current stage of the pandemic compared to before the pandemic began. Smoking cannabis products with multiple people may be considered a social activity, and the decrease in group CU may have also altered the methods used to engage in CU. Due to the decrease in group CU, ingestible CU may have increased because individuals are more likely to use ingestible cannabis products in fewer numbers, or in isolation. This means that due to fewer social gatherings during the COVID-19 pandemic, individuals may be choosing to engage in CU via methods that do not have the social novelty of smoking. Another reason is that the biggest difference between ingestion and inhalation of cannabis extracts is the delayed onset of drug effect with ingestion (Barrus et al., 2016). Thus, individuals may be opting for methods

that do not result in an immediate high because they are not in smoking groups that are aiming to collectively experience the high from cannabis.

Secondary Analysis

Demographic Predictors of Lifetime CU

Utilizing the MPI as the dependent variable for this study was problematic in performing an accurate analysis and led to a nonsignificant logistic regression model. Many of the students (n = 51; 44.3%) in this sample did not report CU problems. Lifetime CU was selected for the secondary analysis because even if students did not endorse problematic usage, it is valuable and important to understand predictors of lifetime CU. Also, when examining the data, it was found that 83 participants reported lifetime usage out of 115, which raised strong intrigue on how the independent variables of this study might predict this binary outcome.

The first step of the logistic regression examining demographic variables as predictors of lifetime CU among college students was not significant. Therefore, gender, age, and race/ethnicity did not significantly predict lifetime CU among college students. This finding is contrary to prior research by McCabe et al. (2007) that found that being male, Hispanic, and White was associated with more drug use and abuse during college.

Regarding age, this survey only included undergraduate students between ages 18-24. According to Zeiger et al. (2019), this is one of the highest using age groups and there simply may not be enough variance of CU among the specific years in this age group. Regarding gender, males on average are more likely to engage in CU compared to females (Cuttler, 2016), yet no significant gender differences in lifetime CU were found in the current study. In the current study a similar percentage of males reported lifetime CU (28%) compared to females (24%). This finding is similar to another study by Schepsis et al. (2011) that suggested CU prevalence rates

may be similar across gender (29% of males and 24% of females). This means that college counselors and researchers should not assume that females are not using cannabis at similar rates compared to their male counterparts. Regarding race/ethnicity, this study does align with prior research suggesting CU prevalence rates are similar across racial groups (Martins et al., 2021). However, in the current study, this finding may be due to the low participation rate of students of color. Only 24% of the sample identified with a racial group other than White, and although this is somewhat close to the demographics of the university, it may be too low for significant differences in CU to be identified.

Lifetime CU and Emotion Regulation

Previous studies have demonstrated the relationship between ER difficulties and CU (Buckner et al., 2007; Garfinkle, 2017). In the current study, a specific ER difficulty, namely, DERS-SF Strategies, significantly predicted lifetime CU among the collegiate sample. The model found that those with more difficulty accessing ER strategies were .673 times more likely to use cannabis in their lifetime. Specifically, the strategies subscale reflects the participants' belief that there are limited strategies one can implement to regulate oneself once upset (Kaufman et al., 2016). The fact that difficulties with ER strategies predicted lifetime CU among college students may mean that students are using CU as a coping mechanism because they do not have an alternative strategy to enact when they become upset or dysregulated. The results suggest that individuals who have engaged in CU at some point in their lifetime may not have access to appropriate ER strategies, nor do they have a high degree of flexibility in their strategy use, which reflects one's ability to engage in psychological adjustment (Campbell-Sills & Barlow, 2006).

Indeed, this finding also aligns with prior research that suggested individuals who experiences more stressful life events were associated with more severe problematic CU, and higher levels of emotion dysregulation resulted in stronger associations (Dingle et al., 2018). The other subscales of the DERS-SF (Non-Acceptance, Impulse, Goals, Clarity, Awareness) were not significant predictors of lifetime CU in the logistic regression model. This finding seems to imply that when counselors are designing emotion regulation-based interventions, it may behoove them to pay particularly attention to if and how student's utilize strategies related to ER. Designing and providing psychoeducation on various ER strategies that have been shown to be effective could be used as a positive alternative to CU. ER skills may be particularly important for school counselors as early training in ER strategies may prevent CU and other substance use problems in emerging adulthood and in an individual's college-attending years (Choopan et al., 2016).

Lifetime CU and ACEs

The current study found ACEs to be a significant predictor of lifetime CU among college students (p = .004). This means that those with one, or multiple ACEs, were more likely to use cannabis in their lifetime. The model found that those with higher ACE scores were 1.67 times more likely to use cannabis in their lifetime than those with lower ACE scores. This finding aligns with recent research by Folk et al. (2021), which suggested that exposure to ACEs predicted CU, among other substances, and psychiatric outcomes among participants. The current study also supports a recent study by Fusco et al. (2021), which found that roughly a third of those who experienced multiple ACEs in childhood reported frequent CU. It is documented in the literature that the stress associated with ACEs can potentially lead individuals to cope via CU, and more likely to develop a CUD, as a result of maladaptive coping (Garfinkle,

2017). Indeed, being 1.6 times more likely to use cannabis in their lifetime as this study suggested compared to those with lower ACE scores underscores how detrimental childhood trauma may potentially be regarding CU in an individual's lifetime.

The current study's findings reaffirm what other studies have reported regarding the associations between traumatic experiences in childhood and CU later in life. Furthermore, this finding aligns with the Stress Sensitization Theory's hypothesis that chronic stress resulting from trauma may lower an individual's threshold to seek out maladaptive coping strategies such as CU. This study highlights the need for various counselors, counselor educators, and researchers to pay close attention to students with trauma histories and how ACEs may increase an individual's susceptibility for lifetime CU.

Lifetime CU and Self-Regulation

The results of the secondary analysis regarding lifetime CU and SR revealed that lower SR scores predicted lifetime CU. SR scores in the current sample have a .957 chance of engaging in CU at some point in their lifetime. This means that higher SR scores may have protective qualities against lifetime CU and as SR increases, the probability of CU decreases (Field, 2018). This matches prior research which suggests that higher levels of SR are associated with lower likelihood to engage in CU (Dvorak et al., 2014). The rationale for the current study having similar findings to Dvorak et al. (2014) is that the SSRQ may have used language that the participants of this study were easily able to understand and apply to their own experiences. SR skills have been heavily taught in K-12 settings as evidenced by the large number of studies that have demonstrated the role of SR being integrated into the curriculum in K-12 settings (Denham, 2006; Mashburn & Pianta, 2006; Valiente et al., 2008), This means that SR may lessen the odds of using cannabis in college students, as evidenced in prior studies (Carver, 2005; Wills et al.,

2011), because SR involves specific processes of initiation or inhibition of behavioral responses (impulsivity, effortful/self-control, inhibition, and constraint) and when an individual is able to effectively use these skills their likelihood of experiencing behavior dysregulation and engaging in CU to compensate for that dysregulation decreases.

Lifetime CU and Free/Reduced Lunch

The results pertaining to free/reduced lunch as a nonsignificant predictor in the logistic regression model is important to consider in this study. Interestingly, and contrary to expectations, free/reduced lunch status did not significantly predict lifetime CU among college students. This contradicts a recent study by Thrul et al. (2019) which reported that free/reduced lunch status was related to 70.5% of the sample population (411 of 583 participants) of individuals engaging in CU.

There are several possible reasons for why this study does not support previous research. First, free/reduced lunch status may not have been an adequate measurement of childhood poverty for the current sample population. This is because some students may have been unsure of what free/reduced lunch status is or may have been unsure if they received free/reduced lunch status during their K-12 schooling. Another possible explanation is that individuals may have been reluctant to report if they received free/reduced lunch due to the stigmatization of poverty in the U.S. Although there is little qualitative evidence to support this rationale, there were several participants (n = 8) who reported that they were unsure of their lunch status as a child. Utilizing a questionnaire that assesses specific resources that participants might have been able to recall from their childhood might have more accurately gauged childhood poverty. Specific measures may potentially include threshold estimates of childcare, work, and out-of-pocket medical expenses; cost of living; and whether their family owned or rented their home as

suggested by Hutto et al. (2011). Also, poverty measurement indexes that take the multidimensionality of poverty into account are evidenced to be more accurate than traditional methods such as free/reduced lunch status. Specifically, Notten and Roelen (2011) reported the need to provide insight into the degree to which individuals experience several unfavorable conditions at the same time in their Measures of Cumulative Deprivation instrument. Finally, because childhood poverty is considered an ACE, it is possible that the same variance that was accounted for by ACEs was accounted for by free/reduced lunch and these two variables may explain the same variance in lifetime CU.

Limitations

The results of this study aimed to examine the predictive nature of ER, SR, ACEs, and childhood poverty with regard to CU problems among college students. However, as with all studies, there are limitations to these findings and the results should be interpreted with caution. First, this study has limitations that pertain to the generalizability of the study results. The participants were full-time undergraduate students from a large University in the Southeast and thus results may not be generalizable to students in other geographic regions. Furthermore, only full-time undergraduate students between the ages of 18 and 24 were included in this study. These findings may not be applicable to students who identify as part-time students, graduate students, or those outside of the age range of young adults (18-24).

With regard to the sample, most participants identified as White (67.8%). This means that other racial groups may be underrepresented, and this limitation should be considered when interpreting results and generalizing the results to other racial and ethnic groups. Specifically, this study combined Black, Hispanic, Multiracial, Pacific Islander, and Other into one variable due to low participant numbers in order to increase confidence in the findings. Participants in this

study also mostly identified as female (72%). This is a potential limitation because prior research has shown that males experience more problems with CU (SAMHSA, 2014) and if the current study had included more males the MPI may have performed better. Additionally, the sample consisted only of students who volunteered to participate. Students who completed the survey were entered into a drawing to win a $20 Visa gift card or were given research credit via the university research pool. Also, CU is an Illegal, and stigmatized, activity in the state the study was conducted in. Therefore, there may be differences in CU between those who chose to complete the survey and those who did not choose to participate.

A second limitation relates to the sampling method employed to collect the data. Homogenous convenience sampling was utilized in order to obtain participants from classrooms with over 30 students in each class. Although a diverse number of academic disciplines were represented in the sample, the invitation to participate was made available only to classrooms with at least 30 students, or who were participating in the Counseling and Human Development Services (CHDS) research pool. Thus, this study may be skewed towards classroom subjects that typically have higher course enrollment, and the counseling and psychology fields because those are the students who primarily used the research pool.

Also, the data used in the study was obtained by self-report, which was not verified for accuracy. Although all survey packets remained anonymous, the sensitive nature of the items related to illicit drug use (i.e., CU), potential trauma including sexual abuse and childhood poverty, may have impacted participants' responses. Although self-reported data is commonly used in social sciences (Althubaiti, 2016) these results should still be considered in light of the limitations of self-reported data.

In addition, using free/reduced lunch status as a marker for poverty in this study may also be a limitation. For example, participants in the study may not have known whether they had free/reduced lunch status as a child, which raises questions about the efficacy of how this variable was included in the study. Thus, free/reduced lunch status may not have been the best measure to assess childhood poverty. Utilizing a measure that was able to provide greater insight into the degree to which individuals experience several unfavorable conditions at the same time as suggested in the Measures of Cumulative Deprivation instrument created by Notten and Roelen (2011) may have been more beneficial for this study. Also, COVID-19 may have impacted who received free/reduced lunch during the pandemic. For example, individuals who identified as a college freshman during the study may have received free/reduced lunch in the year prior due to COVID-19, not poverty.

Finally, it is also important to note the timing of the current study may be a potential limitation. Data was collected at the end of the spring semester. During this time, it may have been possible that students were preparing for and taking final exams, seeking employment opportunities, and preparing for summer trips after the end of spring term. This may not have only impacted participation in this study, but also impacted CU among the participants in this study. For example, a student who was experiencing a high degree of stress due to their upcoming final exams may have been engaging in CU as a coping mechanism to help with exam related stress. If the survey had been administered earlier in the semester they may not have been engaging in the same degree of CU.

Implications for College Counselors

The results of the current study have several implications for counselors working with collegiate populations. First, ACEs was significantly associated with lifetime CU, which is

consistent with the Stress Sensitization Theory's assumption that early adversity is related to poor health outcomes later in life (Manyema et al., 2018). Indeed, substance use in young adulthood is one possible response to chronic stress (King & Chassin, 2008). When working with college students who use cannabis, utilizing an ACE screening questionnaire may help inform counselors of important childhood risk factors (Rariden et al., 2021). College counselors should be trained to recognize that early-life adversities, such as ACEs, may potentially impact an individual's stress response, which may impact the interventions that may be most efficacious in a student's treatment plan (Cheong et al., 2017). For example, an individual presenting with anxiety as a result of a traumatic event may benefit more from interventions focused on systematic desensitization of the event whereas an individual presenting with generalized anxiety and depression may have better results utilizing applied relaxation techniques (Hayes-Sketlton et al., 2013). Also, this study may serve as a potential form of psychoeducation as college counselors may explain the increased odds of lifetime CU when an individual has suffered an ACE in childhood. These results also highlight the importance of college counselors being trained in trauma-informed care because of the relationship between trauma in childhood and lifetime CU. Counselors who are trained in trauma-informed care may be better equipped to help students process the underlying reasons they choose to engage in CU and take advantage of interventions and practices that are geared towards trauma-focused modalities.

The prevalence of CU among this sample also has implications for college counselors. Specifically, 67% reported lifetime CU and 35.7% reported past-30-day CU. This finding supports prior studies reporting that daily CU has risen from 3.5% in 2007 to 5.9% in 2014 to 7.9% in 2020 among 19-to-22-year-old full-time college students, showing a significant increase of 3.3% over the past five years (Schulenberg et al., 2021). The implications of this study's

findings regarding prevalence rates are that CU is continuing to increase on college campuses and college counselors need to be mindful that more students may present for counseling services that have used cannabis in the past or are using currently. However, some students do not associate their potential presenting concerns with problematic CU. Therefore, counselors in a college setting should be prepared to gain information regarding CU, provide psychoeducation on the risks associated with CU, and have ongoing discussions with students who are engaging in CU about how their usage is impacting their daily functioning.

There are also several implications regarding the predictive nature of ER with regard to lifetime CU. Regarding ER, it may behoove college counselors to help clients who use cannabis to develop ER strategies so they can manage emotional states without using substances. Effective ER strategies that may be considered include individuals identifying triggers and labeling their emotional states during times of emotional duress. Other specific strategies and interventions that may be considered useful when working with a college student who use cannabis include CBT modalities such as reappraisal (recognizing negative thought patterns and attempting to adapt to more effective strategies; Gross 1998), and suppression (inhibiting behaviors tied to emotional responses including facial expressions, verbal expressions, and gestures; Gross, 2015). This is evidenced in a recent study by Boehme et al. (2019) that CBT modalities may be useful in resolving dysfunctional ER strategies utilizing reappraisal and suppression.

With regard to SR, college counselors may be able to gain information about individual protective factors by assessing clients' SR and engaging in psychoeducation regarding SR strategies to those with low SR scores. SR interventions that might be utilized by college counselors include self-evaluation (self-judgments of present performance and self-reactions to their judgments), and self-reflection (acknowledging one's own emotions, behaviors, preferences,

and values and to understand their impact) as these interventions focus specifically on how individuals conceptualize their preferred SR strategies before and after using them (Li et al., 2018; Schunk, 1996).

Implications for School Counselors

Due to the average age of first CU in this study (16.89) school counselors may also tentatively use these findings but should exercise caution because this study was primarily focused on a college population. This study found that ER, SR, and ACES predicted lifetime CU, therefore, school counselors may consider providing CU support/resources for students with ACEs. School counselors should also consider including ER strategies and SR skills in classroom activities. The same ER strategies and SR skills that were mentioned for college counselors may also be applicable for school counselors (identifying triggers, labeling emotional states during times of emotional duress, and engaging in reappraisal and suppression techniques; Gross, 1998, Gross, 2015). School Counselors may also seek to become more aware of ACEs and incorporate a trauma-informed approach in schools as this study may underscore the relationship between trauma in childhood/adolescence and potential substance use difficulties (such as CUDs) in adulthood. Chickering's Seven Vectors Theory may be applicable to school counselors because school counselors can engage in prevention efforts focused on increasing awareness of the upcoming risks that students in middle and high school may face in a college environment, particularly related to the unique intersectionality between young adults attending college and increased substance use concerns,

Implications for Counselor Educators

Identification and assessment of addiction are areas that many mental health professionals have identified as needing more training and resources (Celluci & Vik's, 2001;

Renner 2007). For example, previous research has shown that school counselors reported lower confidence in identifying students with substance use concerns (Burrow-Sanchez & Lopez, 2009). This is also true for mental health counselors who have reported a need for improved training to effectively provide substance abuse counseling services (Crozier & Gressard, 2005). This study provided an updated depiction of how college students are using cannabis-products in 2022, and during the COVID-19 pandemic. Given the prevalence rates of CU, counselor educators should consider integrating content and training about CU into core counseling courses with a focus on how deficits in ER, SR, and the presence of ACEs, often are precursors to substance use behaviors including CU. Specifically, in light of the results of this study, it may be most helpful to include ER, SR, and trauma-focused interventions and psychoeducation strategies into counseling courses such as human development, helping skills, and counseling theory.

Counselor educators may also teach how Chickering's Seven Vectors of Identity Development Theory applies to students who are engaging in CU. This theory postulates that the specific intersectionality of emerging adulthood and the social contexts of the college environment may result in an increased likelihood to engage in CU (Reifman & Watson, 2003). Understanding the contextual underpinning of this theory and how it applies to college settings could prove useful to counselors aiming to create prevention and intervention strategies with collegiate clients. Additionally, counselors in college settings can use the Seven Vectors Theory to contextualize potential substance use concerns within the student's environment and their unique motives to engage in CU. Future research studies should also seek to assess how counselor educators who train counselors to understand and incorporate Chickering's Seven

Vectors Theory in their formal counseling training are able to apply this psychosocial theory to their work with students who are at risk for addictions.

Implications for Future Research

The results of the current study provide direction for future research endeavors to better understand the relationship between lifetime CU and ER, SR, ACEs, and childhood poverty and to apply this understanding to a variety of populations and counseling professionals. Future research projects should include larger representations of the groups that were underrepresented in the current study, specifically racial and ethnic minorities, and males. Due to a lack of adequate sample size from Black, Hispanic, Multiracial, Pacific Islander and Other categories, these racial groups were combined into one variable, which is potentially counter to multiculturally competent research and issues of Diversity, Equity, and Inclusion. Additionally, future studies involving college students who are not considered young adults (18-24), individuals who are not enrolled full-time, and graduate students, may provide additional information related to collegiate substance abuse, ER, SR, ACEs, and childhood poverty.

In addition, rather than addressing lifetime CU, future research is needed to include CU problems without using the MPI as the primary assessment instrument. There are many instruments for assessing marijuana problems including the Cannabis Use Problems Identification Test (CUPIT); Cannabis Abuse Screening Test (CAST); Electronic THC Online Knowledge Experience (e-TOKE); Severity of Dependence Scale: Cannabis (SDS); and Adolescent Cannabis Problems Questionnaire (CPQ-A), that may prove to be more accurate than the MPI with collegiate populations. Furthermore, if the MPI is to be used it may be better suited for use with college students who are seeking counseling for CU, because there may be more understanding of CU problems among those seeking support.

