

FREQUENCY OF MARIJUANA USE BY CALIFORNIA UNIVERSITY STUDENTS

BASED ON GENDER AND ETHNICITY: A QUANTITATIVE ANALYSIS

by

Evelyn Lorraine Anderson

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Philosophy

Liberty University, Lynchburg, VA

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ABSTRACT

The purpose of this quantitative causal-comparative study was to determine the frequency of marijuana use by California university students based on gender and ethnicity. This study was important because marijuana is the most used illicit substance in the United States, and there is limited research regarding the demographic characteristics of California university students who use marijuana. The quantitative research design was used to describe the patterns of marijuana use by California university students. The setting was online. The participants included a random sample of 167 college students from five California state universities. The Daily Sessions, Frequency, Age of Onset, and Quantity of Cannabis Use Inventory was used to determine the frequency of marijuana use. An independent samples *t* test was used to determine if there were differences in the frequency of marijuana use based on gender, while a one-way analysis of variance was used to determine the differences in the frequency of use based on ethnicity. Caucasian males and females were in the highest use group, Asian males and females and African American females were in the mid-range use group, and Hispanic males and females were in the lowest range use group. The conclusion was California university students' frequency of marijuana use differs based on gender and ethnicity. Recommendations for further study include increasing the number of participants and institutions of higher education, the use of trend data, and the use of a qualitative research design.

Keywords: marijuana, student, frequency of use, gender, ethnicity

Copyright

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Dedication

I dedicate my dissertation to my family and friends, whose love, support, and encouragement have been the driving forces to navigate me throughout my journey.

To my mother Lucinda, who has been a constant source of unconditional love, strength, and understanding. Mom, I love you more than I could ever express, and I appreciate your selflessness as I worked to complete my research, writing, and editing. I thank God for you every day.

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“If you can’t fly, then run, if you can’t run, then walk, if you can’t walk, then crawl, but whatever you do, you have to keep moving forward.”- Dr. Martin Luther King Jr.

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List of Abbreviations

Analysis of Variance (ANOVA)

California Department of Public Health (CDPH)

California State University (CSU)

Daily Sessions, Frequency, Age of Onset and Quantity of Cannabis Use Inventory (DFAQ-CU)

Drug Free School Community Act (DFSCA)

Institutions of Higher Learning (IHL)

Medical Marijuana Laws (MML)

Recreational Marijuana Laws (RML)

Tetrahydrocannabinol (THC)

CHAPTER ONE: INTRODUCTION

Overview

Marijuana is considered the most widely used illicit substance in the United States, and college students are the most frequent users (Blavos et al., 2019). This research determined the frequency of marijuana use by California university students based on gender and ethnicity. This chapter includes the background, problem statement, purpose statement, significance of the study, research questions, and definitions.

Background

Marijuana is the most widely used illicit substance globally (Bahji & Callum, 2019; Bhattacharyya et al., 2017), and next to alcohol, it is the most frequently used substance on college campuses (Blavos et al., 2019); therefore, college administrators need to know what the frequency of use is on their campuses. Several personal experiences involving the frequent use of marijuana prompted the need to study this topic. As a sergeant for the Los Angeles County Sheriff's department, I witnessed the negative implications of frequent marijuana use on individuals and their families. The implications included incarceration, family separation, poor academic outcomes, and unemployment. In my work as an adjunct professor of criminal justice and public administration, I observed the negative implications of frequent marijuana use on college students. The implications included poor academic performance, including failing grades, poor class attendance rates, and low degree completion rates. The negative implications and the gap in the body of knowledge are the overarching rationales for conducting this study. California recently legalized marijuana use for recreational purposes, but researchers have not investigated the frequency of marijuana use by California university students based on the gender and ethnicity of college students (Yu et al., 2020). Given the gap in knowledge, it was

necessary to determine the frequency of marijuana use by California university students based on gender and ethnicity.

Historical Overview

By 2021, 29 U.S. states increased their efforts to decriminalize and legalize recreational marijuana use (Kerr et al., 2017; Rense, 2021). According to Maier et al. (2017), decriminalization and legalization differ in that decriminalization is the amending of existing statutes and reducing penalties for the use, possession, or sale of marijuana. In contrast, legalization removes existing statutes and penalties for using, possessing, or selling marijuana. Although marijuana use is legal in many states, federal law prohibits it (Yu et al., 2020). A review of the related literature revealed that California was one of the first states to decriminalize and legalize marijuana use (Grigorian et al., 2019).

In 1996, California passed the Compassionate Use Act, allowing patients and caregivers to possess and grow marijuana for medical purposes (Petersen, 2016). The Compassionate Use Act was the first voter-approved ballot initiative allowing the use of medical marijuana in the United States (California Department Public of Health [CDPH], n.d.; Hall & Weier, 2015). The 2018 passage of Proposition 64, also known as the Adult Use of Marijuana Act, allowed adults aged 21 and over to possess up to one ounce of marijuana and grow six marijuana plants in their homes (CDPH, n.d.). The passage of these medical marijuana laws (MML) and recreational marijuana laws (RML) resulted in the decriminalization and legalization of the possession, use, cultivation, and sale of marijuana in California (Vidourek et al., 2018; Yu et al., 2020).

Society at Large

Research indicates that college students in the United States are using marijuana more frequently since the passage of MML and RML (Bae & Kerr, 2020; Blavos et al., 2019). The

frequency of marijuana use by California university students based on gender and ethnicity has not been investigated. Yu et al. (2020) and Bahji and Callum (2019) concluded that marijuana was the most abused illicit drug in the United States, and college students had the highest use rates. College students in various states have experienced use-related consequences from frequent marijuana use; researchers recommended that future research identify interventions to mitigate those consequences (Bae & Kerr, 2020; Blavos et al., 2019; Geiger-Oneto & Simkins, 2017). Researchers found that use-related consequences were linked to the demographic characteristics of gender and ethnicity (Bae & Kerr, 2020; Miller et al., 2017).

Given the high prevalence of marijuana use in society, researchers sought to understand marijuana use at colleges. Cho et al. (2015) found that attending college was a significant life event as college students transitioned into adulthood. This transition into adulthood includes a period of experimentation. During this period of experimentation, college students frequently use and abuse marijuana (Cho et al., 2015; Escobedo et al., 2018). Bae and Kerr (2020) found that the transition from high school into college included a decline in parental supervision, exposure to older peer groups, and a culture of substance abuse, including marijuana.

To better understand the use of marijuana among college students, researchers sought to determine if marijuana use varied across subgroups of college students. Miller et al. (2017) investigated students from one university in Washington and determined that the frequency of marijuana use among college students differed across age, gender, and ethnicity. Other researchers investigated the frequency of marijuana use across the subgroups of age, gender, and ethnicity (Bae & Kerr, 2020; Miller et al., 2017; Wu et al., 2016).

Miller et al. (2017) and Pearson et al. (2017) discovered that 18- to 25-year-olds were the most frequent marijuana users. The gender subgroups included males and females (Bae & Kerr,

2020; Miller et al., 2017; Wu et al., 2016). Miller et al. (2017) determined that although males were 2 to 7% more likely to be in a higher use category than females, females had more significant increases in use after the passage of MML and RML than males. Bae and Kerr (2020) also compared the frequency of marijuana use across the gender subgroup, and they agreed with Miller et al. (2017) that females were more likely to have an increase in marijuana use after the passage of MML and RML than males. Researchers also compared marijuana use across the subgroup of ethnicity (Miller et al., 2017; Wu et al., 2016). Miller et al. (2017) discovered that after the legalization of marijuana, marijuana use among African American students increased by 88% and Hispanic college students by 93% when compared to Caucasian and Asian college students. Wu et al. (2016) determined that after the legalization of marijuana, African Americans, Hispanics, Multiracial persons, and Native Americans had higher use rates than Caucasians.

Included in the comparisons of age, gender, and ethnicity subgroups, researchers analyzed frequency rates using data from single states and multiple states (Bae & Kerr, 2020; Miller et al., 2017; Wu et al., 2016). Miller et al. (2017) compared students from one state while Bae and Kerr (2020) examined the frequency of marijuana use among college students from 48 states. Like Bae and Kerr (2020), Wu et al. (2016) compared the prevalence of marijuana use across multiple states; however, the scope of their study was slightly larger than that of Bae and Kerr (2020) as they included college-age adults from all 50 U.S. states. Like Miller et al. (2017), Wu et al. (2016) found that minority ethnic groups had higher marijuana use rates than their Caucasian and Asian peers, and the likelihood of using or abusing marijuana after RML was more significant in females than in males. Miller et al. (2017), unlike Bae and Kerr (2020), included college students from only one state and compared the mean frequency of marijuana

use before and after the decriminalization of the recreational use of marijuana. They found that the mean frequency was significantly higher for females and African Americans and Hispanics after the passage of RML.

Recognizing the prevalence of marijuana use among demographic subgroups of college students, researchers sought to identify the implications of marijuana use. Bae and Kerr (2020) found that the occasional or experimental use of marijuana did not result in higher use patterns across genders. They determined that the frequent use of marijuana included academic and health consequences across genders. Kogan et al. (2017) focused on the college-age African American male, and like Bae and Kerr (2020), discovered many occasional users did not develop high use patterns. Kogan et al. noted that marijuana users experienced use-related consequences, including physical injuries, poor interpersonal relationships, and adverse financial outcomes. Blavos et al. (2019) found the negative implications of frequent marijuana use among college students included impaired motor skills, short-term memory loss, poor class attendance rates resulting in failing grades, and disproportionately low degree completion rates across age, gender, and ethnicity. Another negative implication identified by Blavos et al. was an increased likelihood of engaging in promiscuous or unsafe sexual practices across subgroups. Cho et al. (2015) agreed with Blavos et al. (2019) that frequent marijuana use among college students resulted in adverse academic outcomes, promiscuous sexual behaviors, physical injury, and adverse legal consequences across genders.

While Blavos et al. (2019) and Cho et al. (2015) identified the negative implications of frequent marijuana use, Geiger-Oneto and Simkins (2017) identified a favorable implication. They found that college students who frequently used marijuana had increased social

acceptability among their peers. They attributed the increased social acceptability to their membership in fraternities or sororities.

Various researchers found that college students experienced negative and positive consequences from frequent marijuana use (Blavos et al., 2019; Kogan et al., 2017). Blavos et al. (2019) and Kogan et al. (2017) concluded that the link between the frequency of marijuana use, and its related consequences was ambiguous. The ambiguity stemmed from a belief that the consequences of frequent marijuana use differed across subgroups of users. The differing degrees of consequences included poor grade performance, high course absenteeism rates, and low degree completion rates. They attributed these differences to varied psychosocial factors based on the gender and ethnicity of the college student.