Taking the drug culture of college settings into consideration and the presence of strong social norms related to CU, studies examining the relationship between lifetime CU and CU problems with samples of young adults between ages 18-24 who are not currently attending college would illuminate the role that college plays in fostering drug use behaviors. By expanding the current study to include non-collegiate adults in treatment for CUDs, the impact of potentially severe ER, SR, and ACEs related difficulties and their impact on CU could be better understood.

In addition to changing the population to be studied, how CU problems are accurately assessed could be surveyed in future studies to enhance the literature. Self-report measures may limit accuracy due to stigmatization and legal implications of substance use. Although self-report is commonly used in studies related to substance use interviewing and biological markers may provide more accurate results, although it is important to note that these measures are potentially more expensive and time consuming (Khalili et al., 2021). Also, COVID-19 has potentially altered the landscape of childhood trauma for childhood and adolescents who have lived during the pandemic. These individuals may have a greater degree of susceptibility to chronic stress as postulated by the Stress Sensitization Theory which highlights the need for clinicians to continue to update trauma assessment measures based on the impact of COVID-19. Some substance abuse and cannabis assessment measures may be altered to include the impact of COVID-19 on stress reactivity.

Future research studies should examine the utility of specific ER and SR paradigms as prevention strategies for CU in school counseling settings. Specifically, how school counselors utilize strategies including, identifying triggers, labeling emotional states during times of emotional duress, and engaging in reappraisal and suppression techniques (Gross, 1998, Gross,

2015) may be beneficial to informing school counselors about the efficacy of specific ER and SR techniques as they apply to CU in middle and high school students. The field of school counseling may also benefit from research focusing on how incorporating a trauma-informed approach for students who are at risk for addictions in order to further illustrate the connection between trauma in childhood/adolescence and an increased susceptibility to addictions including cannabis.

Qualitative studies examining problematic CU and the impact of COVID-19 on collegiate CU may also be beneficial to the field of addictions. Specific qualitative questions that should be explored in greater detail in a future study include asking college attending young adults (18-24) if they believe that marijuana problems exist, and if so, how knowledgable are college students regarding problematic CU. Other potential qualitative questions based on the results of this study include asking college students why they believe ingestible CU has increased during the pandemic. Asking about specific questions regarding the utility of ingestible CU compared to other forms (smoking, vaping, etc.) might shed light on the increase of CU on college campuses as evidenced by this study. Finally, this study showed that group CU has decreased, and a potential qualitative study might seek to gain information regarding why that decrease has occurred by asking students who engage in CU why they are using less in groups to ascertain if students have not had the same opportunities to engage in group CU, or if they are attempting to reduce the risks associated with contracting COVID-19 in social situations by mitigating their social CU.

Conclusions

The purpose of this study was to explore the relationship between CU problems, ER, SR, ACEs and childhood poverty among traditional-aged college students. A review of relevant

literature revealed both theoretical and empirical works linking ER, SR, ACEs, and childhood poverty to CU independently. The logistic regression model assessing the primary study variables as predictors for CU problems was nonsignificant. The reason for this finding may be related to college student perceptions of cannabis being problematic. Perhaps students in this study did not attribute any potentially related difficulties they might be having in their lives with their CU. However, a secondary analysis examining the primary study variables as predictors for lifetime CU yielded significant findings. Specifically, the results of the secondary logistic regression indicated that self-regulation, ACEs, and a specific dimension of emotion regulation (Strategies) predicted lifetime CU among traditional age college students.

Furthermore, a Wilcoxon Signed Rank Test and two McNemar's Tests found no differences in CU frequency before the pandemic and currently, an increase in ingestible cannabis products being use currently compared to before the pandemic, and a decrease in group CU currently compared to before the pandemic.

These results have implications for counselors in clinical or college settings, counselor educators, as well as future researchers. Counselors working with college students may benefit by addressing CU, social patterns of CU, and methods of CU with their clients through assessments and interventions instead of solely focusing on CU problems, as well as incorporating these constructs into case conceptualizations and treatment plans. The development of interventions designed to increase awareness of cannabis related problems may positively impact college students at-risk for CUDs and other substance abuse concerns. Counselor educators may best serve counselors-in-training by infusing the constructs of ER, SR, and ACEs into course curriculum. By exploring the utility of addressing ER, SR, and ACEs, in practice, counselor educators can train counselors to not only address potential CU concerns, but

also the underlying issues that may contribute to the development, and maintenance of CU problems. Furthermore, the exploration of the sociological constructs of CU, CU methods, and social CU in a counseling training program that supports Chickering's Seven Vector's Theory, which is a psychosocial perspective that addressees the unique intersectionality between CU and emerging adulthood. The implications for future research include examining ER, SR, and ACEs, with a variety of populations including college students seeking counseling services for CU. This information can further inform future interventions and provide insight into identifying students at-risk for collegiate CU and problematic CU.

References

Abajobir, A. A., Najman, J. M., Williams, G., Strathearn, L., Clavarino, A., & Kisely, S. (2017). Substantiated childhood maltreatment and young adulthood cannabis use disorders: A pre-birth cohort study. *Psychiatry Research*, *256*, 21–31. https://doi.org/10.1016/j.psychres.2017.06.017

Afifi, T. O., Taillieu, T., Salmon, S., Davila, I. G., Stewart-Tufescu, A., Fortier, J., Struck, S., Asmundson, G., Sareen, J., & MacMillan, H. L. (2020). Adverse childhood experiences (ACEs), peer victimization, and substance use among adolescents. *Child Abuse & Neglect*, *106*, 104504. https://doi.org/10.1016/j.chiabu.2020.104504

Alexander, M. (2012). *The New Jim Crow.* The New Press

Allem, J. P., Soto, D. W., Baezconde-Garbanati, L., & Unger, J. B. (2015). Adverse childhood experiences and substance use among Hispanic emerging adults in Southern California. *Addictive Behaviors*, *50*, 199–204. https://doi.org/10.1016/j.addbeh.2015.06.038

Allen, M., & Donkin, A. (2015). The impact of adverse experiences in the home on the health of children and young people, and inequalities in prevalence and effects. *UCL Institute of Health Equity*.

Allen, T. J., Moeller, F. G., Rhoades, H. M., & Cherek, D. R. (1998). Impulsivity and history of drug dependence. *Drug and Alcohol Dependence*, *50*(2), 137–145. https://doi.org/10.1016/s0376-8716(98)00023-4

Althubaiti A. (2016). Information bias in health research: Definition, pitfalls, and adjustment methods. *Journal of Multidisciplinary Healthcare*, *9*, 211–217. https://doi.org/10.2147/JMDH.S104807

Al-Zouabi, I., Stogner, J. M., Miller, B. L., & Lane, E. S. (2018). Butane hash oil and dabbing: Insights into use, amateur production techniques, and potential harm mitigation. *Substance Abuse and Rehabilitation*, *9*, 91–101. https://doi.org/10.2147/SAR.S135252

Ambroson, D. L. (1996). The construction and validation of the Developmental Scale of Sexual Risk-Taking. *Dissertation Abstracts International: Section B: The Sciences & Engineering, 57* (1-B), 0757. (UMI No. AAM9614580).

American Psychiatric Association. (2013). *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.). Author.

American Psychological Association. (2019). Guidelines for psychological practice for people with low-Income and economic marginalization. www.apa.org/about/policy/guidelines-lowincome.pdf.

American Psychological Association, Task Force on Socioeconomic Status. (2007). *Report of the APA Task Force on Socioeconomic Status.* Washington, DC: American Psychological Association.

Anda, R. F., Felitti, V. J., Bremner, J. D., Walker, J. D., Whitfield, C., Perry, B. D., Dube, S. R., & Giles, W. H. (2006). The enduring effects of abuse and related adverse experiences in childhood. A convergence of evidence from neurobiology and epidemiology. *European Archives of Psychiatry and Clinical Neuroscience*, *256*(3), 174–186. https://doi.org/10.1007/s00406-005-0624-4

Anderson, M., Hansen, D., & Rees, D. (2015). Medical marijuana laws and teen marijuana use. *American Law and Economics Review*, *17*(2), 495-528.

Anderson, M. & Rees, D. (2021). The public health effects of legalizing marijuana, *NBER Working Papers 28647*, National Bureau of Economic Research.

Andersen S. L. (2018). Stress, sensitive periods, and substance abuse. *Neurobiology of Stress*, *10*, 100140. https://doi.org/10.1016/j.ynstr.2018.100140

Anderson, S. P., Zylla, D. M., McGriff, D. M., & Arneson, T. J. (2019). Impact of medical cannabis on patient-reported symptoms for patients with cancer enrolled in Minnesota's medical cannabis program. *Journal of Oncology Practice*, *15*(4), e338–e345. https://doi.org/10.1200/JOP.18.00562

American Civil Liberties Union. (2013). The war on marijuana in black and white. https://http://www.aclu.org/files/assets/aclu-thewaronmarijuana-rel2.pdf.

Archie, S. R., & Cucullo, L. (2019). Harmful effects of smoking cannabis: A cerebrovascular and neurological perspective. *Frontiers in Pharmacology*, *10*, 1481. https://doi.org/10.3389/fphar.2019.01481

Arnett, J. J. (2003). Conceptions of the transition to adulthood among emerging adults in American ethnic groups. *New Directions for Child and Adolescent Development*, *100*, 63-76.

Arnold, J. C., Nation, T., & McGregor, I. S. (2020). Prescribing medicinal cannabis. *Australian Prescriber*, *43*(5), 152–159. https://doi.org/10.18773/austprescr.2020.052

Asmaro, D., Carolan, P. L., & Liotti, M. (2014). Electrophysiological evidence of early attentional bias to drug-related pictures in chronic cannabis users. *Addictive Behaviors*, *39*(1), 114–121. https://doi.org/10.1016/j.addbeh.2013.09.012

Azofeifa, A., Mattson, M. E., Schauer, G., McAfee, T., Grant, A., & Lyerla, R. (2016). National Estimates of Marijuana Use and Related Indicators - National Survey on Drug Use and Health, United States, 2002-2014. *Morbidity and Mortality Weekly Report. Surveillance Summaries (Washington, D.C.: 2002)*, *65*(11), 1–28. https://doi.org/10.15585/mmwr.ss6511a1

Avraham, Y., Ben-Shushan, D., Breuer, A., Zolotarev, O., Okon, A., Fink, N., Katz, V., & Berry, E. M. (2004). Very low doses of delta 8-THC increase food consumption and alter neurotransmitter levels following weight loss. *Pharmacology, Biochemistry, and Behavior*, *77*(4), 675–684. https://doi.org/10.1016/j.pbb.2004.01.015

Bakhshani, N. M., & Hosseinbor, M. (2013). A comparative study of self-regulation in substance dependent and non-dependent individuals. *Global Journal of Health Science*, *5*(6), 40–45. https://doi.org/10.5539/gjhs.v5n6p40

Barbera, E. F. (2016). Wanderworten etymological format: A 'hemp'case study, starting from Votic and Baltofinnic.

Barrett, D., Ju, S., Katsiyannis, A., & Zhang, D. (2015). Females in the juvenile justice system: Influences on delinquency and recidivism. *Journal of Child and Family Studies, 24*(2), 427-433.

Barrus, D. G., Capogrossi, K. L., Cates, S. C., Gourdet, C. K., Peiper, N. C., Novak, S. P., Lefever, T. W., & Wiley, J. L. (2016). Tasty THC: Promises and challenges of cannabis edibles. *Methods Report (RTI Press)*, 10.3768/rtipress.2016.op.0035.1611. https://doi.org/10.3768/rtipress.2016.op.0035.1611

Battistella, G., Fornari, E., Annoni, J. M., Chtioui, H., Dao, K., Fabritius, M., Favrat, B., Mall, J. F., Maeder, P., & Giroud, C. (2014). Long-term effects of cannabis on brain

structure. *Neuropsychopharmacology: Official publication of the American College of Neuropsychopharmacology*, *39*(9), 2041–2048. https://doi.org/10.1038/npp.2014.67

Baumeister, R. F., Vohs, K. D. (2007). Self-regulation, ego depletion and motivation. *Social and Personality Psychology Compass, 1*(1):115- 128.

Becci, A. A., Brook, J., & Lloyd, M. H. (2015). Co-occurrence of parental substance abuse and child serious emotional disturbance: Understanding multiple pathways to improve child and family outcomes. *Child Welfare*, *94*(4), 71–96.

Beckett, K., Nyrop, K., Pfingst, L., & Bowen, M. (2005). Drug use, drug possession arrests, and the question of race: Lessons from Seattle. *Social Problems*, *52*(3), 419-441.

Berzofsky, M., Creel, D. D., & Moore, M. A. (2015). Measuring socioeconomic status (SES) in the NCVS: Background, options, and recommendations.

Bellis, M. A., Hughes, K., Ford, K. (2018). Adverse childhood experiences and sources of childhood resilience: A retrospective study of their combined relationships with child health and educational attendance. *BMC Public Health, 18*, 792 https://doi.org/10.1186/s12889-018-5699-8

Bellis, M. A., Hughes, K., Merleo, M., Tocque, K., Hughes, S., Allen, T., Harrison, D., & Fe-Rodriguez, E. (2007). Predictors of risky alcohol consumption in schoolchildren and their implications for preventing alcohol-related harm. *Substance Abuse Treatment, Prevention, and Policy, 2,* Article 15.

Bethell, C., Jones, J., Gombojav, N., Linkenbach, J., & Sege, R. (2019). Positive childhood experiences and adult mental and relational health in a statewide sample: Associations across adverse childhood experiences levels. *JAMA Pediatrics. 173*(11), e193007. doi:10.1001/jamapediatrics.2019.3007

Bjureberg, J., Ljótsson, B., Tull, M. T., Hedman, E., Sahlin, H., Lundh, L. G., Bjärehed, J., DiLillo, D., Messman-Moore, T., Gumpert, C. H., & Gratz, K. L. (2016). Development and validation of a brief version of the Difficulties in Emotion Regulation Scale: The DERS-16. *Journal of Psychopathology and Behavioral Assessment*, *38*, 284-296. https://doi.org/10.1007/s10862-015-9514-x

Blagg, K., Gunderson, C., Schanzenbach, D. W., Ziliak, J. P. (2017). Assessing Food Insecurity on Campus: Urban Institute.

Blair, C., & Raver, C. C. (2012). Child development in the context of adversity: Experiential canalization of brain and behavior. *The American Psychologist*, *67*(4), 309–318. https://doi.org/10.1037/a0027493

Blanchard, B. (2013). "Cannabis Use, Schizotypy, and Personality: Associations with Cannabis-Related Problems and Emotion Recognition". *Graduate College Dissertations and Theses* Western Carolina University.

Blevins, C. E., Walker, D. D., Stephens, R. S., Banes, K. E., & Roffman, R. A. (2018). Changing social norms: The impact of normative feedback included in motivational enhancement therapy on cannabis outcomes among heavy-using adolescents. *Addictive Behaviors*, *76*, 270-274.

Block, R. I., & Ghoneim, M. M. (1993). Effects of chronic marijuana use on human cognition. *Psychopharmacology*, *110*(1-2), 219–228. https://doi.org/10.1007/BF02246977

Boden, M. T., Gross, J. J., Babson, K. A., & Bonn-Miller, M. O. (2013). The interactive effects of emotional clarity and cognitive reappraisal on problematic cannabis use among

medical cannabis users. *Addictive Behaviors*, *38*(3), 1663–1668. https://doi.org/10.1016/j.addbeh.2012.09.001

Boehme, S., Biehl, S. C., & Mühlberger, A. (2019). Effects of differential strategies of emotion regulation. *Brain Sciences*, *9*(9), 225. https://doi.org/10.3390/brainsci9090225

Bonn-Miller, M. O., Vujanovic, A. A., Boden, M. T., & Gross, J. J. (2011). Posttraumatic stress, difficulties in emotion regulation, and coping-oriented marijuana use. *Cognitive Behaviour Therapy*, *40*(1), 34–44. https://doi.org/10.1080/16506073.2010.525253

Booth, M. (2005). *Cannabis: A History*. 1st Picador ed. Picador

Bornstein, M. H., Jager, J., & Putnick, D. L. (2013). Sampling in developmental science: Situations, shortcomings, solutions, and standards. *Developmental Review: DR*, *33*(4), 357–370. https://doi.org/10.1016/j.dr.2013.08.00

Bracken-Roche, D., Bell, E., Macdonald, M. E. (2017). The concept of 'vulnerability' in research ethics: An in-depth analysis of policies and guidelines. *Health Research Policy Systems, 15*(8). https://doi.org/10.1186/s12961-016-0164-6

Bradford, A. C., Bradford, W. D., Abraham, A., & Bagwell Adams, G. (2018). Association between US state medical cannabis laws and opioid prescribing in the Medicare Part D population. *JAMA Internal Medicine*, *178*(5), 667–672. https://doi.org/10.1001/jamainternmed.2018.0266

Braveman, P. A., Cubbin, C., Egerter, S., Chideya, S., Marchi, K. S., Metzler, M., & Posner, S. (2005). Socioeconomic status in health research: One size does not fit all. *JAMA*, *294*(22), 2879–2888. https://doi.org/10.1001/jama.294.22.2879

Brechwald, W. A., & Prinstein, M. J. (2011). Beyond Homophily: A decade of advances in understanding peer influence processes. *Journal of Research on Adolescence: The*

Official Journal of the Society for Research on Adolescence, *21*(1), 166–179. https://doi.org/10.1111/j.1532-7795.2010.00721.x

Breedlove, M., Choi, J., & Zyromski, B. (2020). Mitigating the effects of Adverse Childhood Experiences: How restorative practices in schools support positive childhood experiences and protective factors. *The New Educator, 17*, 223 - 241.

Brennan, D. J., Hellerstedt, W. L., Ross, M. W., & Welles, S. L. (2007). History of childhood sexual abuse and HIV risk behaviors in homosexual and bisexual men. *American Journal of Public Health*, *97*(6), 1107–1112. https://doi.org/10.2105/AJPH.2005.071423

Bridgeman, M. B., & Abazia, D. T. (2017). Medicinal cannabis: History, pharmacology, and implications for the acute care setting. *P & T: A Peer-Reviewed Journal for Formulary Management*, *42*(3), 180–188.

Brinker, J., & Cheruvu, V. K. (2017). Social and emotional support as a protective factor against current depression among individuals with adverse childhood experiences. *Preventive Medicine Reports*, *5*, 127–133. doi:10.1016/j.pmedr.2016.11.018

Brockie, T. N., Dana-Sacco, G., Wallen, G. R., Wilcox, H. C., & Campbell, J. C. (2015). The relationship of adverse childhood experiences to PTSD, depression, poly-drug use and suicide attempt in reservation-based Native American adolescents and young adults. *American Journal of Community Psychology*, *55*(3-4), 411–421. https://doi.org/10.1007/s10464-015-9721-3

Brockman, R., Ciarrochi, J., Parker, P., & Kashdan, T. (2017). Emotion regulation strategies in daily life: mindfulness, cognitive reappraisal and emotion suppression. *Cognitive Behaviour Therapy*, *46*(2), 91–113. https://doi.org/10.1080/16506073.2016.1218926

Brodbeck, J., Matter, M., Page, J., & Moggi, F. (2007). Motives for cannabis use as a moderator variable of distress among young adults. *Addictive Behaviors*, *32*(8), 1537-1545.

Brohl, B., Kammerzell, R., & Koski, W. L. (2015). Colorado marijuana enforcement division: Annual update. *Colorado Department of Revenue*, *27*.

Brown, J., Kranzler, H. R., & Del Boca, F. K. (1992). Self-reports by alcohol and drug abuse inpatients: Factors affecting reliability and validity. *British Journal of Addiction*, *87*(7), 1013–1024. https://doi.org/10.1111/j.1360-0443.1992.tb03118.x

Brown, J. M., Miller, W. R., & Lawendowski, L. A. (1999). The self-regulation questionnaire.

Bryant, D. J., Coman, E. N., & Damian, A. J. (2020). Association of adverse childhood experiences (ACEs) and substance use disorders (SUDs) in a multi-site safety net healthcare setting. *Addictive Behaviors Reports*, *12*, 100293. https://doi.org/10.1016/j.abrep.2020.100293

Buckner, J. D., Bonn-Miller, M. O., Zvolensky, M. J., & Schmidt, N. B. (2007). Marijuana use motives and social anxiety among marijuana-using young adults. *Addictive Behaviors*, *32*(10), 2238–2252. https://doi.org/10.1016/j.addbeh.2007.04.004

Burnette, C. E., & Figley, C. R. (2017). Historical oppression, resilience, and transcendence: Can a holistic framework help explain violence experienced by indigenous people? *Social Work, 62*(1), 37–44. https://doi.org/10.1093/sw/sww065

Burrow-Sánchez, J. J., & Lopez, A. L. (2009). Identifying substance abuse issues in high schools: A national survey of high school counselors. *Journal of Counseling and Development, 87*, 72-79.

Campbell-Sills, L., Barlow, D. H., Brown, T. A., & Hofmann, S. G. (2006). Acceptability and suppression of negative emotion in anxiety and mood disorders. *Emotion, 6(4)*, 587-95.

Cauffman, E., Shulman, E. P., Steinberg, L., Claus, E., Banich, M. T., Graham, S., & Woolard, J. (2010). Age differences in affective decision making as indexed by performance on the Iowa Gambling Task. *Developmental psychology*, *46*(1), 193.

Carey, K. B., Neal, D. J., & Collins, S. E. (2004). A psychometric analysis of the self-regulation questionnaire. *Addictive Behaviors*, *29*(2), 253-260.

Carliner, H., Mauro, P., & Brown, Q. (2017). The widening gender gap in marijuana use prevalence in the U.S. during a period of economic change, 2002-2014. *Drug Alcohol Dependence*, *170*, 51-58. doi:10.1016/j.drugalcdep.2016.10.042

Carrà, G., Bartoli, F., Riboldi, I., Trotta, G., & Crocamo, C. (2018). Poverty matters: Cannabis use among people with serious mental illness: Findings from the United States survey on drug use and health, 2015. *The International Journal of Social Psychiatry*, *64*(7), 656–659. https://doi.org/10.1177/0020764018795213

Carver, C. S. (2005). Impulse and constraint: Perspectives from personality psychology, convergence with theory in other areas, and potential for integration. *Personality and Social Psychology Review*, *9*(4), 312-333.

Castaneto, M. S., Gorelick, D. A., Desrosiers, N. A., Hartman, R. L., Pirard, S., & Huestis, M. A. (2014). Synthetic cannabinoids: Epidemiology, pharmacodynamics, and clinical implications. *Drug and Alcohol Dependence*, *144*, 12–41. https://doi.org/10.1016/j.drugalcdep.2014.08.005

Caulkins, J. P., Kilmer, B., Kleiman, M., MacCoun, R. J., Midgette, G., Oglesby, P., & Reuter, P. H. (2015). *Considering marijuana legalization: Insights for Vermont and other jurisdictions*. Rand Corporation.

Cavazos-Rehg, P., Krauss, M., Grucza, R., & Bierut, L. (2014). Characterizing the followers and tweets of a marijuana-focused Twitter handle. *Journal of Medical Internet Research*, *16*(6), e157.

Cavicchioli, M., Movalli, M., Vassena, G., Ramella, P., Prudenziati, F., & Maffei, C. (2019). The therapeutic role of emotion regulation and coping strategies during a stand-alone DBT Skills training program for alcohol use disorder and concurrent substance use disorders. *Addictive Behaviors*, *98*, 106035. https://doi.org/10.1016/j.addbeh.2019.106035

Cellucci, T., & Vik, P. (2001). Training for substance abuse treatment among psychologists in a rural state. *Professional Psychology: Research and Practice, 32,* 248

Center for Behavioral Health Statistics and Quality. (2015). *2014 National Survey on Drug Use and Health: Methodological Summary and Definitions*. Substance Abuse and Mental Health Services Administration.

Center for Behavioral Health Statistics and Quality (2016a) Key substance use and mental health indicators in the United States: Results from the 2015 National Survey on Drug Use and Health. Substance Abuse and Mental Health Services Administration; 2016a. [January 9, 2017]. https://www.samhsa.gov/data/sites/default/files/NSDUH-FFR1-2015/NSDUH-FFR1-2015/NSDUH-FFR1-2015.pdf.

Center for Behavioral Health Statistics and Quality (2016b). 2015 National Survey on Drug Use and Health: Detailed tables. Substance Abuse and Mental Health Services Administration; 2016b. [December 27, 2016].

https://www.samhsa.gov/data/sites/default/files/NSDUH-DetTabs-2015/NSDUH-DetTabs-2015/NSDUH-DetTabs-2015.pdf.

Center for Behavioral Health Statistics and Quality. (2018). 2017 National Survey on Drug Use and Health: Detailed Tables. *Substance Abuse and Mental Health Services Administration*.

Chapman, D. P., Dube, S. R., & Anda, R. F. (2007). Adverse childhood events as risk factors for negative mental health outcomes. *Psychiatric Annals*, *37*(5), 359.

Chen, Y. H., & Lin, Y. J. (2018). Validation of the Short Self-Regulation Questionnaire for Taiwanese College Students (TSSRQ). *Frontiers in Psychology*, *9*, 259. https://doi.org/10.3389/fpsyg.2018.00259

Cheong, E. V., Sinnott, C., Dahly, D., & Kearney, P. M. (2017). Adverse Childhood Experiences (ACEs) and later-life depression: Perceived social support as a potential protective factor. *BMJ Open*, 7(9), e013228. https://doi.org/10.1136/bmjopen-2016-013228

Chickering, A. W. (1969). Education and identity. Jossey-Bass

Chong, W. W., Acar, Z. I., West, M. L., & Wong, F. (2022). A scoping review on the medical and recreational use of cannabis during the COVID-19 pandemic. *Cannabis and Cannabinoid Research* 10.1089/can.2021.0054. Advance online publication. https://doi.org/10.1089/can.2021.0054

Choopan, H., Kalantarkousheh, S. M., Aazami, Y., Doostian, Y., Farhoudian, A., & Massah, O. (2016). Effectiveness of emotion regulation Training on the reduction of craving in drug abusers. *Addiction & Health*, *8*(2), 68–75.

Cingl, L. (2018). Social learning under acute stress. *PloS One*, *13*(8), e0202335. https://doi.org/10.1371/journal.pone.0202335

Clark, T. T., Doyle, O., & Clincy, A. (2013). Age of first cigarette, alcohol, and marijuana use among U.S. biracial/ethnic youth: A population-based study. *Addictive Behaviors*, *38*(9), 2450–2454. https://doi.org/10.1016/j.addbeh.2013.04.005

Clements, R. (1999). Prevalence of alcohol-use disorders and alcohol-related problems in a college student sample. *Journal of American College Health, 48,* 111- 118.

Cloutier, R. M., Calhoun, B. H., & Linden-Carmichael, A. N. (2022). Associations of mode of administration on cannabis consumption and subjective intoxication in daily life. *Psychology of Addictive Behaviors, 36*(1), 67–77. https://doi.org/10.1037/adb0000726

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd ed.). Lawrence Erlbaum Associates, Publishers.

Cohen, K., & Weinstein, A. M. (2018). Synthetic and non-synthetic cannabinoid drugs and their adverse effects: A review from public health prospective. *Frontiers in Public Health*, *6*, 162. https://doi.org/10.3389/fpubh.2018.00162

Cohen, K., & Weinstein, A. M. (2018). The effects of cannabinoids on executive functions: Evidence from cannabis and synthetic cannabinoids—a systematic review. *Brain Sciences*, *8*(3), 40.

Cohen, K., Weizman, A. M., & Weinstein, A. (2019). Positive and negative effects of cannabis and cannabinoids on health. *Clinical Pharmacology & Therapeutics*, *105*(5), 1139-1147.

Cole, J. (2013). Guidance regarding marijuana enforcement. *Federal Sentencing Reporter*, *26*, 217.

Coleman-Jensen, A., Gregory, C., & Singh, A. (2014). Household food security in the United States in 2013. *USDA-ERS Economic Research Report*, (173).

Compare, A., Zarbo, C., Shonin, E., Van Gordon, W., & Marconi, C. (2014). Emotional regulation and depression: A potential mediator between heart and mind. *Cardiovascular Psychiatry and Neurology*, 324374. https://doi.org/10.1155/2014/324374

Compton, W. M., Han, B., Jones, C. M., Blanco, C., & Hughes, A. (2016). Marijuana use and use disorders in adults in the USA, 2002–14: Analysis of annual cross-sectional surveys. *The Lancet Psychiatry*, *3*(10), 954-964.

Controlled Substances Act. (2018). (21 U.S.C. 801 et seq.)

Crocq, M. A. (2020). History of cannabis and the endocannabinoid system. *Dialogues in Clinical Neuroscience*, *22*(3), 223–228. https://doi.org/10.31887/DCNS.2020.22.3/mcrocq

Crozier, M. K., & Gressard, C. F. (2005). A national study of substance abuse professionals in higher education. *Journal of Drug and Alcohol Education, 49,* 43-6

Cullen, K. A., Ambrose, B. K., Gentzke, A. S., Apelberg, B. J., Jamal, A., & King, B. A. (2018). Notes from the field: Increase in use of electronic cigarettes and any tobacco product among middle and high school students—United States, 2011–2018. *Morbidity and Mortality Weekly Report*, *67*(45), 1276.

Cunradi, C. B., Caetano, R., Alter, H. J., & Ponicki, W. R. (2020). Adverse childhood experiences are associated with at-risk drinking, cannabis and illicit drug use in females but not males: an Emergency Department study. *The American Journal of Drug and Alcohol Abuse*, *46*(6), 739–748. https://doi.org/10.1080/00952990.2020.1823989

Cuttler, C., Mischley, L. K., & Sexton, M. (2016). Sex differences in cannabis use and effects: A cross-sectional survey of cannabis users. *Cannabis and Cannabinoid Research*, *1*(1), 166–175. https://doi.org/10.1089/can.2016.0010

Cuttler, C., & Spradlin, A. (2017). Measuring cannabis consumption: Psychometric properties of the Daily Sessions, Frequency, Age of Onset, and Quantity of Cannabis Use Inventory (DFAQ-CU). *PloS One*, *12*(5), e0178194. https://doi.org/10.1371/journal.pone.0178194

Dai, H., & Richter, K. (2019). A national survey of marijuana use among US adults with medical conditions, 2016-2017. *JAMA Network Open.* 2(9):e1911936. doi:10.1001/jamanetworkopen.2019.11936

D'Amico, E. J., Miles, J. N., & Tucker, J. S. (2015). Gateway to curiosity: Medical marijuana ads and intention and use during middle school. *Psychology of Addictive Behaviors*, *29*(3), 613.

D'Amico, E. J., Parast, L., Meredith, L. S., Ewing, B. A., Shadel, W. G., & Stein, B. D. (2016). Screening in primary care: What is the best way to identify at-risk youth for substance use? *Pediatrics*, *138*(6), e20161717. https://doi.org/10.1542/peds.2016-1717

D'Amico, E. J., Tucker, J. S., Pedersen, E. R., & Shih, R. A. (2017). Understanding rates of marijuana use and consequences among adolescents in a changing legal landscape. *Current Addiction Reports*, *4*(4), 343–349. https://doi.org/10.1007/s40429-017-0170-y

Dariš, B., Tancer Verboten, M., Knez, Ž., & Ferk, P. (2019). Cannabinoids in cancer treatment: Therapeutic potential and legislation. *Bosnian Journal of Basic Medical Sciences*, *19*(1), 14–23. https://doi.org/10.17305/bjbms.2018.3532

Davenport, S. S., & Caulkins, J. P. (2016). Evolution of the United States marijuana market in the decade of liberalization before full legalization. *Journal of Drug Issues*, *46*(4), 411-427.

Degenhardt, L., & Hall, W. (2001). The association between psychosis and problematical drug use among Australian adults: Findings from the National Survey of Mental Health and Well-Being. *Psychological Medicine*, *31*(4), 659–668. https://doi.org/10.1017/s0033291701003865

Denham, S. A. (2006). Social-emotional competence as support for school readiness: What is it and how do we assess it?. *Early Education and Development*, *17*(1), 57-89.

De Ravello, L., Abeita, J., & Brown, P. (2008). Breaking the cycle/mending the hoop: Adverse childhood experiences among incarcerated American Indian/Alaska Native women in New Mexico. *Health Care for Women International*, *29*(3), 300–315. https://doi.org/10.1080/07399330701738366

Díaz, M. S. (2017). Is there a link between marijuana use and the risk of having psychiatric disorders? *Semergen*, *43*(4), 335-337.

Digman, J. M. (1990). Personality structure: Emergence of the five-factor model. *Annual Review of Psychology, 41*, 417–440.

Dills, A., Goffard, S., & Miron, J. (2016). Dose of reality: The effect of state marijuana legalizations (September 16, 2016). *Cato Institute Policy Analysis No. 799*, Available at SSRN: https://ssrn.com/abstract=2842278

Dingle, G. A., Neves, D., Alhadad, S., & Hides, L. (2018). Individual and interpersonal emotion regulation among adults with substance use disorders and matched controls. *The British Journal of Clinical Psychology*, *57*(2), 186–202. https://doi.org/10.1111/bjc.12168

Dooley, D. G., Bandealy, A., Tschudy, M. M. (2020). Low-income children and coronavirus disease 2019 (COVID-19) in the US. *JAMA Pediatrics.* 74(10):922–923. doi:10.1001/jamapediatrics.2020.2065

Douglas, K. R., Chan, G., Gelernter, J., Arias, A. J., Anton, R. F., Weiss, R. D., Brady, K., Poling, J., Farrer, L., & Kranzler, H. R. (2010). Adverse childhood events as risk factors for substance dependence: partial mediation by mood and anxiety disorders. *Addictive Behaviors*, *35*(1), 7–13. https://doi.org/10.1016/j.addbeh.2009.07.004

Drug Policy Alliance. (2014). A brief history of the drug war. *Drug Policy Alliance*. http://www.drugpolicy.org/facts/new-solutions-drug-policy/brief-history-drug-war-0

D'Souza, D. C., Perry, E., MacDougall, L., Ammerman, Y., Cooper, T., Wu, Y. T., Braley, G., Gueorguieva, R., & Krystal, J. H. (2004). The psychotomimetic effects of intravenous delta-9-tetrahydrocannabinol in healthy individuals: Implications for psychosis. *Neuropsychopharmacology: Official Publication of the American College of Neuropsychopharmacology*, *29*(8), 1558–1572. https://doi.org/10.1038/sj.npp.1300496

Dube, S. R., Felitti, V. J., Dong, M., Chapman, D. P., Giles, W. H., & Anda, R. F. (2003). Childhood abuse, neglect, and household dysfunction and the risk of illicit drug use: The Adverse Childhood Experiences study. *Pediatrics*, *111*(3), 564–572. https://doi.org/10.1542/peds.111.3.564

Ducharme, L. J., Mello, H. L., Roman, P. M., Knudsen, H. K., & Johnson, J. A. (2007). Service delivery in substance abuse treatment: Reexamining “comprehensive” care. *The Journal of Behavioral Health Services & Research*, *34*(2), 121-136.

Duke, N. N. (2018). Adolescent adversity and concurrent tobacco, alcohol, and marijuana use. *American Journal of Health Behavior*, *42*(5), 85-99.

Dvir, Y., Denietolis, B., & Frazier, J. A. (2013). Childhood trauma and psychosis. *Child and Adolescent Psychiatric Clinics of North America*, *22*(4), 629–641. https://doi.org/10.1016/j.chc.2013.04.006

Dvorak, R. D., & Day, A. M. (2014). Marijuana and self-regulation: Examining likelihood and intensity of use and problems. *Addictive Behaviors*, *39*(3), 709–712. https://doi.org/10.1016/j.addbeh.2013.11.001

Egerton, G. A., Colder, C. R., & Lee, Y. (2021). Testing the dual process model of adolescent cannabis use with prospective three-way interactions between self-regulation, negative outcome expectancies, and implicit cannabis attitudes. *Addictive Behaviors*, *118*, 106902. https://doi.org/10.1016/j.addbeh.2021.106902

ElSohly, M. A., Mehmedic, Z., Foster, S., Gon, C., Chandra, S., & Church, J. C. (2016). Changes in Cannabis potency over the last 2 decades (1995-2014): Analysis of current data in the United States. *Biological Psychiatry*, *79*(7), 613–619. https://doi.org/10.1016/j.biopsych.2016.01.004

Engs, R. C., Diebold, B. A., & Hanson, D. J. (1996). The drinking patterns and problems of a national sample of college students, 1994. *Journal of Alcohol & Drug Education, 41,* 13-33.

Epstein, M., Bailey, J. A., Steeger, C. M., Hill, K. G., & Skinner, M. L. (2018). Predictors of adult marijuana use among parents and nonparents. *Prevention Science: The Official Journal of the Society for Prevention Research*, *19*(2), 109–116. https://doi.org/10.1007/s11121-017-0801-5

Erickson, P. G., Hyshka, E., & Hathaway, A. D. (2010). Legal regulation of marijuana: The better way. in N. Frost, J. Freilich and T. Clear (Eds.), *Contemporary Issues in Criminal Justice Policy*, 109-118, Belmont, CA: Wadsworth, Cengage Learning

Esposito-Smythers, C., Spirito, A., Kahler, C. W., Hunt, J., & Monti, P. (2011). Treatment of co-occurring substance abuse and suicidality among adolescents: A randomized trial. *Journal of Consulting and Clinical Psychology*, *79*(6), 728.

Eyisi, D. (2016) The usefulness of qualitative and quantitative approaches and methods in researching problem solving ability in science education curriculum. *Journal of Education Practice*, *7*, 91-100.

Fagerland, M. W., Lydersen, S., & Laake, P. (2013). The McNemar test for binary matched-pairs data: Mid-*p* and asymptotic are better than exact conditional. *BMC Medical Research* Methodology, *13*(91). https://doi.org/10.1186/1471-2288-13-91

Farsalinos, K., Barbouni, A., & Niaura, R. (2021). Changes from 2017 to 2018 in e-cigarette use and in ever marijuana use with e-cigarettes among US adolescents: Analysis of the National Youth Tobacco Survey. *Addiction (Abingdon, England)*, *116*(1), 139–149. https://doi.org/10.1111/add.15162

Fattore, L. (2016). Synthetic cannabinoids-further evidence supporting the relationship between cannabinoids and psychosis. *Biological Psychiatry*, *79*(7), 539–548. https://doi.org/10.1016/j.biopsych.2016.02.001

Felitti, V. J., Anda, R. F., Nordenberg, D., Williamson, D. F., Spitz, A. M., Edwards, V., Koss, M. P., & Marks, J. S. (1998). Relationship of childhood abuse and household dysfunction to many of the leading causes of death in adults. The Adverse Childhood Experiences (ACE) study. *American Journal of Preventive Medicine*, *14*(4), 245–258. https://doi.org/10.1016/s0749-3797(98)00017-8

Felson, J., Adamczyk, A. & Thomas, C. (2019). “How and Why Have Attitudes about Cannabis Legalization Changed so Much?” Social Science Research,

https://doi.org/10.1016/j.ssresearch.2018.12.011.