Policymakers at institutions of higher learning (IHL) in California must deal with the legalization of marijuana, and they are not clear on what the legalization will mean for the state (Kelly, 2018). Policymakers are aware that college students across the United States use marijuana (Blavos et al., 2019; Yu et al., 2020). Researchers have analyzed the frequency of marijuana use before and after the passage of MML and RML using single and multiple state comparisons and determined the frequency increased across subgroups of students (Bae & Kerr, 2020; Miller et al., 2017; Wu et al., 2016). The consequences of frequent marijuana use are ambiguous and prevalent (Kelly, 2018).

Given the prevalence of marijuana use among college students and the potential for use-related consequences, determining the frequency of marijuana use at California universities across demographic subgroups is necessary. Researchers underscored the need for higher education leaders to implement preventative measures to educate students regarding the negative consequences of frequent marijuana use (Bae & Kerr, 2020; Blavos et al., 2019; Hall & Weier,

2015). Researchers also underscored the importance of colleges identifying the frequency of marijuana use across student demographic groups and establishing marijuana user profiles that include demographic characteristics and patterns of use (Bae & Kerr, 2020; Pearson et al., 2016). Researchers found that females and minority students use rates increased after the passage of RML (Miller et al., 2017; Wu et al., 2016). Bae and Kerr (2020) noted there is a limited body of knowledge on the frequency of marijuana use among college students, and future examinations should determine if frequency varies across subgroups. This research will determine the frequency of marijuana use by California university students based on gender and ethnicity.

Education System

The United States Department of Education governs the level of care, managerial, and ethical responsibilities of all California universities, including their campuses' safety. The United States Department of Education standards ensure compliance with the Drug Free School and Communities Act (DFSCA). Policymakers tasked with DFSCA compliance at IHL include administrators, drug prevention coordinators, students' affairs representatives, health service employees, and campus police (Safe Supportive Learning, n.d.).

The compliance measures in DFSCA include directives for school administrators to recognize the effect drug use and abuse can have on academic performance and student's well-being. The compliance measures include mandates for school administrators to design and implement drug use and abuse intervention and prevention programs. The programs must include a process to direct school staff and students to drug counseling, treatment, rehabilitation services and programs and address violations of substance abuse policies (Safe Supportive Learning, n.d.). These programs must include administrative procedures to address any situation deemed unsafe. Situations deemed unsafe in the DFSCA directives are the possession, use, and distribution of illicit drugs at or near university campuses, including marijuana (Safe Supportive

Learning, n.d.). Non-compliance with the directives outlined in the DFSCA compliance measures may result in administrative disciplinary action ranging from assistance with program design to the termination of federal funding to the university (Safe Supportive Learning, n.d.).

California state university administrators acted to comply with DFSCA directives (California State University [CSU], n.d.). They created an employee-focused assistance program where employees access marijuana-related education and counseling services. Employees have access to the National Institute on Drug Abuse, an organization that supports scientific research on drug use and abuse; a link to the DFSCA guidebook, which outlines the DFSCA regulations and provides a link to the Drug Enforcement Agency and information on the importance of drug prevention at colleges (CSU, n.d.). In addition, they developed a student wellness program called the Basic Needs Initiative, which links students to service providers who can provide emergency housing, food resources, medical and mental health services, and literacy services (CSU, n.d.). These are the only programs or policies on marijuana use or possession at California state universities.

Theory

Tinto's social integration theory framed this study. In his social integration theory, Tinto sought to explain the processes of interaction four-year college students experienced before their departure or completion of college. He described the students' differing rates of completion as their level of persistence. He sought to determine why some students' level of persistence was different from others. Tinto found that college students' capacity to persist increased when they socially integrated with their peers, faculty, administrators, and the institution. Conversely, students who were not socially integrated into the college setting had low levels of persistence.

Persistence levels are key performance measures and indicators of institutional health in that if student persistence is low, then institutional health is low (Kinzie & Hurtado, 2017).

To understand why college students' levels of persistence differed, Tinto (1975) focused on their processes of interaction. He described the student's interaction processes as the combination of their pre-existing attributes and experiences, which encompassed their family background and their skills and abilities. The attributes and experiences provided the foundation for the process of interaction by the student with the social and academic components of the institution of higher learning. Tinto identified the individual demographic characteristics of the students and focused on their gender and ethnicity. He also identified the behavioral characteristics of students who failed to persist, which included poor grade performance, a lack of social integration, and low levels of academic integration. Grade performance encompassed class attendance rates, course grades, and achievement across various academic subjects. Social integration encompassed interpersonal relationships with peers, faculty, and administrators. Academic integration included students' understanding of the institution's social norms (Tinto, 1975).

Researchers found that the behavioral characteristics of students who failed to persist in Tinto's study are like those of students who frequently used marijuana (Bae & Kerr, 2020; Blavos et al., 2019; Vidourek et al., 2018). Bae and Kerr (2020) noted that college students who frequently used marijuana had adverse academic outcomes. Blavos et al. (2019) determined that students who used marijuana frequently spent less time studying, had high absenteeism rates and poor grades, and were at an increased risk of dropping out of school. Kogan et al. (2017) concluded that college-aged adults who frequently used marijuana socially disengaged with non-user groups—including peers, schools, and civil organizations—and had poor interpersonal

skills. Pearson et al. (2016) highlighted several instances wherein college students who frequently used marijuana exhibited impetuous behaviors and were unable to establish and maintain substantive interpersonal relationships. The behavioral characteristics of students with low levels of persistence and students who frequently use marijuana are similar academically and socially. Tinto (1975) recommended that future research focus on why students fail to persist. He believed that determining the demographic and behavioral characteristics of students was necessary to determine if those characteristics were contributing factors in the differing levels of persistence.