(PDF) How and why have attitudes about cannabis legalization changed so much? https://www.researchgate.net/publication/329535390_How_and_why_have_attitudes_about_cannabis_legalization_changed_so_much.

Fergusson, D. M., & Boden, J. M. (2008). Cannabis use and later life outcomes. *Addiction, 103*, 969–976. https://doi.org/10.1111/j.1360-0443.2008.02221.x.

Field, A. (2018). *Discovering Statistics Using IBM SPSS Statistics* (5th ed.). SAGE Publications.

Firth, C. L., Maher, J. E., Dilley, J. A., Darnell, A., & Lovrich, N. P. (2019). Did marijuana legalization in Washington State reduce racial disparities in adult marijuana arrests?. *Substance Use & Misuse*, *54*(9), 1582–1587. https://doi.org/10.1080/10826084.2019.1593007

Fischer, B., Russell, C., Sabioni, P., van den Brink, W., Le Foll, B., Hall, W., Rehm, J., & Room, R. (2017). Lower-risk cannabis use guidelines: A comprehensive update of evidence and recommendations. *American Journal of Public Health*, *107*(8), 1–12. https://doi.org/10.2105/AJPH.2017.303818

Flórez-Salamanca, L., Secades-Villa, R., Budney, A. J., García-Rodríguez, O., Wang, S., & Blanco, C. (2013). Probability and predictors of cannabis use disorders relapse: Results of the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *Drug and Alcohol Dependence*, *132*(1-2), 127–133. https://doi.org/10.1016/j.drugalcdep.2013.01.013

Folk, J. B., Ramos, L., Bath, E. P., Rosen, B., Marshall, B., Kemp, K., Brown, L., Conrad, S., & Tolou-Shams, M. (2021). The prospective impact of Adverse Childhood Experiences on

justice-involved youth's psychiatric symptoms and substance use. *Journal of Consulting and Clinical Psychology*, *89*(6), 483–498. https://doi.org/10.1037/ccp0000655

Forster, M., Grigsby, T. J., Rogers, C. J., & Benjamin, S. M. (2018). The relationship between family-based adverse childhood experiences and substance use behaviors among a diverse sample of college students. *Addictive Behaviors*, *76*, 298–304. doi:10.1016/j.addbeh.2017.08.037

Forster, M., Rogers, C. J., Benjamin, S. M., Grigsby, T., Lust, K., & Eisenberg, M. E. (2019). Adverse Childhood Experiences, ethnicity, and substance use among college students: Findings from a two-State Sample. *Substance Use & Misuse*, *54*(14), 2368–2379. https://doi.org/10.1080/10826084.2019.1650772

Freeman, T. P., Groshkova, T., Cunningham, A., Sedefov, R., Griffiths, P., & Lynskey, M. T. (2019). Increasing potency and price of cannabis in Europe, 2006-16. *Addiction (Abingdon, England)*, *114*(6), 1015–1023. https://doi.org/10.1111/add.14525

Freeman, T. P., & Winstock, A. R. (2015). Examining the profile of high-potency cannabis and its association with severity of cannabis dependence. *Psychological Medicine*, *45*(15), 3181–3189. https://doi.org/10.1017/S0033291715001178

Fridberg, D. J., Vollmer, J. M., O'Donnell, B. F., & Skosnik, P. D. (2011). Cannabis users differ from non-users on measures of personality and schizotypy. *Psychiatry Research*, *186*(1), 46–52. https://doi.org/10.1016/j.psychres.2010.07.035

Fusco R. A. (2021). Frequent marijuana or alcohol use in low-income emerging adults: Impact of adverse life experiences. *Substance Use & Misuse*, *56*(5), 711–717. https://doi.org/10.1080/10826084.2021.1892140

Gaoni, Y., & Mechoulam, R. (1964). Isolation, structure, and partial synthesis of an active constituent of hashish. *Journal of the American Chemical Society*, *86*(8), 1646-1647.

Garner, B. R., Knight, K., & Simpson, D. D. (2007). Burnout among corrections-based drug treatment staff: Impact of individual and organizational factors. *International Journal of Offender Therapy and Comparative Criminology*, *51*(5), 510-522.

Garfinkle, E. (2017). The associations between marijuana use, emotion dysregulation, and heart rate variability among healthy young adults. https://doi.org/doi:10.7282/T3T43X5G

Gerber, R. J. (2004). Legalizing marijuana: *Drug policy reform and prohibition politics*: Greenwood Press.

Gettman, J. (2015). *Marijuana arrests in Colorado after the passage of Amendment 64*. https://www.drugpolicy.org/sites/default/files/Colorado_Marijuana_Arrests_After_Amendment_64.pdf

George, O., Sanders, C., Freiling, J., Grigoryan, E., Vu, S., Allen, C. D., Crawford, E., Mandyam, C. D., & Koob, G. F. (2012). Recruitment of medial prefrontal cortex neurons during alcohol withdrawal predicts cognitive impairment and excessive alcohol drinking. *Proceedings of the National Academy of Sciences of the United States of America*, *109*(44), 18156–18161. https://doi.org/10.1073/pnas.1116523109

Georgia Department of Education, (2021). *Free and Reduced Price Meal Eligibility*. https://oraapp.doe.k12.ga.us/ows-bin/owa/fte_pack_frl001_public.entry_form

Gillebaart, M. (2018). The 'operational' definition of self-control. *Frontiers in Psychology,* (9)1231. doi:10.3389/fpsyg.2018.01231

Gladden, R. M., Vivolo-Kantor, A. M., Hamburger, M. E., & Lumpkin, C. D. (2014). *Bullying Surveillance Among Youths: Uniform Definitions for Public Health and Recommended*

Data Elements, Version 1.0. Atlanta, GA; National Center for Injury Prevention and Control, Centers for Disease Control and Prevention and U.S. Department of Education.

Goldrick-Rab, S., Richardson, J., Schneider, J., Hernandez, A., & Cady, C. (2018). Still hungry and homeless in college. *Wisconsin HOPE Lab*, https://hope4college.com/wp-content/uploads/2018/09/Wisconsin-HOPE-Lab-Still-Hungry-and-Homeless.pdf (PDF, 1.33MB)

Goodman, E., & Huang, B. (2002). Socioeconomic status, depressive symptoms, and adolescent substance use. *Archives of Pediatrics & Adolescent Medicine*, *156*(5), 448–453. https://doi.org/10.1001/archpedi.156.5.448

Goodman, S., Wadsworth, E., Leos-Toro, C., Hammond, D., & International Cannabis Policy Study team (2020). Prevalence and forms of cannabis use in legal vs. illegal recreational cannabis markets. *The International Journal on Drug Policy*, *76*, 102658. https://doi.org/10.1016/j.drugpo.2019.102658

Gratz, K. L., & Roemer, L. (2004). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the difficulties in emotion regulation scale. *Journal of Psychopathology and Behavioral Assessment*, *26*(1), 41-54.

Griffin, K. W., Botvin, G. J., Scheier, L. M., & Nichols, T. R. (2002). Factors associated with regular marijuana use among high school students: A long-term follow-up study. *Substance Use Misuse*. *37*, 225–238.

Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology*, *2*(3), p. 275. doi:10.1037/1089-2680.2.3.271

Gross, J. J. (2015). Emotion regulation: Current status and future prospects. *Psychological Inquiry, 26*(1), 1–26. https://doi.org/10.1080/1047840X.2014.940781

Grotenhermen, F. (2001). Harm reduction associated with inhalation and oral administration of cannabis and THC. *Journal of Cannabis Therapeutics*, *1*(3-4), 133-152.

Hackman, D. A., Betancourt, L. M., Brodsky, N. L., Hurt, H., & Farah, M. J. (2012). Neighborhood disadvantage and adolescent stress reactivity. *Frontiers in Human Neuroscience*, *6*, 277.

Hafeez, H., Zeshan, M., Tahir, M. A., Jahan, N., & Naveed, S. (2017). Health care disparities among lesbian, gay, bisexual, and transgender youth: A literature review. *Cureus*, *9*(4), e1184. https://doi.org/10.7759/cureus.1184

Hallion, L. S., Steinman, S. A., Tolin, D. F., & Diefenbach, G. J. (2018). Psychometric properties of the Difficulties in Emotion Regulation Scale (DERS) and its short forms in adults with emotional disorders. *Frontiers in Psychology*, *9*, 539. https://doi.org/10.3389/fpsyg.2018.00539

Hambrick, E. P., Oppenheim-Weller, S., N'zi, A. M., & Taussig, H. N. (2016). Mental health interventions for children in foster aare: A systematic review. *Children and Youth Services Review*, *70*, 65–77. https://doi.org/10.1016/j.childyouth.2016.09.002

Hannah, L., & Mallinson, D. (2018). Defiant innovation: The adoption of medical marijuana laws in the American states. *Policy Studies Journal, 46*, 402-423.

Harrison L. (1997). The validity of self-reported drug use in survey research: An overview and critique of research methods. *NIDA Research Monograph*, *167*, 17–36.

Harrison, L. D., & Hughes, A. (Eds.). (1997). *The validity of self-reported drug use: Improving the accuracy of survey estimates* (Vol. 167). US Department of Health and Human

Services, National Institutes of Health, National Institute on Drug Abuse, Division of Epidemiology and Prevention Research.

Harkness, K. L., Hayden, E. P., & Lopez-Duran, N. L. (2015). Stress sensitivity and stress sensitization in psychopathology: An introduction to the special section. *Journal of Abnormal Psychology*, *124*(1), 1–3. doi:10.1037/abn0000041

Hartman, R., Huestis, M. (2013). Cannabis effects on driving skills. *Clinical Chemistry, 59*(3), 478-492. doi:10.1373/clinchem.2012.194381

Hasin, D. S., Saha, T. D., Kerridge, B. T., Goldstein, R. B., Chou, S. P., Zhang, H., Jung, J., Pickering, R. P., Ruan, W. J., Smith, S. M., Huang, B., & Grant, B. F. (2015). Prevalence of marijuana use disorders in the United States between 2001-2002 and 2012-2013. *JAMA Psychiatry*, *72*(12), 1235–1242. https://doi.org/10.1001/jamapsychiatry.2015.1858

Hasin, D. S., Kerridge, B. T., Saha, T. D., Huang, B., Pickering, R., Smith, S. M., Jung, J., Zhang, H., & Grant, B. F. (2016). Prevalence and correlates of DSM-5 Cannabis Use Disorder, 2012-2013: Findings from the National Epidemiologic Survey on Alcohol and Related Conditions-III. *The American Journal of Psychiatry*, *173*(6), 588–599. https://doi.org/10.1176/appi.ajp.2015.15070907

Hathaway, A. D., Comeau, N. C., Erickson, P. G. (2011). Cannabis normalization and stigma: Contemporary practices of moral regulation. *Criminology & Criminal Justice*, 11(5), 451–469.

Haug, S., Núñez, C. L., Becker, J., Gmel, G., & Schaub, M. P. (2014). Predictors of onset of cannabis and other drug use in male young adults: Results from a longitudinal study. *BMC Public Health*, *14*, 1202. https://doi.org/10.1186/1471-2458-14-1202

Haushofer, J., Jang, C., & Lynham, J. (2015). Stress and temporal discounting: Do domains matter?. *Mimeo*.

Hayes-Skelton, S. A., Roemer, L., Orsillo, S. M., & Borkovec, T. D. (2013). A contemporary view of applied relaxation for generalized anxiety disorder. *Cognitive Behaviour Therapy*, *42*(4), 292-302.

Hedden, S. L. (2015). *Behavioral Health Trends in the United States: Results from the 2014 National Survey on Drug Use and Health*. Substance Abuse and Mental Health Services Administration, Department of Health & Human Services.

Hendin, H., & Haas, A. P. (1985). The adaptive significance of chronic marijuana use for adolescents and adults. *Advances in Alcohol & Substance Abuse*, *4*(3-4), 99–115. https://doi.org/10.1300/J251v04n03_05

Hemsing, N., & Greaves, L. (2020). Gender norms, roles and relations and cannabis-use patterns: A scoping review. *International Journal of Environmental Research and Public Health*, *17*(3), 947. https://doi.org/10.3390/ijerph17030947

Heyman, R. B., Anglin, T. M., Copperman, S. M., Joffe, A., McDonald, C. A., Rogers, P. D., Shah, R. Z., Armentano, M., Boyd, G. M., & Czechowicz, D. (1999). American Academy of Pediatrics. Committee on Substance Abuse. Marijuana: A continuing concern for pediatricians. *Pediatrics*, *104*(4), 982–985.

Hill, M. (2015). Perspective: Be clear about the real risks. *Nature*, *525*(7570), S14-S14.

Hines, L. A., Freeman, T. P., Gage, S. H., Zammit, S., Hickman, M., Cannon, M., Munafo, M., MacLeod, J., & Heron, J. (2020). Association of high-potency cannabis use with mental health and substance use in adolescence. *JAMA Psychiatry*, *77*(10), 1044–1051. https://doi.org/10.1001/jamapsychiatry.2020.103

Holland, J. (2010). *The Pot Book: A Complete Guide to Cannabis*. Simon and Schuster.

Hollister, L. E., & Gillespie, H. K. (1973). Delta-8- and delta-9-tetrahydrocannabinol comparison in man by oral and intravenous administration. *Clinical Pharmacology and Therapeutics*, *14*(3), 353–357. https://doi.org/10.1002/cpt1973143353

Hosmer, D. W., and Lemeshow, S. (2000*). Applied Logistic Regression Analysis*, Second Edition, John Wiley and Sons Inc.

Hopfer, C. (2014). Implications of marijuana legalization for adolescent substance use. *Substance Abuse*, *35*(4), 331–335. https://doi.org/10.1080/08897077.2014.943386

Huestis, M. A., Solimini, R., Pichini, S., Pacifici, R., Carlier, J., & Busardò, F. P. (2019). Cannabidiol adverse effects and toxicity. *Current Neuropharmacology*, *17*(10), 974–989. https://doi.org/10.2174/1570159X17666190603171901

Hughes, M., & Tucker, W. (2018). Poverty as an Adverse Childhood Experience. *North Carolina Medical Journal*, *79*(2), 124–126. https://doi.org/10.18043/ncm.79.2.124

Humensky, J. L. (2010). Are adolescents with high socioeconomic status more likely to engage in alcohol and illicit drug use in early adulthood?. *Substance Abuse Treatment Prevention Policy 5*(19), https://doi.org/10.1186/1747-597X-5-19

Hunt, J., Eisenberg, D., & Kilbourne, A. M. (2010). Consequences of receipt of a psychiatric diagnosis for completion of college. *Psychiatric Services*, *61*(4), 399–404. https://doi.org/10.1176/ps.2010.61.4.399

Hutto, N., Waldfogel, J., Kaushal, N., & Garfinkel, I. (2011). Improving the measurement of poverty. *Social Service Review, 85*(1), 39–74. https://doi.org/10.1086/659129

Hyman, S. M., & Sinha, R. (2009). Stress-related factors in cannabis use and misuse: Implications for prevention and treatment. *Journal of Substance Abuse Treatment*, *36*(4), 400–413. https://doi.org/10.1016/j.jsat.2008.08.005

Imtiaz, S., Wells, S., Rehm, J., Wickens, C., Hamilton, H., Nigatu, Y., Jankowicz, D., & Elton-Marshall, T. (2022). Daily cannabis use during the novel coronavirus disease (COVID-19) pandemic in Canada: A repeated cross-sectional study from May 2020 to December 2020. *Substance Abuse Treatment, Prevention, and Policy 17*(14). https://doi.org/10.1186/s13011-022-00441-x

Ishida, J. H., Wong, P. O., Cohen, B. E., Vali, M., Steigerwald, S., & Keyhani, S. (2019). Substitution of marijuana for opioids in a national survey of US adults. *PloS One*, *14*(10), e0222577. https://doi.org/10.1371/journal.pone.0222577

Jackson, D. B., Chilton, M., Johnson, K. R., & Vaughn, M. G. (2019). Adverse childhood experiences and household food insecurity: Findings from the 2016 National Survey of Children's Health. *American Journal of Preventive Medicine*, *57*(5), 667–674. https://doi.org/10.1016/j.amepre.2019.06.004

Jacobs, W., Idoko, E., Montgomery, L., Smith, M. L., & Merianos, A. L. (2021). Concurrent e-cigarette and marijuana use and health-risk behaviors among U.S. high school students. *Preventive Medicine*, *145*, 106429. https://doi.org/10.1016/j.ypmed.2021.106429

Jager, J., Putnick, D. L., & Bornstein, M. H. (2017). II. More than just convenient: The scientific merits of homogenous convenience samples. *Monographs of the Society for Research in Child Development*, *82*(2), 13–30. https://doi.org/10.1111/mono.12296

Jenson, T. E. (2018). Psychosocial and behavioral risk profiles of cigarette smokers and e-cigarette users among adolescents in Minnesota: The 2016 Minnesota Student Survey. *Preventing Chronic Disease*, 15:180222.

Jobes, M. L., Aharonovich, E., Epstein, D. H., Phillips, K. A., Reamer, D., Anderson, M., & Preston, K. L. (2015). Effects of prereactivation propranolol on cocaine craving elicited by imagery script/cue sets in opioid-dependent polydrug users: A randomized study. *Journal of Addiction Medicine*, *9*(6), 491.

Jager, J., Putnick, D. L., & Bornstein, M. H. (2017). More than just convenient: The scientific merits of homogenous convenience samples. *Monographs of the Society for Research in Child Development, 82*(2), 13–30. https://doi.org/10.1111/mono.12296

Johnson, E. C., Tillman, R., Aliev, F., Meyers, J. L., Salvatore, J. E., Anokhin, A. P., Dick, D. M., Edenberg, H. J., Kramer, J. R., Kuperman, S., McCutcheon, V. V., Nurnberger, J. I., Jr, Porjesz, B., Schuckit, M. A., Tischfield, J., Bucholz, K. K., & Agrawal, A. (2019). Exploring the relationship between polygenic risk for cannabis use, peer cannabis use and the longitudinal course of cannabis involvement. *Addiction (Abingdon, England)*, 114(4), 687–697. https://doi.org/10.1111/add.14512

Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2004). Monitoring the Future National Survey Results on Drug Use, 1975-2003. Volume I: Secondary school students.

Johnston L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2012) Monitoring the Future National Survey Results on Drug Use*, 1975–2011: Volume II, College students and adults ages 19–50.* Ann Arbor: Institute for Social Research, The University of Michigan.

Johnston, L. D., Miech, R. A., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2018). Monitoring the Future National Survey Results on Drug Use, 1975-2017: Overview, key findings on adolescent drug use.

Johnston, L. D., Miech, R. A., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2019). *Demographic subgroup trends among adolescents in the use of various licit and illicit drugs, 1975-2018 (Monitoring the Future Occasional Paper No. 92).* Ann Arbor, MI. Institute for Social Research, The University of Michigan.

Johnston, L. D., Miech, R. A., O'Malley, P. M., Bachman, J. G., Schulenberg, J. E., & Patrick, M. E. (2019). Monitoring the Future National Survey Results on Drug Use, 1975-2018: Overview, Key Findings on Adolescent Drug Use. *Institute for Social Research*.

Johnston, L., O'malley, P. M., & Bachman, J. G. (2004). Monitoring the future: national survey results on drug use, 1975-2003.

Jouroukhin, Y., Zhu, X., Shevelkin, A. V., Hasegawa, Y., Abazyan, B., Saito, A., Pevsner, J., Kamiya, A., & Pletnikov, M. V. (2019). Adolescent Δ^9-tetrahydrocannabinol exposure and astrocyte-specific genetic vulnerability converge on nuclear factor-κB-cyclooxygenase-2 signaling to impair memory in adulthood. *Biological Psychiatry*, *85*(11), 891–903. https://doi.org/10.1016/j.biopsych.2018.07.024

Kahn, S. (2017). *Predictors of Daily Marijuana Use Among a National Sample of US Youth.* (Doctoral Thesis), University of Florida

Kalichman, S. C., Gore-Felton, C., Benotsch, E., Cage, M., & Rompa, D. (2004). Trauma symptoms, sexual behaviors, and substance abuse: Correlates of childhood sex ual abuse and HIV risks among men who have sex with men. *Journal of Child Sexual Abuse*, *13*, 1–15.

Kalmakis, K. A., & Chandler, G. E. (2015). Health consequences of adverse childhood experiences: A systematic review. *Journal of the American Association of Nurse Practitioners*, *27*(8), 457–465. https://doi.org/10.1002/2327-6924.12215

Kamer, R., Warshafsky, S., & Kamer, G. (2020). Change in traffic fatality rates in the first 4 states to legalize recreational marijuana. *JAMA International Medicine*, *180*(8), 1119–1120. doi:10.1001/jamainternmed.2020.1769

Kandel, D. (1975). Stages in adolescent involvement in drug use. *Science, 190*(4217), 912–914

Kandel, D., Yamaguchi, K., & Klein, L. (2006). Testing the gateway hypothesis. *Addiction (Abingdon, England)*, *101*(4), 470–476. https://doi.org/10.1111/j.1360-0443.2006.01426.x

Katehakis, A. (2009). Affective neuroscience and the treatment of sexual addiction. *Sexual Addiction & Compulsivity, 16*(1), 1–31. https://doi.org/10.1080/10720160802708966

Kaufman, E. A., Xia, M., Fosco, G., Yaptangco, M., Skidmore, C. R., & Crowell, S. E. (2016). The Difficulties in Emotion Regulation Scale Short Form (DERS-SF): Validation and replication in adolescent and adult samples. *Journal of Psychopathology and Behavioral Assessment*, *38*(3), 443-455. https://doi.org/10.1007/s10862-015-9529-3

Khalili, P., Nadimi, A. E., Baradaran, H. R., Janani, L., Rahimi-Movaghar, A., Rajabi, Z., Rahmani, A., Hojati, Z., Khalagi, K., & Motevalian, S. A. (2021). Validity of self-reported substance use: Research setting versus primary health care setting. *Substance Abuse: Treatment, Prevention, and Policy*, *16*(1), https://doi.org/10.1186/s13011-021-00398-3

Khan, R., Naveed, S., Mian, N., Fida, A., Raafey, M. A., & Aedma, K. K. (2020). The therapeutic role of Cannabidiol in mental health: A systematic review. *Journal of Cannabis Research*, *2*(1), 2. https://doi.org/10.1186/s42238-019-0012-y

Kelly, B. C., & Parsons, J. T. (2013). Prescription drug misuse and sexual risk taking among HIV-negative MSM. *AIDS and Behavior*, *17*(3), 926-930.

Kelley, N. J., Gallucci, A., Riva, P., Romero Lauro, L. J., & Schmeichel, B. J. (2019). Stimulating self-regulation: A review of non-invasive brain stimulation studies of goal-directed behavior. *Frontiers in Behavioral Neuroscience*, *12*, 337. https://doi.org/10.3389/fnbeh.2018.00337

Kessler, R. C., McLaughlin, K. A., Green, J. G., Gruber, M. J., Sampson, N. A., Zaslavsky, A. M.,Aguilar-Gaxiola, S., Alhamzawi, A., Alonso, J., Angermeyer, M., Benjet, C., Bromet, E., Chatterji, S., Girolamo, G., Demyttenaere, K., Fayyad, J., Florescu, S., Gal, G., Gureje, O., Haro, J., Hu, C., Karam, E., Kawakami, N., Lee, S., Lepine, J. P., Ormel, J., Posada-Villa, J., Sagar, R., Tsang, A., Ustun, T., Vassilev, S., Viana, M., & Williams, D. R. (2010). Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys. *The British Journal of Psychiatry*, *197*(5), 378-385.

Keyhani, S., Abraham, A., Cohen, B., Vali, M., Yoo, S., Dollinger, C., & Steigerwald, S. (2020). Development of a Cannabis Assessment Tool (CAT-1) to measure current and lifetime marijuana use among older veterans. *BMJ Open, 10*.

Kim, J. H., Santaella-Tenorio, J., Mauro, C., Wrobel, J., Cerdà, M., Keyes, K. M., Hasin, D., Martins, S. S., & Li, G. (2016). State medical marijuana laws and the prevalence of opioids detected among fatally injured drivers. *American Journal of Public Health*, *106*(11), 2032–2037.

Kim, J. H., Pears, K., Leve, L., Chamberlain, P., & Smith, D. (2013). Intervention effects on health-risking sexual behavior among girls in foster care: The role of placement disruption and tobacco and marijuana use. *Journal of Child & Adolescent Substance Abuse*, *22*(5), 370–387.

Kim, H. Y. (2014). Statistical notes for clinical researchers: Nonparametric statistical methods: 1. Nonparametric methods for comparing two groups. *Restorative Dentistry & Endodontics*, *39*(3), 235–239. https://doi.org/10.5395/rde.2014.39.3.235

Kim, P., Evans, G. W., Angstadt, M., Ho, S. S., Sripada, C. S., Swain, J. E., Liberzon, I., & Phan, K. L. (2013). Effects of childhood poverty and chronic stress on emotion regulatory brain function in adulthood. *Proceedings of the National Academy of Sciences of the United States of America*, *110*(46), 18442–18447. https://doi.org/10.1073/pnas.1308240110

Kim, Y. H. (2017). Associations of adverse childhood experiences with depression and alcohol abuse among Korean college students. *Child Abuse & Neglect*, *67*, 338–348. http://dx.doi.org/10.1016/j.chiabu.2017.03.009.

King, K. M., & Chassin, L. (2008). Adolescent stressors, psychopathology, and young adult substance dependence: a prospective study. *Journal of Studies on Alcohol and Drugs*, *69*(5), 629–638. https://doi.org/10.15288/jsad.2008.69.629

Kingston, S., Rose, M., Cohen-Serrins, J., Knight, E. (2017) A qualitative study of the context of child and adolescent substance use initiation and patterns of use in the first year for early and later initiators. *PLoS ONE 12*(1): e0170794. doi:10.1371/journal.pone.0170794

Kirst, M., Mecredy, G., Borland, T., & Chaiton, M. (2014). Predictors of substance use among young adults transitioning away from high school: A narrative review. *Substance Use & Misuse*, *49*(13), 1795-1807.

Kliewer, W., & Parham, B. (2019). Resilience against marijuana use initiation in low-income African American youth. *Addictive Behaviors*, *89*, 236–239. https://doi.org/10.1016/j.addbeh.2018.08.038

Klugman, C. (2016). Weeding Out the Truth: DEA's New Stance on Marijuana Largely the Same as the Old. http://www.bioethics.net/2016/08/weeding-out-the-truth-deas-new-stance-on-marijuana-largely-the-same-as-the-old.

Kober, H. (2014). Emotion regulation in substance use disorders. In J. J. Gross (Ed.), *Handbook of emotion regulation* (pp. 428–446). The Guilford Press

Koob, G. F., & Volkow, N. D. (2016). Neurobiology of addiction: A neurocircuitry analysis. *The Lancet Psychiatry*, *3*(8), 760–773. https://doi.org/10.1016/S2215-0366(16)00104-8

Koob, G., & Volkow, N. (2010). Neurocircuitry of Addiction. *Neuropsychopharmacol*ogy, *35***,** 217–238, https://doi.org/10.1038/npp.2009.110

Kowitt, S. D., Osman, A., Meernik, C., Zarkin, G. A., Ranney, L. M., Martin, J., Heck, C., & Goldstein, A. O. (2019). Vaping cannabis among adolescents: Prevalence and associations with tobacco use from a cross-sectional study in the USA. *BMJ Open*, *9*(6), e028535. https://doi.org/10.1136/bmjopen-2018-028535

Krystal, H. (2018). The misclassification of medical marijuana. *The Journal of the American Academy of Psychiatry and the Law*, *46*(4), 472-479.

Kuntsche, E., Knibbe, R., Engels, R., & Gmel, G. (2007). Drinking motives as mediators of the link between alcohol expectancies and alcohol use among adolescents. *Journal of Studies on Alcohol and Drugs*, *68*(1), 76–85. https://doi.org/10.15288/jsad.2007.68.76

Lac, A., & Luk, J. W. (2018). Testing the amotivational syndrome: Marijuana use longitudinally predicts lower self-efficacy even after controlling for demographics, personality, and alcohol and cigarette use. *Prevention Science: The Official Journal of the Society for Prevention Research*, *19*(2), 117–126. https://doi.org/10.1007/s11121-017-0811-3

Lafaye, G., Karila, L., Blecha, L., & Benyamina, A. (2017). Cannabis, cannabinoids, and health. *Dialogues in Clinical Neuroscience*, *19*(3), 309–316. https://doi.org/10.31887/DCNS.2017.19.3/glafaye

Lake, S., Walsh, Z., Kerr, T., Cooper, Z. D., Buxton, J., Wood, E., Ware, M. A., & Milloy, M. J. (2019). Frequency of cannabis and illicit opioid use among people who use drugs and report chronic pain: A longitudinal analysis. *PLoS Medicine*, *16*(11), e1002967. https://doi.org/10.1371/journal.pmed.1002967

Lander, L., Howsare, J., & Byrne, M. (2013). The impact of substance use disorders on families and children: From theory to practice. *Social Work in Public Health*, *28*(3-4), 194–205. https://doi.org/10.1080/19371918.2013.759005

Larsen, C., & Shahinas, J. (2020). Dosage, efficacy and safety of cannabidiol administration in adults: A systematic review of human trials. *Journal of Clinical Medicine Research*, *12*(3), 129–141. https://doi.org/10.14740/jocmr4090

Lau, N., Sales, P., Averill, S., Murphy, F., Sato, S. O., & Murphy, S. (2015). Responsible and controlled use: Older cannabis users and harm reduction. *International Journal of Drug Policy*, *26*(8), 709-718.

Laudet, A. B., & White, W. L. (2008). Recovery capital as prospective predictor of sustained recovery, life satisfaction, and stress among former poly-substance users. *Substance Use & Misuse*, *43*(1), 27–54. https://doi.org/10.1080/10826080701681473

Lee, C. A., Smith, D. C., Lanker, A., & Clary, K. L. (2021). Sensitivity and specificity of the CRAFFT to identify heavy cannabis use: Evidence from a large statewide adolescent sample. *Addictive Behaviors*, *122*, 107006. https://doi.org/10.1016/j.addbeh.2021.107006

Lee, C. T., McClernon, F. J., Kollins, S. H., Prybol, K., & Fuemmeler, B. F. (2013). Childhood economic strains in predicting substance use in emerging adulthood: Mediation effects of youth self-control and parenting practices. *Journal of Pediatric Psychology*, *38*(10), 1130–1143. https://doi.org/10.1093/jpepsy/jst056

Lee, M., Kim-Godwin, Y., & Hur, H. (2021). Race/ethnicity differences in risk and protective factors for marijuana use among U.S. adolescents. *BMC Public Health, 21***,** 1167. https://doi.org/10.1186/s12889-021-11159-z

Leggett, T., & United Nations Office on Drugs and Crime (2006). A review of the world cannabis situation. *Bulletin on Narcotics*, *58*(1-2), 1–155.

Lewis, M. (2007). Stepwise versus hierarchical regression: Pros and cons. http://www.academia.edu/1860655/Stepwise_versus_hierarchical_regression_Pros_and_cons

Leyland, A., Rowse, G., & Emerson, L.-M. (2019). Experimental effects of mindfulness inductions on self-regulation: Systematic review and meta-analysis. *Emotion, 19*(1), 108–122. https://doi.org/10.1037/emo0000425

Li, J., Ye, H., Tang, Y., Zhou, Z., & Hu, X. (2018). What are the effects of self-regulation phases and strategies for chinese students? A meta-analysis of two decades research of the

association between self-regulation and academic performance. *Frontiers in Psychology*, *9*, 2434. https://doi.org/10.3389/fpsyg.2018.02434

Lisdahl, K. M., Sher, K. J., Conway, K. P., Gonzalez, R., Feldstein Ewing, S. W., Nixon, S. J., Tapert, S., Bartsch, H., Goldstein, R. Z., & Heitzeg, M. (2018). Adolescent brain cognitive development (ABCD) study: Overview of substance use assessment methods. *Developmental Cognitive Neuroscience*, *32*, 80–96. https://doi.org/10.1016/j.dcn.2018.02.007

Loflin, M., & Earleywine, M. (2014). A new method of cannabis ingestion: The dangers of dabs?. *Addictive Behaviors*, *39*(10), 1430–1433. https://doi.org/10.1016/j.addbeh.2014.05.013

Lovallo, W. R., Farag, N. H., Sorocco, K. H., Acheson, A., Cohoon, A. J., & Vincent, A. S. (2013). Early life adversity contributes to impaired cognition and impulsive behavior: Studies from the Oklahoma Family Health Patterns Project. *Alcoholism, Clinical and Experimental Research*, *37*(4), 616–623. https://doi.org/10.1111/acer.12016

Lowe, D., Sasiadek, J. D., Coles, A. S., & George, T. P. (2019). Cannabis and mental illness: A review. *European Archives of Psychiatry and Clinical Neuroscience*, *269*(1), 107–120. https://doi.org/10.1007/s00406-018-0970-7

Lucke, H. R., Harbke, C. R., Mathes, E. W., & Hammersley, J. J. (2021). Higher emotion dysregulation and coping motives in alcohol and marijuana users. *Substance Use & Misuse*, *56*(7), 950–961. https://doi.org/10.1080/10826084.2021.1901927

Luthar, S. S., & Goldstein, A. S. (2008). Substance use and related behaviors among suburban late adolescents: The importance of perceived parent containment. *Development and Psychopathology*, *20*(2), 591-614.

Macvarish, J., & Lee, E. (2019). Constructions of parents in adverse childhood experiences discourse. *Social Policy and Society*, *18*(3), 467-477. doi:10.1017/S1474746419000083

Malmberg, M., Kleinjan, M., Vermulst, A.A., Overbeek, G., Monshouwer, K., Lammers, J., and Engels, R. C. M. E. (2012). Do substance use risk personality dimensions predict the onset of substance use in early adolescence? A variable- and person-centered approach. *Journal of Youth Adolescence*. *41*, 1512–1525.

Mann, T., de Ridder, D., & Fujita, K. (2013). Self-regulation of health behavior: Social psychological approaches to goal setting and goal striving. *Health Psychology: Official Journal of the Division of Health Psychology, American Psychological Association*, *32*(5), 487–498. https://doi.org/10.1037/a0028533

Manyema, M., Norris, S. A., & Richter, L. M. (2018). Stress begets stress: The association of adverse childhood experiences with psychological distress in the presence of adult life stress. *BMC Public Health*, *18*(1), 835. https://doi.org/10.1186/s12889-018-5767-0

Markle, G. (2015). Factors influencing persistence among nontraditional university students. *Adult Education Quarterly*, *65*(3), 267-285. doi:10.1177/0741713615583085.

Martin, M. J., & Pritchard, M. E. (1991). Factors associated with alcohol use in later adolescence. *Journal of Studies on Alcohol*, *52*(1), 5-9.

Martínez, V., Iriondo De-Hond, A., Borrelli, F., Capasso, R., Del Castillo, M. D., & Abalo, R. (2020). Cannabidiol and other non-psychoactive cannabinoids for prevention and treatment of gastrointestinal disorders: Useful nutraceuticals?. *International Journal of Molecular Sciences*, *21*(9), 3067. https://doi.org/10.3390/ijms21093067

Martins, S. S., Segura, L. E., Levy, N. S., Mauro, P. M., Mauro, C. M., Philbin, M. M., & Hasin, D. S. (2021). Racial and ethnic differences in cannabis use following legalization in US

states with medical cannabis laws. *JAMA Network Open*, *4*(9), e2127002. https://doi.org/10.1001/jamanetworkopen.2021.27002

Mashburn, A. J., & Pianta, R. C. (2006). Social relationships and school readiness. *Early Education and Development*, *17*(1), 151-176.

Matson, T. E., Carrell, D. S., Bobb, J. F., Cronkite, D. J., Oliver, M. M., Luce, C., Ghitza, U. E., Hsu, C. W., Campbell, C. I., Browne, K. C., Binswanger, I. A., Saxon, A. J., Bradley, K. A., & Lapham, G. T. (2021). Prevalence of medical cannabis use and associated health conditions documented in electronic health records among primary care patients in Washington state. *JAMA Network Open*, *4*(5), e219375. https://doi.org/10.1001/jamanetworkopen.2021.9375

McCabe, S. E., Morales, M., Cranford, J. A., Delva, J., McPherson, M. D., & Boyd, C. J. (2007). Race/ethnicity and gender differences in drug use and abuse among college students. *Journal of Ethnicity in Substance Abuse*, *6*(2), 75–95. https://doi.org/10.1300/J233v06n02_06

McCarty A. T. (2016). Child poverty in the United States: A tale of devastation and the promise of hope. *Sociology Compass*, *10*(7), 623–639. https://doi.org/10.1111/soc4.12386

McEwen, B. S., & Gianaros, P. J. (2011). Stress-and allostasis-induced brain plasticity. *Annual Review of Medicine*, *62*, 431-445.

McGinty, E. E., Samples, H., Bandara, S. N., Saloner, B., Bachhuber, M. A., & Barry, C. L. (2016). The emerging public discourse on state legalization of marijuana for recreational use in the US: Analysis of news media coverage, 2010-2014. *Preventive Medicine*, *90*, 114–120.

McKenzie, N. (2021). *Cannabis Vaping among College Students* (Doctoral dissertation, University of Toledo). OhioLINK Electronic Theses and Dissertations Center. http://rave.ohiolink.edu/etdc/view?acc_num=toledo162013175306891

McNulty, T. L., Oser, C. B., Aaron Johnson, J., Knudsen, H. K., & Roman, P. M. (2007). Counselor turnover in substance abuse treatment centers: An organizational□level analysis. *Sociological inquiry*, *77*(2), 166-193.