Tinto's (1975) theoretical model was appropriate for this study for several reasons. The first reason was socially integrated students had high levels of persistence (Tinto, 1975). The second reason was that students who had a positive attitude regarding marijuana use, whether they used marijuana or not, experienced increased social acceptability among their peers (Geiger-Oneto & Simkins, 2017). The third reason was that students with low levels of persistence had similar behavioral characteristics to students who frequently used marijuana (Bae & Kerr, 2020; Blavos et al., 2019; Tinto, 1975). The final reason was that students' level of persistence was a key performance measure in the determination of institutional health (Kinzie & Hurtado, 2017). Tinto's theoretical model aligned with this study because it explained the factors impacting student persistence and degree completion. In addition, Tinto discovered persistence was linked to institutional health and therefore was a critical concern among educational policymakers (Kinzie & Hurtado, 2017).

Tinto also uncovered the behavioral characteristics of students who had low levels of persistence. Researchers discovered that the behavioral characteristics of students with low levels of persistence are like students who frequently used marijuana (Blavos et al., 2019; Miller et al.,

2017). Tinto stressed the need to determine the demographic characteristics of students, including their gender and ethnicity. Pearson et al. (2017) indicated that a baseline of information was necessary to understand frequent marijuana use by college students, and it should include the demographics characteristics of gender and ethnicity.

Problem Statement

Marijuana use in the United States has increased over the past 30 years, and nearly 50% of college students have used marijuana (Miller et al., 2017). A review of the related literature revealed that researchers investigated the prevalence of marijuana use among college students (Bae & Kerr, 2020; Blavos et al., 2019; Miller et al., 2017). Researchers underscored the need for higher education leaders to identify segments of the student population with a high frequency of marijuana use and to implement preventative measures aimed at educating those students regarding the negative consequences (Bae & Kerr, 2020; Blavos et al., 2019; Hall & Weier, 2015). Researchers also recommended that colleges establish marijuana user profiles (Bae & Kerr, 2020; Pearson et al., 2017). In 2018, the state of California legalized and decriminalized marijuana use. There is a gap in the literature regarding the frequency of marijuana use. Researchers have not investigated the frequency of marijuana use among California university students based on gender and ethnicity; therefore, the problem was a lack of knowledge regarding the frequency of marijuana use among California university students based on gender and ethnicity.

Purpose Statement

The purpose of this quantitative causal-comparative study was to determine the frequency of marijuana use by California university students based on gender and ethnicity. The quantitative causal-comparative design was appropriate for identifying the frequency of

marijuana use based on gender and ethnicity and for determining if differences existed between gender and ethnic groups. The frequency of marijuana use was the dependent variable while the independent variables were gender and ethnicity. Gender included male and female while the ethnic groups were African American, Asian, Caucasian, and Hispanic. The population for this study was college students who currently attend any one of the 23 California state universities.

Significance of the Study

Conducting this study was paramount as researchers found that almost 50% of college students in the United States had used marijuana (Miller et al., 2017). Researchers also found that marijuana use by college students increased on colleges campuses (Schmidt et al., 2016). The prevalence of marijuana use has increased to such an extent that it has become a socially acceptable norm (Vidourek et al., 2018). Yu et al. (2020) stressed the importance of gathering unbiased data about the frequency of marijuana use across student subgroups. They recommended that policymakers at IHL use their findings to minimize the adverse effects and promote informed and responsible marijuana use among students. Pearson et al. (2017) suggested that policymakers at IHL develop a user profile that includes marijuana use patterns across student subgroups. By developing a marijuana user profile, policymakers at IHL increase their capacity to implement policy measures targeted to promote the informed and responsible use of marijuana and to elevate persistence (Pearson et al., 2017). This study was critical because it determined the frequency of marijuana use by California university students based on gender and ethnicity.

Other researchers investigated the frequency of marijuana use across student subgroups. Salas-Wright et al. (2015) completed a study that used the National Survey on Drug Use and Health data from 2002-2013 to investigate the perceptions of marijuana use across multiple age

groups of the U.S. population. They found disapproval rates of marijuana use among 18- to 25-year-olds had dropped more than 40% over 11 years, and marijuana use rates in this segment of the population increased slightly each year. Like Salas-Wright et al. (2015), Schmidt et al. (2016) used National Survey on Drug Use and Health data from various age groups; however, their focus differed as they investigated the prevalence of marijuana in states that passed MML. They concluded that 18- to 25-year-olds developed permissive attitudes regarding marijuana use since their states passed MML and that 18- to 25-year-olds were two times more likely to view weekly marijuana use as insignificant in 2013 than they were in 2004.

Yu et al. (2020) also used National Survey on Drug Use and Health data, but their study was more extensive than Salas-Wright et al.'s (2015) and Schmidt et al.'s (2016) studies as they investigated the prevalence of marijuana use over 37 years (1979-2016). They found the prevalence of marijuana use among young adults increased by more than 30% from the early- to mid-1990s, when states began passing MML, to 2016. Given this increase, they recommended that researchers identify strategies to promote responsible marijuana use. According to Johnson et al. (2015), because the United States continues to pass MML and RML, tracking patterns of use and developing strategies to prevent negative consequences is paramount.