Mead A. (2019). Legal and regulatory issues governing cannabis and cannabis-derived products in the United States. *Frontiers in Plant Science*, *10*, 697. https://doi.org/10.3389/fpls.2019.00697

Mekonnen, T., Mogesie N., & Mekonnen, W. (2020). The role of adverse childhood experience on depression symptom, prevalence, and severity among school going adolescents", *Depression Research and Treatment*. https://doi.org/10.1155/2020/5951792

Merlin, M. D. (2003). Archaeological Evidence for the Tradition of Psychoactive Plant Use in the Old World. *Economic Botany*, *57*(3), 295–323. http://www.jstor.org/stable/4256701

Mersky, J. P., Topitzes, J., & Reynolds, A. J. (2013). Impacts of adverse childhood experiences on health, mental health, and substance use in early adulthood: A cohort study of an urban, minority sample in the U.S. *Child Abuse & Neglect*, *37*(11), 917–925. https://doi.org/10.1016/j.chiabu.2013.07.011

Mezuk, B., Ratliff, S. M., Concha, J. B., Abdou, C. M., Rafferty, J. A., Lee, H., & Jackson, J. S. (2017). Stress, self-regulation, and context: Evidence from the health and retirement survey. *SSM - Population Health, 3*, 455 - 463.

Miech, R. A., Leventhal, A., Johnston, L., O'Malley, P. M., Patrick, M. E., & Barrington-Trimis, J. (2021). Trends in use and perceptions of nicotine vaping among US youth from 2017

to 2020. *JAMA Pediatrics*, *175*(2), 185–190. https://doi.org/10.1001/jamapediatrics.2020.5667

Miech, R. A., Patrick, M. E., O'Malley, P. M., & Johnston, L. D. (2017). The influence of college attendance on risk for marijuana initiation in the United States: 1977 to 2015. *American Journal of Public Health*, *107*(6), 996–1002. https://doi.org/10.2105/AJPH.2017.303745

Minkoff, K. (2001). Developing standards of care for individuals with co-occurring psychiatric and substance use disorders. *Psychiatric Services, 52*(5), 597–599. https://doi.org/10.1176/appi.ps.52.5.597

Mischel, W. (1974). Advances in Experimental Social Psychology (Vol. 7).

Mischel, W. (2014). *The Marshmallow Test: Mastering self-control.* Little, Brown and Co.

Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H. L., Houts, R., Poulton, R., Roberts, B. W., Ross, S., Sears, M. R., Thomson, W. M., & Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences of the United States of America*, *108*(7), 2693-2698. https://doi.org/10.1073/pnas.1010076108

Mohler-Kuo, M., Lee, J. E., & Wechsler, H. (2003). Trends in marijuana and other illicit drug use among college students: results from 4 Harvard School of Public Health College alcohol study surveys: 1993-2001. *Journal of American College Health: Journal of American College Health*, *52*(1), 17–24. https://doi.org/10.1080/07448480309595719

Morris, A. S., Silk, J. S., Steinberg, L., Myers, S. S., & Robinson, L. R. (2007). The role of the family context in the development of emotion regulation. *Social Development (Oxford, England)*, *16*(2), 361–388. https://doi.org/10.1111/j.1467-9507.2007.00389.x

Murphy, A., Steele, M., Dube, S. R., Bate, J., Bonuck, K., Meissner, P., Goldman, H., & Steele, H. (2014). Adverse Childhood Experiences (ACEs) questionnaire and Adult Attachment Interview (AAI): Implications for parent child relationships. *Child Abuse & Neglect*, *38*(2), 224–233. https://doi.org/10.1016/j.chiabu.2013.09.004

Musto, D. (1972). The Marihuana Tax Act of 1937. *Archives of General Psychiatry, 26*(2), 101–108. doi:10.1001/archpsyc.1972.01750200005002

Najman, J. M., Clavarino, A., McGee, T. R., Bor, W., Williams, G. M., & Hayatbakhsh, M. R. (2010). Timing and chronicity of family poverty and development of unhealthy behaviors in children: a longitudinal study. *The Journal of Adolescent Health: Official Publication of the Society for Adolescent Medicine*, *46*(6), 538–544. https://doi.org/10.1016/j.jadohealth.2009.12.00

National Action Council for Minorities in Engineering. (2013). Retrieved from http://www.nacme.org/

National Academies of Sciences, Engineering, and Medicine. (2017). The health effects of cannabis and cannabinoids: The current state of evidence and recommendations for research.

National Center for Education Statistics. (2012). Washington, D.C.: (NCES),

National Survey on Drug Use and Health (U.S.), & United States. (2019). The NSDUH report. U.S. Dept.

National Institute on Drug Abuse. (2019a). Is there a link between marijuana use and psychiatric disorders? https://www.drugabuse.gov/publications/research-reports/marijuana/there-link-between-marijuana-use-psychiatric-disorders (accessed 08-04-19 2019).

National Institute on Drug Abuse. (2019b). Vaping of marijuana on the rise among teens. https://www.drugabuse.gov/news-events/news-releases/2019/12/vaping-of-marijuana-on-the-rise-among-teens on 2021, August 12

National Institute on Drug Abuse. (2021a). How does marijuana produce its effects?. https://www.drugabuse.gov/publications/research-reports/marijuana/how-does-marijuana-produce-its-effects on 2021

National Institute on Drug Abuse. (2021b). How does marijuana use affect school, work, and social life?. https://www.drugabuse.gov/publications/research-reports/marijuana/how-does-marijuana-use-affect-school-work-social-life on 2021, September 12

National Institute on Drug Abuse. (2021). Is marijuana safe and effective as medicine?. https://www.drugabuse.gov/publications/research-reports/marijuana/marijuana-safe-effective-medicine on 2021, September 7

Neal, D. J., & Carey, K. B. (2005). A follow-up psychometric analysis of the self-regulation questionnaire. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*, *19*(4), 414–422. https://doi.org/10.1037/0893-164X.19.4.414

Neill, K. (2014). The war on drugs in the American states: Variations in sentencing policies over time. Doctor of Philosophy (PhD), dissertation, Old Dominion University, DOI: 10.25777/bs1d-e877 https://digitalcommons.odu.edu/publicservice_etds/30

Newmeyer, M. N., Swortwood, M. J., Barnes, A. J., Abulseoud, O. A., Scheidweiler, K. B., & Huestis, M. A. (2016). Free and glucuronide whole blood cannabinoids' pharmacokinetics after controlled smoked, vaporized, and oral cannabis administration in

frequent and occasional cannabis users: Identification of recent cannabis intake. *Clinical Chemistry*, *62*(12), 1579–1592. https://doi.org/10.1373/clinchem.2016.263475

Niesink, R. J., & van Laar, M. W. (2013). Does cannabidiol protect against adverse psychological effects of THC?. *Frontiers in Psychiatry*, *4*, 130. https://doi.org/10.3389/fpsyt.2013.00130

Notten, G., & Roelen, K. (2010). Cross-national comparison of monetary and multidimensional child poverty in the European Union: Puzzling with the few pieces that the EU-SILC provides. Brooks World Poverty Institute, University of Manchester.

Nunn, K. (2002). Race, crime and the pool of surplus criminality: Or why the "War on Drugs" was a "War on Blacks," *Journal of Gender Race & Justice*, *381*, available at http://scholarship.law.ufl.edu/facultypub/10

Organization for Economic Co-operation and Development. (2021). Poverty rate (indicator). doi:10.1787/0fe1315d-en (Accessed on 03 November 2021)

Okasha, T. A., Abd Elsamie, A., Azzam, H. M., Elserafi, D., Morsy, M. H., & Shorub, E. M. (2021). Emotional regulation as a mediating factor in substance use disorders. *Addictive Disorders & Their Treatment, 20*, 202-210.

Oregon Public Health Division. (2016). *Marijuana report: Marijuana use, attitudes and health effects in Oregon, December 2016*. Oregon Health Authority. https://apps.state.or.us/Forms/Served/le8509b.pdf

Oser, C. B., Biebel, E. P., Pullen, E., & Harp, K. L. (2013). Causes, consequences, and prevention of burnout among substance abuse treatment counselors: A rural versus urban comparison. *Journal of Psychoactive Drugs*, *45*(1), 17–27. https://doi.org/10.1080/02791072.2013.763558

Pacula, R. L., & Smart, R. (2017). Medical Marijuana and Marijuana Legalization. *Annual Review of Clinical Psychology*, *13*, 397–419. https://doi.org/10.1146/annurev-clinpsy-032816-045128

Palmer, P. B., & O'Connell, D. G. (2009). Regression analysis for prediction: Understanding the process. *Cardiopulmonary Physical Therapy Journal*, *20*(3), 23–26.

Patrick, M. E., Wightman, P., Schoeni, R. F., & Schulenberg, J. E. (2012). Socioeconomic status and substance use among young adults: A comparison across constructs and drugs. *Journal of Studies on Alcohol and Drugs*, *73*(5), 772–782. https://doi.org/10.15288/jsad.2012.73.772

Patton, G. C., Coffey, C., Carlin, J. B., Degenhardt, L., Lynskey, M., & Hall, W. (2002). Cannabis use and mental health in young people: cohort study. *BMJ (Clinical research ed.)*, *325*(7374), 1195–1198. https://doi.org/10.1136/bmj.325.7374.119

Paulus, D. J., Hogan, J. B. D., & Zvolensky, M. J. (2018). Examining emotion dysregulation as an underlying factor explaining relations of anxiety sensitivity and cannabis use severity. *Translational Issues in Psychological Science, 4*(1), 21–32. https://doi.org/10.1037/tps0000143

Pedhazur, E. J. (1997). *Multiple Regression in Behavioral Research* (3rd ed.). Orlando, FL: Harcourt Brace.

Pedrelli, P., Nyer, M., Yeung, A., Zulauf, C., & Wilens, T. (2015). College students: Mental health problems and treatment considerations. *Academic Psychiatry: The Journal of the American Association of Directors of Psychiatric Residency Training and the Association for Academic Psychiatry*, *39*(5), 503–511. https://doi.org/10.1007/s40596-014-0205-9

Pentz, M. A., & Riggs, N. R. (2013). Longitudinal relationships of executive cognitive function and parent influence to child substance use and physical activity. *Prevention Science*, *14*(3), 229-237.

Perron, B. E., Grahovac, I. D., Uppal, J. S., Granillo, M. T., Shutter, J., & Porter, C. A. (2011). Supporting students in recovery on college campuses: Opportunities for student affairs professionals. *Journal of Student Affairs Research and Practice*, *48*(1), 47–64. https://doi.org/10.2202/1949-6605.622

Pew Research Center. (2019). "Two-thirds of Americans support marijuana legalization," Pew Research Center. (November 14, 2019). https://www.pewresearch.org/fact-tank/2019/11/14/americans-support-marijuana-legalization/.

Phan, K. L., Wager, T., Taylor, S. F., & Liberzon, I. (2002). Functional neuroanatomy of emotion: A meta-analysis of emotion activation studies in PET and fMRI. *Neuroimage*, *16*, 331–48. doi:10.1006/nimg.2002.1087.

Pinchevsky, G. M., Arria, A. M., Caldeira, K. M., Garnier-Dykstra, L. M., Vincent, K. B., & O'Grady, K. E. (2012). Marijuana exposure opportunity and initiation during college: parent and peer influences. *Prevention Science: The Official Journal of the Society for Prevention Research*, *13*(1), 43–54. https://doi.org/10.1007/s11121-011-0243-4

Pisanti, S., & Bifulco, M. (2019). Medical cannabis: A plurimillennial history of an evergreen. *Journal of Cellular Physiology*, *234*(6), 8342–8351. https://doi.org/10.1002/jcp.27725

Pomahacova, B., Van der Kooy, F., & Verpoorte, R. (2009). Cannabis smoke condensate III: The cannabinoid content of vaporised Cannabis sativa. *Inhalation Toxicology*, *21*(13), 1108-1112.

Post, R. M. (1992). Transduction of psychosocial stress into the neurobiology of recurrent affective disorder. *American Journal of Psychiatry, 149,* 999–1010.

Preston, K. L., Kowalczyk, W. J., Phillips, K. A., Jobes, M. L., Vahabzadeh, M., Lin, J. L., Mezghanni, M., & Epstein, D. H. (2018). Exacerbated craving in the presence of stress and drug cues in drug-dependent patients. *Neuropsychopharmacology: Official Publication of the American College of Neuropsychopharmacology*, *43*(4), 859–867. https://doi.org/10.1038/npp.2017.275

Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: toward an integrative model of change. *Journal of Consulting and Clinical Psychology*, *51*(3), 390–395. https://doi.org/10.1037//0022-006x.51.3.390

Quinn, K., Boone, L., Scheidell, J. D., Mateu-Gelabert, P., McGorray, S. P., Beharie, N., Cottler, L. B., & Khan, M. R. (2016). The relationships of childhood trauma and adulthood prescription pain reliever misuse and injection drug use. *Drug and Alcohol Dependence*, *169*, 190–198. https://doi.org/10.1016/j.drugalcdep.2016.09.021

Rajapaksha, R., Hammonds, R., Filbey, F., Choudhary, P. K., & Biswas, S. (2020). A preliminary risk prediction model for cannabis use disorder. *Preventive Medicine Reports*, *20*, 101228. https://doi.org/10.1016/j.pmedr.2020.101228

Raphael, S., & Stoll, M. (2013). *Why are so many Americans in prison*? Russell Sage Foundation

Rariden, C., SmithBattle, L., Yoo, J. H., Cibulka, N., & Loman, D. (2021). Screening for adverse childhood experiences: Literature review and practice implications. *The Journal for Nurse Practitioners: JNP*, *17*(1), 98–104. https://doi.org/10.1016/j.nurpra.2020.08.002

Reifman, A., & Watson, W. K. (2003). Binge drinking during the first semester of college: Continuation and desistance from high school patterns. *Journal of American College Health, 52,* 0744-8481.

Reiss, F., Meyrose, A. K., Otto, C., Lampert, T., Klasen, F., & Ravens-Sieberer, U. (2019) Socioeconomic status, stressful life situations and mental health problems in children and adolescents: Results of the German BELLA cohort-study. *PLoS ONE 14*(3): e0213700. https://doi.org/10.1371/journal.pone.0213700

Renna, F. (2007). The economic cost of teen drinking: Late graduation and lowered earnings. *Health Economics*, *16*(4), 407-419.

Renner, J. A. (2007). Training psychiatrists to treat dual diagnosis patients. *Journal of Dual Diagnosis, 3,*125-136.

Richard, J., Marchica, L., Sciola, A., Ivoska, W., & Derevensky, J. (2021). Adverse childhood experiences and substance use: The mediating role of perceptions of harm and peer and parental attitudes. *International Journal of Child and Adolescent Resilience (IJCAR)*, *8*(1). https://ijcar-rirea.ca/index.php/ijcar-rirea/article/view/247

Richmond-Rakerd, L. S., Slutske, W. S., & Wood, P. K. (2017). Age of initiation and substance use progression: A multivariate latent growth analysis. *Psychology of Addictive Behaviors*: *Journal of the Society of Psychologists in Addictive Behaviors*, *31*(6), 664–675. https://doi.org/10.1037/adb0000304

Rivara, F., & Le Menestrel, S. (2016). Committee on the biological and psychosocial effects of peer victimization: Lessons for bullying prevention, board on children, youth, and families, committee on law and justice, division of behavioral and social sciences and education, health and medicine division, & national academies of sciences, engineering, and medicine (Eds.). *Preventing Bullying Through Science, Policy, and Practice*. National Academies Press (US).

Rivers-Auty, J. R., Smith, P. F., & Ashton, J. C. (2014). The cannabinoid CB2 receptor agonist GW405833 does not ameliorate brain damage induced by hypoxia-ischemia in rats. *Neuroscience Letters*, *569*, 104-109.

Room, R., Fischer, B., Hall, W., Lenton, S., Reuter, P. (2010). *Cannabis Policy – Moving Beyond Stalemate.* Oxford University Press.

Rosso, S. A., & FitzSimons, C. (2016). Hunger Doesn't Take a Vacation.

Sacco, L. (2014). Drug Enforcement in the United States: History, Policy, and Trends, report, October 2, 2014; (https://digital.library.unt.edu/ark:/67531/metadc463078/: accessed August 16, 2021).

Sachs-Ericsson, N. J., Rushing, N. C., Stanley, I. H., & Sheffler, J. (2016). In my end is my beginning: Developmental trajectories of adverse childhood experiences to late-life suicide. *Aging & Mental Health*, *20*(2), 139–165. https://doi.org/10.1080/13607863.2015.1063107

Schunk, D. H. (1996). Goal and self-evaluative influences during children's cognitive skill learning. *American Educational Research Journal*, *33*, 359-382.

Satterlund, T., Lee, J., & Moore, R. (2015). Stigma among California's medical marijuana patients. *Journal of Psychoactive Drugs*, *47*(1), 10–17, https://doi.org/10.1080/02791072.2014.991858

Schauer, G. L., King, B. A., Bunnell, R. E., Promoff, G., & McAfee, T. A. (2016). Toking, vaping, and eating for health or fun: Marijuana use patterns in adults, U.S., 2014. *American Journal of Preventive Medicine*, *50*(1), 1–8. https://doi.org/10.1016/j.amepre.2015.05.027

Schepis, T. S., Desai, R. A., Cavallo, D. A., Smith, A. E., McFetridge, A., Liss, T. B., Potenza, M. N., & Krishnan-Sarin, S. (2011). Gender differences in adolescent marijuana use and associated psychosocial characteristics. *Journal of Addiction Medicine*, *5*(1), 65–73. https://doi.org/10.1097/ADM.0b013e3181d8dc62

Schneider, A., Hommel, G., & Blettner, M. (2010). Linear regression analysis: Part 14 of a series on evaluation of scientific publications. *Deutsches Arzteblatt International*, *107*(44), 776–782. https://doi.org/10.3238/arztebl.2010.0776

Schuermeyer, J., Salomonsen-Sautel, S., Price, R. K., Balan, S., Thurstone, C., Min, S. J., & Sakai, J. T. (2014). Temporal trends in marijuana attitudes, availability and use in Colorado compared to non-medical marijuana states: 2003-11. *Drug and Alcohol Dependence*, *140*, 145–155. https://doi.org/10.1016/j.drugalcdep.2014.04.016

Schulenberg, J. E., Patrick, M. E., Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Miech, R. A. (2021). *Monitoring the Future national survey results on drug use, 1975–2020: Volume II, college students and adults ages 19–60*. Ann Arbor: Institute for Social Research, The University of Michigan.

Secades-Villa, R., Garcia-Rodríguez, O., Jin, C. J., Wang, S., & Blanco, C. (2015). Probability and predictors of the cannabis gateway effect: A national study. *The International Journal on Drug Policy*, *26*(2), 135–142. https://doi.org/10.1016/j.drugpo.2014.07.011

Seely, K. A., Lapoint, J., Moran, J. H., & Fattore, L. (2012). Spice drugs are more than harmless herbal blends: A review of the pharmacology and toxicology of synthetic cannabinoids. *Progress in Neuro-psychopharmacology and Biological Psychiatry*, *39*(2), 234-243.

Senn, T. E., Walsh, J. L., & Carey, M. P. (2014). The mediating roles of perceived stress and health behaviors in the relation between objective, subjective, and neighborhood socioeconomic status and perceived health. *Annals of Behavioral Medicine: A Publication of the Society of Behavioral Medicine*, *48*(2), 215–224. https://doi.org/10.1007/s12160-014-9591-1

Sessions, J. B. (2018). Marijuana enforcement. *Office of the Attorney General, U.S. Department of Justice.*

Shannon, S., Lewis, N., Lee, H., & Hughes, S. (2019). Cannabidiol in anxiety and sleep: A large case series. *The Permanente Journal*, *23*, 18–041. https://doi.org/10.7812/TPP/18-041

Shavers, V. L. (2007). Measurement of socioeconomic status in health disparities research. *Journal of the National Medical Association, 99,* 1013–1023.