Although researchers have investigated marijuana use among young adults since the passage of MML (Schmidt et al., 2016; Yu et al., 2020), they have not investigated the frequency of marijuana use among students who attended any of the 23 California state universities across demographic subgroups. Policymakers at these universities could use that baseline data to obtain facts on the frequency of marijuana use on their campuses, develop marijuana user profiles, and develop policies to mitigate negative consequences. Those policies could help improve

conditions, lives, and the work environment at colleges and universities in the state of California and colleges and universities across the United States.

Research Questions

RQ1: Is there a difference in the frequency of marijuana use by California university students based on gender?

RQ2: Is there a difference in the frequency of marijuana use by California university students based on ethnicity?

Definitions

1. *Academic performance* – This is the measurement of student achievement across subjects, and it includes classroom performance on grades, performance on tests, and graduation rates (Tinto, 1975).

2. *Cannabis sativa plant* – This is a green leafy plant used to produce hemp fiber and is also used as a mind-altering drug because it produces small and large amounts of tetrahydrocannabinol (THC). It has a dried preparation and a resinous extract version, and it can be smoked or consumed in food (Drug Enforcement Administration (DEA), n.d.).

3. *Cannabis indica plant* – This is a green leafy plant used as a mind-altering drug since it produces large amounts of THC. The higher THC levels produce euphoric effects and make it popular for use as a recreational and medicinal drug. It has a dried preparation and a resinous extract version, and it can be smoked or consumed in food (DEA, n.d.).

4. *Delta-9 tetrahydrocannabinol (THC)* – This is a crystal-like substance that is the main active ingredient in cannabis; it is responsible for psychological effects (CDPH, n.d.).

5. *Hemp* – This is a variation of the cannabis sativa plant; this variation contains 0.3% or less THC. It includes the seeds and stems and all derivatives, extracts, or resins (CDPH, n.d.).

6. *Institutional performance* – This is the standard by which accreditation committees evaluate the health of an institution they use persistence and graduation rates to determine institutional performance (Kinzie & Hurtado, 2017).

7. *Illicit drugs* – These are drugs that are forbidden by law, rules, or custom (Yu et al., 2020).

8. *Marijuana* – This is a variation of the cannabis sativa or indica plant; this version consistently contains greater than 0.3% of THC. The higher THC levels produce euphoric effects and make it popular for use as a recreational and medicinal drug. The plant has a dried preparation and a resinous extract version, and it can be smoked or consumed in food (DEA, n.d.).

9. *Medical marijuana laws* – These are a series of laws passed that were designed to legalize the possession, use, cultivation, and sale of marijuana for medical purposes (Yu et al., 2020).

10. *Persistence* – This is a measure of undergraduate students' overall degree completion rate (Tinto, 1975).

11. *Recreational marijuana laws* – These are a series of laws legislators passed to legalize the possession, use, cultivation, and sale of marijuana for recreational purposes (Pearson et al., 2016).

12. *Trafficking* – This is the act of moving materials, persons, or products for illegal purposes (World Health Organization, 2020).

CHAPTER TWO: LITERATURE REVIEW

Overview

This chapter presents a review of literature pursuant to the topic. The first section includes a description of the theoretical framework and its application. The following section is a review of the related literature. This chapter includes a description of the gap in the literature. The final section is a summary of the chapter.

Theoretical Framework

The theoretical framework for this study was Tinto's social integration theory. Tinto (1975) rooted his theory in the concepts of Durkheim et al.'s (2002) theory of social integration. Durkheim et al. believed the degree to which individuals integrated into society was a predictive factor of their risk of suicide. Durkheim et al. reasoned that a supportive social network and feelings of connectedness to society were protective factors against suicide while the lack of a social network and feelings of disconnectedness were contributive factors. Durkheim et al. used a quantitative comparative analysis in their investigation of suicide. They found there were mechanisms in society that exerted a force on people. The mechanisms that exerted a force on people were people's norms, beliefs, and values. The mechanism Durkheim et al. described included the desire or need of a person to fit within society. The mechanisms were how people interacted, what they believed, and what they valued. Durkheim et al. believed these mechanisms worked together with the norms, beliefs, and values of the people in society, and a person's need to fit in created a shared manner of behavior in that society. The shared manner of behavior included what people believed was acceptable behavior or what they respected. An example would be wearing a formal suit in the workplace instead of a casual outfit or showing respect to people who obtain a formal education. Durkheim et al. believed the shared manner of behavior

bound people together and made them more socially integrated. Durkheim et al. discovered that when people did not conform to the acceptable behaviors of others, they became more socially isolated, and the rate of suicide increased.

Tinto (1975) believed a college was a social system with norms, beliefs, and values, and the members of this social system adopted those norms, beliefs, and values and created a shared manner of behavior. He conducted a review of the literature and developed an explanatory longitudinal model. He compared group means of college students and sought to understand why some did not finish college. He found an inextricable link between integration and persistence as students who felt socially and academically integrated at their institutions of higher learning (IHL) were more likely to persist in their studies and graduate. According to Tinto, student persistence is one of the most important measures for assessing the performance of IHL.

Because student persistence is a key measure of IHL performance, Tinto (1975) described the factors influencing degree completion rates. He wanted to ensure policymakers had a clear understanding of the factors influencing students' degree completion rates. He believed Durkheim et al.'s (2002) theory could help identify the factors influencing students' degree completion rates. Tinto reasoned that because the college social system was like the broader society described by Durkheim et al. (2002), he could use his social integration theory to identify the factors that influenced them. By identifying those factors, policymakers could create policies to improve degree completion rates among subgroups of college students and improve IHL performance (Tinto, 1975).

Persistence

Persistence is a measure of students' ability to complete their degrees and of IHL performance (Tinto, 1975, 2017). Tinto (1975) determined that researchers did not adequately

define persistence. He found that prior researchers limited their definition of persistence to the percentage of students who returned to their IHL for the next academic year, and they did not distinguish those students who failed academically and withdrew from college from those students who transferred to other schools. Tinto believed that to understand persistence, researchers should determine the demographic characteristics of students who exhibited low levels of persistence. He conducted a quantitative causal-comparative study and determined that men had a higher rate of persistence in college than women, and students from minority backgrounds had lower persistence rates than students from Caucasian backgrounds.

Tinto found persistence differed across gender and ethnicity, and he sought to understand the factors contributing to those differences. The first factor Tinto (1975) found contributing to differences across gender and ethnicity was social integration. Tinto found that men with high rates of social integration had higher persistence rates in college than women with high rates of social integration. Tinto noted that social integration encompassed interactions with peers, faculty, and administrators. Social interactions with peers occurred at sorority and fraternity parties or extracurricular activities. Social interactions with faculty and administrators occurred in the classrooms and during faculty and administrative led events. Tinto discovered that interactions increased when the interests and value systems of the students aligned with those of the IHL.

The second factor contributing to differences in persistence was the students' motivation to complete their degree, and a subfactor of motivation was commitment. Tinto (1975, 2017) found a link between persistence and motivation in that students' level of motivation increased if their parents were actively involved in their education. Tinto attributed the increase in motivation to the shared beliefs between students and their family members regarding education and the

quality of family relationships. He also concluded that students' commitment to completing their degree increased when a family member completed college. Since ethnicity encompasses individuals' beliefs and values, family and ethnicity are intertwined; thus, Tinto concluded that commitment and ethnicity impacted persistence.

Because Tinto (2017) believed students' commitment to completing their degree and motivation level impacted persistence, he sought to explain it. He identified and described the factors that were important from students' perspectives, not the institutions. He determined that most students were committed to completing their degree, but they had to believe in their ability to succeed. He indicated that the ethnic groups to which students belonged were reminders of negative stereotypes associated with ethnicity and undermined their ability to succeed. The negative stereotypes included poor academic records and being a first-generation or low-income college student (Tinto, 2017). Tinto (2017) found a significant gap in persistence between Caucasian students, who were the majority, and minority students. He identified two critical factors to increase persistence for minority students: self-efficacy and social integration. He described self-efficacy as students' personal belief in their ability to achieve and social integration as their level of engagement. Tinto defined students' level of engagement as their perceptions of the depth of their relationship with peers, faculty, and administrators. He then determined that the depth of their relationship promoted a sense of belonging; consequently, students immersed themselves in their IHL and exhibited an increased level of commitment to academics and persistence in completing their degree (Tinto, 2017).

The third factor contributing to differences in persistence was grade performance. Tinto (1975) determined that past grade performance in high school was a strong predictor of grade performance in college. He indicated that grade performance and academic performance were

similar. Grade performance is the measure instructors use to gauge students' ability and understanding of classroom assignments and tests. Academic performance is an overall measure of students' course grades, grade point average, and degree completion rates (Tinto, 1975). Tinto (1975) found that academic performance increased when students became integrated into the intellectual environment. The intellectual environment included academics and interactions with faculty and administrators.

Tinto (2017) underscored the need for IHL to measure institutional performance by understanding the factors influencing students' persistence to degree completion, and he believed there was a link between a students' rate of persistence and the performance of IHL (Kinzie & Hurtado, 2017; Tinto, 1975, 2017). Kinzie and Hurtado (2017) reviewed the National Survey of Student Engagement to determine its usefulness as a tool to support data-informed decision-making. They concluded that data on college students' level of persistence to complete college was a measure used to determine the performance and health of IHL.

Researchers found that several factors that contributed to differing degrees of persistence were prevalent in college students who frequently used marijuana. Those factors included social integration, family or ethnicity, and academic performance. Geiger-Oneto and Simkins (2017) found that college students who had a positive attitude toward marijuana use, whether they consumed marijuana or not, experienced increased social acceptability among their peers. Vidourek et al. (2018) discovered that 75% of marijuana users had a family member who used marijuana. Blavos et al. (2019) determined that college students who frequently used marijuana exhibited poor academic performance and had low levels of persistence. Since the factors contributing to varying degrees of persistence are prevalent in college students who frequently use marijuana, Tinto's social integration model was used to determine what factors were

important to investigate. Researchers found that marijuana use among college students has increased since the passage of medical marijuana laws (MML) and recreational marijuana laws (RML) (Bae & Kerr, 2020; Blavos et al., 2019; Miller et al., 2017). College administrators are responsible for developing policies to assist students with completing college and improving the performance of IHL (Kinzie & Hurtado, 2017), and California state university administrators do not have guidelines on what is needed to assist college students who frequently use marijuana.

Like Durkheim et al. (2002), Tinto (1975) believed colleges and society have members who create norms, beliefs, and values and a shared manner of behavior. In his literature review, Tinto noted that prior research described the processes but not the behaviors that resulted in lower levels of persistence; therefore, Tinto sought to develop a theoretical model wherein he identified the behaviors that led to lower levels of persistence. He determined that the demographic characteristics of gender and ethnicity must be analyzed and means compared across demographic groups. He explained why students had varying levels of persistence across the demographic subgroups of gender and ethnicity. His comparison of group means revealed that school administrators should target their intervention and prevention strategies toward subgroups of students at risk of not completing their degrees. His theory was appropriate for this study because the California state university social system is like the social system Tinto described. The California state university system is composed of four-year universities, and it is the largest system in the United States (California State Universities (CSU), n.d.).