Sherman, B. J., & McRae-Clark, A. L. (2016). Treatment of cannabis use disorder: Current science and future outlook. *Pharmacotherapy*, *36*(5), 511–535. https://doi.org/10.1002/phar.1747

Shi, Y., Liang, D., Bao, Y., An, R., Wallace, M. S., & Grant, I. (2019). Recreational marijuana legalization and prescription opioids received by Medicaid enrollees. *Drug and Alcohol Dependence*, *194*, 13–19. https://doi.org/10.1016/j.drugalcdep.2018.09.016

Scholes-Balog, K. E., Hemphill, S. A., Evans-Whipp, T. J., Toumbourou, J. W., & Patton, G. C. (2016). Developmental trajectories of adolescent cannabis use and their relationship to young adult social and behavioural adjustment: A longitudinal study of Australian youth. *Addictive Behaviors*, *53*, 11–18. https://doi.org/10.1016/j.addbeh.2015.09.008

Shrivastava, A., Johnston, M., & Tsuang, M. (2011). Cannabis use and cognitive dysfunction. *Indian Journal of Psychiatry*, *53*(3), 187–191. https://doi.org/10.4103/0019-5545.86796

Sinha, R. (2008). Chronic stress, drug use, and vulnerability to addiction. *Annals of the New York Academy of Sciences*, *1141*, 105–130. https://doi.org/10.1196/annals.1441.030

Skliamis, K., Benschop, A., Liebregts, N., & Korf, D. J. (2021). Where, when and with whom: Cannabis use, settings and self-regulation rules. *Contemporary Drug Problems*, *48*(3), 241–259. https://doi.org/10.1177/00914509211033921

Solomon, R. (2020). Racism and its effect on cannabis research. *Cannabis and Cannabinoid Research*, *5*(1), 2–5. https://doi.org/10.1089/can.2019.0063

Sorkhou, M., Bedder, R. H., & George, T. P. (2021). The behavioral sequelae of cannabis use in healthy people: A systematic review. *Frontiers in Psychiatry*, *12*, 630247. https://doi.org/10.3389/fpsyt.2021.630247

Spaderna, M., Addy, P. H., & D'Souza, D. C. (2013). Spicing things up: Synthetic cannabinoids. *Psychopharmacology*, *228*(4), 525-540.

Spechler, P. A. (2019). "Biobehavioral Predictors Of Cannabis Use In Adolescence" (2019). *Graduate College Dissertations and Theses.* 1122. https://scholarworks.uvm.edu/graddis/1122

Spechler, P. A., Allgaier, N., Chaarani, B., Whelan, R., Watts, R., Orr, C., Albaugh, M. D., D'Alberto, N., Higgins, S. T., Hudson, K. E., Mackey, S., Potter, A., Banaschewski, T., Bokde, A., Bromberg, U., Büchel, C., Cattrell, A., Conrod, P. J., Desrivières, S., Flor, H., … IMAGEN Consortium (2019). The initiation of cannabis use in adolescence is predicted by sex-specific psychosocial and neurobiological features. *The European Journal of Neuroscience*, *50*(3), 2346–2356. https://doi.org/10.1111/ejn.13989

Spindle, T. R., Cone, E. J., Schlienz, N. J., Mitchell, J. M., Bigelow, G. E., Flegel, R., Hayes, E., & Vandrey, R. (2018). Acute effects of smoked and vaporized cannabis in healthy adults who infrequently use cannabis: A Crossover Trial. *JAMA Network Open*, *1*(7), e184841. https://doi.org/10.1001/jamanetworkopen.2018.4841

Spooner, C. & Hetherington, K. (2005) *Social Determinants of Drug Use*, National Drug and Alcohol Research Centre.

Stangor, C. (2014). *Introduction to Psychology*. FlatWorld

Steigerwald, S., Wong, P. O., Cohen, B. E., Ishida, J. H., Vali, M., Madden, E., & Keyhani, S. (2018). Smoking, vaping, and use of edibles and other forms of marijuana among US adults. *Annals of Internal Medicine*, *169*(12), 890-892.

Steinberg L. (2008). A social neuroscience perspective on adolescent risk-taking. *Developmental Review: DR*, *28*(1), 78–106. https://doi.org/10.1016/j.dr.2007.08.002

Stogner, J., & Miller, B. (2015). Assessing the dangers of "dabbing": Mere marijuana or harmful new trend? *Pediatrics*, *136*(1):1–3

Stroud, C. B. (2018). The Stress Sensitization Model. *In The Oxford Handbook of Stress and Mental Health*.

Stuyt E. (2018). The problem with the current high potency THC marijuana from the perspective of an addiction psychiatrist. *Missouri Medicine*, *115*(6), 482–486.

Subbaraman, M. & Kerr, W. (2021). Cannabis use frequency, route of administration, and co-use with alcohol among older adults in Washington state. *Journal of Cannabis Research, 3*(17). https://doi.org/10.1186/s42238-021-00071-3

Substance Abuse and Mental Health Services Administration (2004). *Alcohol Treatment and Adolescents*. Retrieved November 01 2004, from http://www.samhsa.gov.

Substance Abuse and Mental Health Services Administration (2014). *Results from the 2013 National Survey on Drug Use and Health: Summary of national findings*. SAMHSA.

Substance Abuse and Mental Health Services Administration. (2019). *Behavioral Health Among College Students Information & Resource Kit*. HHS Publication No. (SMA) 19-5052. Substance Abuse and Mental Health Services Administration,

Suerken, C. K., Reboussin, B. A., Sutfin, E. L., Wagoner, K. G., Spangler, J., & Wolfson, M. (2014). Prevalence of marijuana use at college entry and risk factors for initiation during freshman year. *Addictive Behaviors*, *39*(1), 302–307. https://doi.org/10.1016/j.addbeh.2013.10.018

Suerken, C. K., Reboussin, B. A., Egan, K. L., Sutfin, E. L., Wagoner, K. G., Spangler, J., & Wolfson, M. (2016). Marijuana use trajectories and academic outcomes among college students. *Drug and Alcohol Dependence*, *162*, 137–145. https://doi.org/10.1016/j.drugalcdep.2016.02.041

Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics* (6th ed.). Boston: Pearson Education, Inc.

Taipale, J. (2016). Self-regulation and beyond: Affect regulation and the infant-caregiver dyad. *Frontiers in Psychology*, *7*, 889. https://doi.org/10.3389/fpsyg.2016.00889

Taleb, B., Kalan, Z., Bahelah, R., Boateng, G., Rahman, M., & Alshbool, F. (2020). Vaping while high: Factors associated with vaping marijuana among youth in the United States. *Drug and Alcohol Dependence*, *217*, 108290. https://doi.org/10.1016/j.drugalcdep.2020.108290

Thanvi, B. R., & Treadwell, S. D. (2009). Cannabis and stroke: Is there a link?. *Postgraduate Medical Journal*, *85*(1000), 80-83.

Thapa, D., Cairns, E. A., Szczesniak, A. M., Toguri, J. T., Caldwell, M. D., & Kelly, M. (2018). The Cannabinoids Δ^8THC, CBD, and HU-308 act via distinct receptors to reduce corneal pain and inflammation. *Cannabis and Cannabinoid Research*, *3*(1), 11–20. https://doi.org/10.1089/can.2017.0041

Thompson, K., Leadbeater, B., Ames, M., & Merrin, G. J. (2019). Associations between marijuana use trajectories and educational and occupational success in young adulthood. *Prevention Science: The Official Journal of the Society for Prevention Research*, *20*(2), 257–269. https://doi.org/10.1007/s11121-018-0904-7.

Thurstone, L. L. (1934). The vectors of mind. *Psychological Review*, *41*, 1–32.

Thrul, J., Rabinowitz, J. A., Reboussin, B. A., Maher, B. S., & Ialongo, N. S. (2021). Adolescent cannabis and tobacco use are associated with opioid use in young adulthood-12-year longitudinal study in an urban cohort. *Addiction (Abingdon, England)*, *116*(3), 643–650. https://doi.org/10.1111/add.15183

Tooley, M., Jose, P., & Grimshaw, G. (2015). A prospective study of stress sensitivity: Emotion regulation as a moderator of the stress-depression relationship. *Conference Abstract: XII International Conference on Cognitive Neuroscience (ICON-XII).* doi:10.3389/conf.fnhum.2015.217.00327

Triandis, H. C., McCusker, C., & Hui, C. H. (1990). Multimethod probes of individualism and collectivism. *Journal of Personality and Social Psychology, 59***,** 1006–1020.

Unger, J. (2012). The most critical unresolved issues associated with race, ethnicity, culture, and substance use. *Substance Use & Misuse*, *47*(4), 390–395. https://doi.org/10.3109/10826084.2011.638017

U.S. Census Bureau (2021). *Poverty Thresholds.* https://www.census.gov/data/tables/time-series/demo/income-poverty/historical-poverty-thresholds.html *U.S. Census Bureau*.

U.S. Census Bureau (2010). Resident Population Data**.** *U.S. Census Bureau*.

Vakalahi, H. F. (2001). Adolescent substance use and family-based risk and protective factors: A literature review. *Journal of Drug Education*, *31*(1), 29–46. https://doi.org/10.2190/QP75-P9AR-NUVJ-FJCB

Valiente, C., Lemery-Chalfant, K., Swanson, J., & Reiser, M. (2008). Prediction of children's academic competence from their effortful control, relationships, and classroom participation. *Journal of Educational Psychology*, *100*(1), 67.

Vandrey, R., Budney, A. J., Kamon, J. L., & Stanger, C. (2005). Cannabis withdrawal in adolescent treatment seekers. *Drug and Alcohol Dependence*, *78*(2), 205-210.

van Amsterdam, J., Brunt, T., & van den Brink, W. (2015). The adverse health effects of synthetic cannabinoids with emphasis on psychosis-like effects. *Journal of Psychopharmacology (Oxford, England)*, *29*(3), 254–263. https://doi.org/10.1177/0269881114565142

Van Der Pol, P., Liebregts, N., De Graaf, R., Korf, D. J., van den Brink, W., & van Laar, M. (2013). Predicting the transition from frequent cannabis use to cannabis dependence: A three-year prospective study. *Drug and Alcohol Dependence*, *133*(2), 352-359.

van Duin, L., Bevaart, F., Zijlmans, J., Luijks, M. A., Doreleijers, T., Wierdsma, A. I., Oldehinkel, A. J., Marhe, R., & Popma, A. (2019). The role of adverse childhood experiences and mental health care use in psychological dysfunction of male multi-problem young adults. *European Child & Adolescent Psychiatry*, *28*(8), 1065–1078. https://doi.org/10.1007/s00787-018-1263-4

Varlet, V., Concha-Lozano, N., Berthet, A., Plateel, G., Favrat, B., De Cesare, M., Lauer, E., Augsburger, M., Thomas, A., & Giroud, C. (2016). Drug vaping applied to cannabis: Is "cannavaping" a therapeutic alternative to marijuana?. *Scientific Reports*, *6*, 25599. https://doi.org/10.1038/srep25599

Volkow, N. D., Baler, R. D., Compton, W. M., & Weiss, S. R. (2014). Adverse health effects of marijuana use. *The New England Journal of Medicine*, *370*(23), 2219–2227. https://doi.org/10.1056/NEJMra1402309

Volkow, N. D., Swanson, J. M., Evins, A. E., DeLisi, L. E., Meier, M. H., Gonzalez, R., Bloomfield, M. A., Curran, H. V., & Baler, R. (2016). Effects of cannabis use on human behavior, including cognition, motivation, and psychosis: A review. *JAMA Psychiatry*, *73*(3), 292–297. https://doi.org/10.1001/jamapsychiatry.2015.3278

Von Cheong, E., Sinnott, C., Dahly, D., & Kearney, P. M. (2017). Adverse childhood experiences (ACEs) and later-life depression: Perceived social support as a potential protective factor. *BMJ Open*, *7*(9). doi:10.1136/bmjopen-2016-013228

Vyas, M. B., LeBaron, V. T., & Gilson, A. M. (2018). The use of cannabis in response to the opioid crisis: A review of the literature. *Nursing Outlook*, *66*(1), 56–65. https://doi.org/10.1016/j.outlook.2017.08.012

Walsh, D., McCartney, G., Smith, M., & Armour, G. (2019). Relationship between childhood socioeconomic position and adverse childhood experiences (ACEs): A systematic review. *Journal of Epidemiology and Community Health*, *73*(12), 1087–1093. https://doi.org/10.1136/jech-2019-212738

Webb, C. W., & Webb, S. M. (2014). Therapeutic benefits of cannabis: A patient survey. *Hawai'i Journal of Medicine & Public Health: A Journal of Asia Pacific Medicine & Public Health*, *73*(4), 109–111.

Wechsler, H., Lee, J.E., Kuo, M., & Lee, H. (2000). *College binge drinking in the 1990s: A continuing problem.* Retrieved October 23, 2004, from http://www.hsph.harvard.edu/cas/rpt2000/CAS2000rpth.htm.

Weyers, S., Dragano, N., Möbus, S., Beck, E. M., Stang, A., Möhlenkamp, S., Jöckel, K. H., Erbel, R., & Siegrist, J. (2010). Poor social relations and adverse health behaviour: Stronger associations in low socioeconomic groups?. *International Journal of Public Health*, *55*(1), 17–23. https://doi.org/10.1007/s00038-009-0070-6

White, H. R., & Labouvie, E. W. (1989). Towards the assessment of adolescent problem drinking. *Journal of Studies on Alcohol*, *50*(1), 30-37.

White, H. R., Labouvie, E. W., & Papadaratsakis, V. (2005). Changes in substance use during the transition to adulthood: A comparison of college students and their noncollege age peers. *Journal of Drug Issues, 35* (2), 281-306.

White, K. M. (2004). *The beginning of today*: *The Marihuana Tax Act of 1937*. PublishAmerica.

Whiting, P. F., Wolff, R. F., Deshpande, S., Di Nisio, M., Duffy, S., Hernandez, A. V., Keurentjes, J. C., Lang, S., Misso, K., Ryder, S., Schmidlkofer, S., Westwood, M., & Kleijnen, J. (2015). Cannabinoids for medical use: A systematic review and meta-analysis. *JAMA*, *313*(24), 2456–2473.

Wills, T. A., Pokhrel, P., Morehouse, E., & Fenster, B. (2011). Behavioral and emotional regulation and adolescent substance use problems: A test of moderation effects in a dual-process model. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*, *25*(2), 279–292. https://doi.org/10.1037/a0022870

Windle, M., Haardörfer, R., Getachew, B., Shah, J., Payne, J., Pillai, D., & Berg, C. J. (2018). A multivariate analysis of adverse childhood experiences and health behaviors and outcomes among college students. *Journal of American College Health*, *66*(4), 246–251. https://doi.org/10.1080/07448481.2018.1431892

Williams A. R. (2020). Cannabis as a gateway drug for opioid use disorder. *The Journal of law, Medicine & Ethics: A Journal of the American Society of Law, Medicine & Ethics*, *48*(2), 268–274. https://doi.org/10.1177/1073110520935338

Wills, T. A., & Ainette, M. G. (2009). *Handbook of Drug Use Etiology.*

Wills, T. A., Pokhrel, P., Morehouse, E., & Fenster, B. (2011). Behavioral and emotional regulation and adolescent substance use problems: A test of moderation effects in a dual-

process model. *Psychology of Addictive Behaviors: Journal of the Society of Psychologists in Addictive Behaviors*, *25*(2), 279–292. https://doi.org/10.1037/a0022870

Windle, M., Haardörfer, R., Getachew, B., Shah, J., Payne, J., Pillai, D., & Berg, C. J. (2018). A multivariate analysis of adverse childhood experiences and health behaviors and outcomes among college students. *Journal of American College Health, 66*(4), 246–251. https://doi.org/10.1080/07448481.2018.1431892

Winters, R., Winters, A., & Amedee, R. G. (2010). Statistics: A brief overview. *The Ochsner Journal*, *10*(3), 213–216.

Wise, R. A., & Koob, G. F. (2014). The development and maintenance of drug addiction. *Neuropsychopharmacology: Official publication of the American College of Neuropsychopharmacology*, *39*(2), 254–262. https://doi.org/10.1038/npp.2013.261

Wolff, M., Enge, S., Kräplin, A., Krönke, K. M., Bühringer, G., Smolka, M. N., & Goschke, T. (2021). Chronic stress, executive functioning, and real-life self-control: An experience sampling study. *Journal of Personality*, *89*(3), 402–421. https://doi.org/10.1111/jopy.12587

Wu, L. T., Swartz, M. S., Brady, K. T., Hoyle, R. H., & NIDA AAPI Workgroup (2015). Perceived cannabis use norms and cannabis use among adolescents in the United States. *Journal of Psychiatric Research*, *64*, 79–87. https://doi.org/10.1016/j.jpsychires.2015.02.022

Wu, L. T., Woody, G. E., Yang, C., Pan, J. J., & Blazer, D. G. (2011). Racial/ethnic variations in substance-related disorders among adolescents in the United States. *Archives of General Psychiatry*, *68*(11), 1176–1185. https://doi.org/10.1001/archgenpsychiatry.2011.120

Wyman, P. A., Cross, W., Hendricks Brown, C., Yu, Q., Tu, X., & Eberly, S. (2010). Intervention to strengthen emotional self-regulation in children with emerging mental health problems: Proximal impact on school behavior. *Journal of Abnormal Child Psychology*, *38*(5), 707–720. https://doi.org/10.1007/s10802-010-9398-x

Xie, Z., & Li, D. (2020). Cross-sectional association between lifetime use of electronic cigarettes with or without marijuana and self-reported past 12-month respiratory symptoms as well as lifetime respiratory diseases in U.S. adults. *Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco*, *22*(1), 70–75. https://doi.org/10.1093/ntr/ntaa194

Yang, D. J. (2000). Craving your next web fix: Internet addiction is no longer a laughing matter. *U.S. News and World Report, 128,* 41.

Yang J., Roman-Urrestarazu, A., Brayne, C. (2020). Responses among substance abuse treatment providers to the opioid epidemic in the USA: Variations in buprenorphine and methadone treatment by geography, operational, and payment characteristics, 2007-16. *PLoS ONE, 15*(3): e0229787. https://doi.org/10.1371/journal.pone.0229787

Zeiger, J. S., Silvers, W.S., Fleegler, E.M., & Zeiger, R.S. (2019). Age related differences in cannabis use and subjective effects in a large population-based survey of adult athletes. *Journal of Cannabis Research*, 1(*1*). doi:10.1186/s42238-019-0006-9

Zhang, C., Brook, J. S., Leukefeld, C. G., & Brook, D. W. (2016). Trajectories of marijuana use from adolescence to adulthood as predictors of unemployment status in the early forties. *The American Journal on Addictions*, *25*(3), 203–209. https://doi.org/10.1111/ajad.12361

Zvonarev, V., Fatuki, T. A., & Tregubenko, P. (2019). The public health concerns of marijuana legalization: An overview of current trends. *Cureus*, *11*(9), e5806. https://doi.org/10.7759/cureus.5806

Appendix

Demographic Questionnaire

This survey contains information related to cannabis use and childhood trauma. If any of these questions cause distress participants are encouraged to stop or pause the survey at any moment if they need to. If participants feel the need to see someone immediately as a result of participation the contact information for The Center for Counseling and Personal Evaluation at 706-542-8508.