By identifying the frequency of marijuana use based on gender and ethnicity, the capacity of California university leaders to establish a user profile of college students who frequently use marijuana may increase. A user profile could target prevention measures designed to identify and help at-risk students.

Related Literature

This review of the related literature provides an overview of the evolution of marijuana and the progression of marijuana use across the United States. Although researchers had investigated the frequency of marijuana use by college students before and after the passage of the MML and RML and compared the frequency of marijuana use among college students within and across states (Bae & Kerr, 2020; Miller et al., 2017), they have not investigated the frequency of marijuana use by California university students based on gender and ethnicity. Researchers found that college students who frequently used marijuana had poor academic performance and low levels of persistence (Blavos et al., 2019); they also determined that students' level of persistence is a measure of performance for IHLs (Kinzie & Hurtado, 2017; Tinto, 1975, 2017). School administrators at IHL ensure college students have the requisite resources to persist in college (Kinzie & Hurtado, 2017; Tinto, 1975, 2017). School safety mandates require administrators to develop policies to assist students who may be at risk of drug use or abuse (Safe Supportive Learning, n.d.). The targeting process should consist of developing a user profile that includes a determination of the frequency of use across subgroups and the negative consequences associated with frequent marijuana use (Pearson et al., 2017).

The Fundamentals of Marijuana

The fundamentals of marijuana include where it was discovered, the plant family to which it belongs, its uses, how it affects people, and how it was legally classified. Researchers traced the origin of marijuana back over 4,000 years and found it was a medical remedy (Horn et al., 2018). Moreno-Rius (2019) discovered cannabis emanated from the Cannabaceae (*cannabis sativa*) family of plants, which are prominent in the Himalayas. The *cannabis sativa* plant's medicinal properties are released through different preparations; these properties are responsible

for the psychoactive effects people experience (Drug Enforcement Administration (DEA), n.d.). Tetrahydrocannabinol (THC) is the chemical property responsible for producing psychoactive effects in people, and the amount of THC determines the strength of its effects (Babayeva et al., 2016). When THC concentrations are high, the psychoactive effects of marijuana increase (Babayeva et al., 2016; DEA, n.d.).

Since the psychoactive properties in the cannabis sativa plant had varying psychoactive effects, scientists, and lawmakers sought to legally distinguish it by the effects (Babayeva et al., 2016). Scientists and lawmakers legally distinguished the cannabis sativa plant into two groups: marijuana and hemp (Babayeva et al., 2016). The level of THC present after the plant preparation process and before consumption legally distinguished marijuana from hemp, with marijuana having a THC of greater than 0.3% and hemp has a THC of 0.3% or less (World Health Organization (WHO), 2020). When THC levels are high, marijuana will produce greater psychoactive effects than hemp (Babayeva et al., 2016; DEA, n.d.).

History of Marijuana Use in the United States

The history of hemp and marijuana in the United States are intertwined. The history goes back to the early 1600s when the colonists grew hemp on their farms as an industrial product to make rope, sails, and clothing. Throughout the 1600s, hemp was also grown and used as legal tender in Pennsylvania, Virginia, and Maryland (Public Broadcasting System (PBS), n.d.). The practice of cultivating hemp as an industrial product in America continued into the early 1900s. In addition to an industrial product, hemp was also used as a medicinal product. Thallman (2019) noted that before the early 1900s, marijuana was not part of the American lexicon; hence, Americans referred to the psychoactive version of the cannabis sativa plant as cannabis, and they often used it as a medicinal product. Before 1905, the United States did not regulate the sale and

use of cannabis, and it was readily available at public pharmacies (Thallman, 2019). In the early 1900s, state legislatures were concerned about the increased availability of cannabis and the potential implications of cannabis use. In 1906, the U.S. Congress passed the Pure Food and Drug Act to regulate cannabis use by requiring manufacturers to label drugs containing it (PBS, n.d.; Thallman, 2019).

Between 1910 and 1920, a distinction emerged between marijuana and hemp, with Americans perceiving marijuana as an illicit drug and hemp as a useful industrial product (PBS, n.d.; Thallman, 2019). The term hemp re-emerged in the American lexicon during World War II when the U.S. Armed forces ran low on military supplies that contained hemp. The U.S. Department of Agriculture partnered with the U.S. Armed Forces and granted deferments to draft-eligible farmers who agreed to produce hemp. After World War II, hemp production and use dissipated while marijuana use increased, and by 1950, marijuana became one of the most used illicit drugs in the United States (DEA, n.d.; Thallman, 2019).

As the prevalence of marijuana use across the United States increased in the early 1950s, the U.S. Congress passed the Boggs Act of 1952 and the Narcotics Control Act of 1956. By passing these acts, Congress established mandatory jail sentences for drug-related offenses, one of which was the possession of marijuana (Yu et al., 2020). In the late 1960s, 11 states sought to decriminalize marijuana use by reducing mandatory jail sentences for possessing small amounts of marijuana. In the early 1970s, Congress lobbied for the decriminalization of marijuana; however, President Nixon rejected Congress's proposal and declared a war on drugs.