Please select ONE:

Gender

Male
Female
Trans
Nonbinary
Other:_____

Age_____

Race/Ethnicity

Asian
Black / African American
Hispanic / Latino
Multiracial
Pacific Islander
White
Native American
Other:_____

Sexual Orientation

Prefer opposite sex relationships
Prefer same sex relationships
Prefer both same sex and opposite sex relationships
Other:_____

Year In School

Freshman
Sophomore
Junior
Senior
Fifth year or older
High school student taking a college course

Current Credit Hours Enrolled in This Semester

0-3
4-6
7-9
10-13
14-16
16+

Did you receive free/reduced lunch (low-cost or free lunches provided each school day) **at any point in your K-12 education?**

Yes No I'm not sure

For this survey "cannabis products" refers to any cannabis-related product from a cannabis plant (typically known as marijuana). **This includes joints, blunts, bong / water pipe, wax, edibles, Delta-8, lotions, oils, patches, sprays, soaps, lubricants, cool or warm balms, vaporizer pen or an e-cigarette.**

Have you ever in your lifetime used any product from the cannabis plant (typically known as marijuana)?

Yes No

How old were you when you first used cannabis?

_____

Have you used cannabis products in the past 30 days?

Yes No

In the past 30 days how many days have you used cannabis products?

_____

What is your preferred method of cannabis use? Choose ONE that best applies to you.

Smoking (joints, blunts, bong / water pipe, wax, etc.)

Ingestible (edibles)

Topical (lotions, oils, patches, sprays, soaps, lubricants, bath salts, and cool or warm balms)

Vaping (vaporizer pen or an e-cigarette device)

Other:_____

How often do you currently use cannabis products? Choose ONE that best applies to you.

Daily Weekly Monthly A few times a year Other:_____

Think of the month prior to when COVID-19 started. What were your typical patterns of cannabis use before the pandemic?

Before the pandemic, I used cannabis products:

Daily
A few times per week
A few times per month
A few times per year
Never

Currently, I use cannabis products:

Daily
A few times per week
A few times per month
A few times per year
Never

Think of the month prior to when COVID-19 started. What was your primary method of use before the pandemic?

Before the pandemic, my primary method of cannabis use was:

Primarily smoking cannabis products (joints, blunts, bong / water pipe, wax, etc.)
Primarily ingesting cannabis products (edibles)
Primarily applied cannabis products topically (lotions, oils, patches, sprays, soaps, lubricants, bath salts, and cool or warm balms)
Primarily vaped cannabis products (vaporizer pen or an e-cigarette device)
Other:_____

Currently, my primary method of cannabis use is:

Primarily smoking cannabis products (joints, blunts, bong / water pipe, wax, etc.)
Primarily ingesting cannabis products (edibles)
Primarily applied cannabis products topically (lotions, oils, patches, sprays, soaps, lubricants, bath salts, and cool or warm balms)
Primarily vaped cannabis products (vaporizer pen or an e-cigarette device)
Other:_____

Think of the month prior to when COVID-19 started. What was your primary social pattern of use before the pandemic?

Before the pandemic, my primary social pattern of cannabis use was:

Alone
With one or two others
In a group
Other:_____

Currently, my primary social pattern of cannabis use is:

Alone
With one or two others
In a group
Other:_____

Difficulties in Emotion Regulation Scale – Short Form (DERS-SF)
Kaufman, Xia, Fosco, Yaptangco, Skidmore, & Crowell (2015)

Please indicate how often the following apply to you.

	Almost Never (0–10%)	Some-times (11–35%)	About Half Of the Time (36–65%)	Most of the Time (66–90%)	Almos Alway (91–100
1. I pay attention to how I feel	1	2	3	4	5
2. I have no idea how I am feeling	1	2	3	4	5
3. I have difficulty making sense out of my feelings	1	2	3	4	5
4. I care about what I am feeling	1	2	3	4	5
5. I am confused about how I feel	1	2	3	4	5
6. When I'm upset, I acknowledge my emotions	1	2	3	4	5
7. When I'm upset, I become embarrassed for feeling that way	1	2	3	4	5
8. When I'm upset, I have difficulty getting work done	1	2	3	4	5
9. When I'm upset, I become out of control	1	2	3	4	5
10. When I'm upset, I believe that I will end up feeling very depressed	1	2	3	4	5
11. When I'm upset, I have difficulty focusing on other things	1	2	3	4	5
12. When I'm upset, I feel guilty for feeling that way	1	2	3	4	5
13. When I'm upset, I have difficulty concentrating	1	2	3	4	5
14. When I'm upset, I have difficulty controlling my behaviors	1	2	3	4	5
15. When I'm upset, I believe there is nothing I can do to make myself feel better	1	2	3	4	5
16. When I'm upset, I become irritated with myself for feeling that way	1	2	3	4	5
17. When I'm upset, I lose control over my behavior	1	2	3	4	5
18. When I'm upset, it takes me a long time to feel better	1	2	3	4	5

Short Form Self-Regulation (SSRQ)

Please answer the following questions by circling the response that best describes how you are. Remember, there are no right or wrong answers.

	Strongly Disagree	Disagree	Uncertain or Unsure	Agree	Strongly Agree
1. I usually keep track of my progress towards my goals.	1	2	3	4	5
2. I have trouble making up my mind about things.	1	2	3	4	5
3. I get easily distracted from my plans	1	2	3	4	5
4. I don't notice the effects of my actions until it is too late.	1	2	3	4	5
5. I am able to accomplish goals I set for myself.	1	2	3	4	5
6. I put off making decisions	1	2	3	4	5
7. It's hard for me to notice when I've "had enough" (alcohol, food, sweets).	1	2	3	4	5
8. If I wanted to change, I am confident	1	2	3	4	5

that I could do it.					
9. When it comes to deciding about a change, I feel overwhelmed by the choices.	1	2	3	4	5
10. I have trouble following through with things once I've made up my mind to do something.	1	2	3	4	5
11. I don't seem to learn from my mistakes.	1	2	3	4	5
12. I can stick to a plan that's working well.	1	2	3	4	5
13. I usually only have to make a mistake one time in order to learn from it.	1	2	3	4	5
14. I have personal standards, and try to live up to them.	1	2	3	4	5
15. As soon as I see a problem or challenge, I start looking for all	1	2	3	4	5

possible solutions.					
16. I have a hard time setting goals for myself.	1	2	3	4	5
17. I have a lot of willpower.	1	2	3	4	5
18. When I'm trying to change something, I pay a lot of attention to how I'm doing.	1	2	3	4	5
19. I have trouble making plans to help me reach my goals.	1	2	3	4	5
20. I am able to resist temptation.	1	2	3	4	5
21. I set goals for myself and keep track of my progress.	1	2	3	4	5
22. Most of the time I don't pay attention to what I'm doing.	1	2	3	4	5
23. I tend to keep doing the same thing, even when it doesn't work.	1	2	3	4	5
24. I can usually find several	1	2	3	4	5

different possibilities when I want to change something.					
25. Once I have a goal, I can usually plan how to reach it.	1	2	3	4	5
26. If I make a resolution to change something, I pay a lot of attention to how I'm doing.	1	2	3	4	5
27. Often I don't notice what I'm doing until someone calls it to my attention.	1	2	3	4	5
28. I usually think before I act.	1	2	3	4	5
29. I learn from my mistakes.	1	2	3	4	5
30. I know how I want to be.	1	2	3	4	5
31. I give up quickly.	1	2	3	4	5

Adverse Childhood Experiences (ACE Questionnaire)

Instructions: While you were growing up, during your first 18 years of life:

1. Did you feel that you didn't' have enough to eat, had to wear dirty clothes, or had no one to protect or take care of you?

YES **NO**

2. Did you lose a parent through divorce, abandonment, death, or other reason?

YES **NO**

3. Did you live with anyone who was depressed, mentally ill, or attempted suicide?

YES **NO**

4. Did your parents or adults in your home ever hit, punch, beat, or threaten to harm each other?

YES **NO**

5. Did a parent or adult in your home ever swear at you, insult you, or put you down?

YES **NO**

6. Did you feel that no one in your family loved you or thought you were special?

YES **NO**

7. Did you live with anyone who had a problem with drinking or using drugs, including prescription drugs?

YES **NO**

8. Did you live with anyone who went to jail or prison?

YES **NO**

9. Did a parent or adult in your home ever hit, beat, kick, or physically hurt you in any way?

YES **NO**

10. Did you experience unwanted sexual contact (such as fondling or oral/anal/vaginal intercourse/penetration? **YES** **NO**

Different things happen to people when they are smoking marijuana, or because of their marijuana use. Some of these things are listed below. Read each statement carefully and circle the one answer that best describes your reactions.

How many times did the following things happen to you while you were smoking marijuana or because of your marijuana use during the last year?

1. Not able to do your homework or study for a test

Never 1-2 times 3-5 times 6-10 times More than 10 times

2. Got into fights, acted bad, or did mean things

Never 1-2 times 3-5 times 6-10 times More than 10 times

3. Missed out on other things because you spent too much money on marijuana

Never 1-2 times 3-5 times 6-10 times More than 10 times

4. Went to work or school high or stoned

Never 1-2 times 3-5 times 6-10 times More than 10 times

5. Caused shame or embarrassment to someone

Never 1-2 times 3-5 times 6-10 times More than 10 times

6. Neglected your responsibilities

Never 1-2 times 3-5 times 6-10 times More than 10 times

7. Relatives avoided you

Never 1-2 times 3-5 times 6-10 times More than 10 times

8. Felt that you needed more marijuana than you used to use in order to get the same effect

Never 1-2 times 3-5 times 6-10 times More than 10 times

9. Tried to control your marijuana use by trying to smoke marijuana only certain times of day or certain places

Never 1-2 times 3-5 times 6-10 times More than 10 times

10. Had withdrawal symptoms, that is, felt sick because you stopped or cut down on smoking marijuana

Never 1-2 times 3-5 times 6-10 times More than 10 times

11. Noticed a change in your personality

Never 1-2 times 3-5 times 6-10 times More than 10 times

12. Felt that you had a problem with school

Never 1-2 times 3-5 times 6-10 times More than 10 times

13. Missed a day (or part of a day) of school or work

Never 1-2 times 3-5 times 6-10 times More than 10 times

14. Tried to cut down on smoking marijuana

Never 1-2 times 3-5 times 6-10 times More than 10 times

15. Suddenly found yourself in a place that you could not remember getting to

Never 1-2 times 3-5 times 6-10 times More than 10 times

16. Passed out or fainted suddenly

Never 1-2 times 3-5 times 6-10 times More than 10 times

17. Had a fight, argument, or bad feelings with a friend

Never 1-2 times 3-5 times 6-10 times More than 10 times

18. Had a fight, argument or bad feelings with a family member

Never 1-2 times 3-5 times 6-10 times More than 10 times

19. Kept smoking marijuana when you promised yourself not to

Never 1-2 times 3-5 times 6-10 times More than 10 times

20. Felt you were going crazy

Never 1-2 times 3-5 times 6-10 times More than 10 times

21. Had a bad time

Never 1-2 times 3-5 times 6-10 times More than 10 times

22. Felt physically or physiologically dependent on marijuana

Never 1-2 times 3-5 times 6-10 times More than 10 times

23. Was told by a friend or neighbor to stop or cut down your marijuana use

Never 1-2 times 3-5 times 6-10 times More than 10 times

24. Felt paranoid or overly nervous in everyday life

Never 1-2 times 3-5 times 6-10 times More than 10 times

25. Felt unmotivated to do things you needed to do in your everyday life

Never 1-2 times 3-5 times 6-10 times More than 10 times

26. Lost interest in things you once enjoyed

Never 1-2 times 3-5 times 6-10 times More than 10 times

27. Noticed that your memory was not as good as it used to be

Never 1-2 times 3-5 times 6-10 times More than 10 times

28. Lost some physical coordination in everyday activities

Never 1-2 times 3-5 times 6-10 times More than 10 times

29. Had trouble thinking clearly in everyday activities

Never 1-2 times 3-5 times 6-10 times More than 10 times

This survey contains information related to cannabis use and childhood trauma. If any of these questions cause distress participants are encouraged to stop or pause the survey at any moment if they need to. If participants feel the need to see someone immediately as a result of participation the contact information for The Center for Counseling and Personal Evaluation at 706-542-8508.

Instructor Recruitment Email

My name is John McCall, and I am a doctoral candidate in the Counseling Education & Supervision program at UGA. My dissertation focuses on addictions, and I am currently conducting a study on self-regulation, adverse childhood experiences (ACEs), emotion regulation, and marijuana use among college students. I am seeking permission to come to your class in order to collect data for the study. During my visit, I will administer a one-time, paper/pencil survey assessing childhood trauma and skills used to regulate emotions and behaviors. Administration of the survey will take approximately 30 minutes of class time. Your students will be provided with the contact information for Counseling and Testing Services should any concerns arise. If you grant me permission, I am open to administering this survey during any class period this semester (at the beginning or end) that is most convenient to you. Thank you for your consideration regarding your help with this research project. If you have any questions, please contact me at john.mccall@uga.edu. I look forward to hearing from you.

Best,

John McCall, M.A.

College Student Affairs Administration

Department of Counseling & Human Development Services

413H Aderhold Hall

University of Georgia

One Week Follow-up Instructor Recruitment Email

My name is John McCall, and I am a doctoral candidate in the Counseling Education & Supervision program at UGA. I emailed one week ago, and I am now sending a follow-up email seeking permission to come to your class in order to collect data for the study. My dissertation focuses on addictions, and I am currently conducting a study on self-regulation, adverse childhood experiences (ACEs), emotion regulation, and marijuana use among college students. During my visit, I will administer a one-time, paper/pencil survey assessing childhood trauma and skills used to regulate emotions and behaviors. Administration of the survey will take approximately 30 minutes of class time. Your students will be provided with the contact information for Counseling and Testing Services should any concerns arise. If you grant me permission, I am open to administering this survey during any class period this semester (at the beginning or end) that is most convenient to you. Thank you for your consideration regarding your help with this research project. If you have any questions, please contact me at john.mccall@uga.edu. I look forward to hearing from you.

Best,

John McCall, M.A.

College Student Affairs Administration

Department of Counseling & Human Development Services

413H Aderhold Hall

University of Georgia

Oral Recruitment Script

You are being invited to participate in a research study that examines cannabis use, childhood trauma, and skills used to regulate emotions and behaviors. This study is being conducted by me, John McCall, and I am a doctoral candidate in the Counseling Education & Supervision program at UGA. The purpose of this study is to help us better understand college student marijuana use, specifically regarding childhood trauma, and skills used to regulate emotions and behaviors. Participation is voluntary and you can choose to stop taking the survey at any time. To participate, you need to be a full-time undergraduate student at UGA and 18 years of age or older. It should take approximately 30 minutes to complete the survey. All responses will be anonymous, that is, at no time will your responses be connected to you as an individual. Participation in this study will not impact your grade in this course. Those who complete the survey may enter a classwide drawing to win a $20 Visa gift card that I will give to a participant in this class at the end of the survey today.

Tables

Table 1
Demographic Data of Sample (N=115)

Variable		M	F	Total
TOTAL		32	83	115 (100%)
YEAR	Freshman	5	15	20 (17.4%)
	Sophomore	1	15	16 (13.9%)
	Junior	7	24	31 (27.0%)
	Senior	17	28	45 (39.1%)
	Fifth+	2	1	3 (2.6%)
RACE				
	Asian	5	11	16 (13.9%)
	Combined	8	13	21 (18.3%)
	White	19	59	78 (67.8%)
LUNCH STATUS				
	No	23	63	86 (75%)
	Yes	9	20	29 (25%)
LIFETIME CU				
	No	9	23	32 (28%)
	Yes	29	54	83 (72%)
CREDIT HOURS				
	10-13	17	45	62 (53.9%)
	14-16	9	33	42 (36.5%)
	16+	6	5	11 (9.6%)
PAST 30 DAY CU				
	No	16	56	72 (62.6%)

Yes	16	25	41 (35.7%)

Note. F = Female; M = Male; CU = Cannabis Use

Table 2

Descriptive Statistics of Instruments

Instrument/Subscale	M	SD	# of Items
MPI	6.96	13.29	29
SSRQ	113.03	16.6	31
DS	6.30	2.58	3
DN	7.49	2.51	3
DI	5.26	2.76	3
DG	9.71	3.14	3
DC	6.10	1.91	3
DA	5.70	2.13	3
ACE-Q	1.47	1.69	10

Table 3

Correlation Matrix of all Study Variables

	MPI	F/R	SR	ACE	DG	DC	DA	DN	DI	DS
MPI	-	-	-	-	-	-	-	-	-	-
F/R	0.19	-	-	-	-	-	-	-	-	-
SR	-.307**	-.171	-	-	-	-	-	-	-	-
AC	.101	.124	-.199*	-	-	-	-	-	-	-
DG	.155	.040	-.309**	.148	-	-	-	-	-	-
DC	.211*	-.042	-.478**	.088	.374**	-	-	-	-	-
DA	.235*	.024	-.319**	-.020	-.044	.308**	-	-	-	-
DN	-.110	0.95	-.305**	.151	.405**	.420**	-.006	-	-	-
DI	.129	.112	-.429**	.064	.330**	.458**	.033	.334**	-	-
DS	.173	.064	-.522**	.201*	.508**	.620**	.135	.562**	.671**	-

Note. All reliability coefficients were calculated using Pearson's R. MPI = Marijuana Problems Index; F/R Lunch = Free/Reduced Lunch; SSRQ = Short Self-Regulation Questionnaire (SSRQ); ACE-Q = Adverse Childhood Experiences Questionnaire; DERS-SF (Goals) = DG; DERS-SF (Clarity) = DC; DERS-SF (Awareness) = DA; DERS-SF (Non-Acceptance) = DN; DERS-SF (Impulse) = DI; DERS-SF (Strategies) = DS.

$N = 115$

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

Table 4 *Regression Model*	***B***	***SE***	**Wald**	***p***	***OR***	***95% CI***
Step 1: Demographic Variables						
Gender	.176	.476	.137	.362	1.156	[.469, 3.030]
Age	.145	.159	.831	.362	1.156	[.846, 1.580]
Asian	-.314	.561	.314	.575	.730	[.242, 2.194]
Combined	1.241	.674	3.393	.065	3.458	[.924, 12.947]
Step 2: Total Scores						
Gender	.793	.587	1.822	.177	2.209	[.699, 6.984.]
Age	.144	.191	.572	.450	1.155	[795, 1.678]
Asian	-.753	.708	1.132	.287	.471	[.118, 1.885]
Combined	1.394	.823	2.692	.090	4.030	[830, 20.227]
ACE-Q	.499	.184	7.384	.007**	1.647	[1.149, 2.360]
Lunch Status	.116	.622	.035	.852	1.123	[.332, 3.801]
SSRQ	-.044	.020	4.588	.032*	.957	[.920, 996]
DS	-.395	.183	4.665	.031*	.673	[.470, 964]
DN	.031	.122	.063	.802	1.031	[.812, 1.309]
DI	.054	.134	.161	.688	1.055	[.812, 1.372]
DG	.162	.093	2.996	.083	1.176	[.979, 1.412
DC	.193	.180	1.157	.282	1.213	[.853, 1.725]
DA	-.225	.137	2.692	.101	.798	[.610, 1.045]

Note. DERS-SF Strategies = DS, DERS- SF Non-Acceptance = DN; DERS-SF Impulse = DI; DERS-SF Goal = DG; DERS-SF Clarity = DC; DERS-SF Awareness = DA

$N = 115$

* p < .05. ** p < .01.