In the early 1980s, President Reagan and his wife expanded the war on drugs by establishing an anti-drug campaign titled *Just Say No*, thereby setting the stage for zero-tolerance policies for drug trafficking across U.S. borders (Yu et al., 2020). In 1986, President Reagan

signed the Anti-Drug Abuse Act into law, thereby further criminalizing the use of marijuana. In 1989, President Bush continued the war on drugs by implementing the Student Drug Testing Program, which increased public schools' authority to drug test students (Thallman, 2019).

While the Nixon, Reagan, and Bush Presidential administrations declared a war on illicit drug use, medical professionals sought to legalize the use of marijuana for medical purposes (Petersen, 2016). Between 1978-1992, medical professionals partnered with the U.S. Government and established the Compassionate Investigational New Drug Program, which allowed patients with human immunodeficiency virus and other ailments to experiment with medical marijuana. In 1992, the U.S. Government discontinued the Compassionate Investigational New Drug Program (Petersen, 2016). In 1993, President Clinton supported the war on drugs but later advocated for drug treatment over mandatory jail sentences for marijuana users (Yu et al., 2020). Between 1993-1994, U.S. Surgeon General Joycelyn Elders recommended that the Federal Food and Drug Administration decriminalize marijuana for medical purposes. Congress and President Clinton opposed the U.S. Surgeon General's recommendation to decriminalize marijuana for medical purposes (Yu et al., 2020).

Legalization of Marijuana Use in California

Efforts to legalize marijuana in California began in 1991 when voters from one large city approved Proposition P. By approving Proposition P, voters wanted the state legislature to pass legislation that would allow physicians to prescribe marijuana for medical purposes (Petersen, 2016). Members of the medical community supported the legislation as they wanted to alleviate the pain and suffering associated with acquired immune deficiency syndrome and other medical conditions. Although close to 80% of the city's voters approved Proposition P, Governor Pete Wilson vetoed it (Petersen, 2016). From 1991 to 1996, California voters initiated the referendum

process and created Proposition 215. The voters secured 400,000 signatures and Proposition 215 was placed on the November 1996 ballot (Petersen, 2016).

In 1996, California voters approved, and the California State Legislature passed Proposition 215 (Hall & Weier, 2015), thereby legalizing marijuana use for diseases and medical conditions including acquired immune deficiency syndrome, cancer, multiple sclerosis, and Parkinson's disease (Babayeva et al., 2016). A review of the related literature revealed that public opinion across the United States regarding the legalization of marijuana shifted significantly over 30 years, with 30% supporting legalization in the mid-1990s, 40% supporting it in 2009, and 64% supporting it in 2017 (Geiger-Oneto & Simkins, 2017). Researchers attributed the shift in public opinion to Americans recognizing the community benefits of legalizing marijuana (Geiger-Oneto & Simkins, 2017). The community benefits included reducing law enforcement costs and increased tax revenues (Geiger-Oneto & Simkins, 2017).

In 2016, the California State Legislature passed the Adult Use of Marijuana Act (California Department of Public Health [CDPH], n.d.). Through passing the Adult Use of Marijuana Act, the California State Legislature gave persons over the age of 21 the right to grow, possess, and use marijuana for non-medical purposes, and the legislature established a scientific distinction between hemp and marijuana (CDPH, n.d.). In 2017, the California Health and Safety Code defined hemp or industrial hemp as a cannabis sativa plant with no more than 0.3% of THC and marijuana as a cannabis sativa plant with greater than 0.3% of THC (Health and Safety Code, California, n.d.). The California Department of Food and Agriculture regulates the THC part of hemp while the California Business and Professions Code regulates the other parts of the cannabis sativa plant, whether in seeds, resin, any mixture, food, or drink (Health and Safety Code, California, n.d.).

The Impact of MML and RML on Marijuana Use in the United States

The passage of MML and RML legalized the possession and use of marijuana in the United States; consequently, researchers sought to understand the effects of legalizing marijuana. Geiger-Oneto and Simkins (2017) used an original survey to investigate Americans' support of the legalization of marijuana. They used a structural equation model to analyze the results. They discovered that over 47% of the participants had used marijuana in their lifetime. Geiger-Oneto and Simkins also found that marijuana users supported its legalization more than non-marijuana users, and users were likely to consume marijuana regardless of legality; conversely, non-users were unlikely to consume marijuana even if it became legal in their state. They discovered that non-users who supported legalization believed the potential for increased community benefits necessitated legalization. Geiger-Oneto and Simkins defined community benefits as a reduction in the costs of enforcing marijuana regulations and increased tax revenues. They determined that the legalization of marijuana did not impact marijuana use behaviors. They indicated that a limitation of their investigation was using a cross-sectional survey design and many female participants (70%). Geiger-Oneto and Simkins recommended that future research focus on the impact of legalization and the community benefits.

While Geiger-Oneto and Simkins (2017) investigated why Americans supported the legalization of marijuana, Schmidt et al. (2016) investigated whether legalization affected users' and non-users' attitudes about marijuana use. They conducted a cross-sectional analysis of a nationally representative sample from 2004-2013. The instrument they used to assess users' perception of risk was the National Survey on Drug Use and Health. They found that students aged 18-25 did not perceive weekly marijuana use as risky behavior. They also compared the perceptions of marijuana use among one group of students aged 18-25 in 2004 and another group

of students aged 18-25 in 2013 and found the latter group of students were almost 2.5 times more likely to report that frequent marijuana use was not risky behavior. Schmidt et al. agreed with Geiger-Oneto and Simkins (2017) that legalization was not likely to impact marijuana use behaviors. They indicated a limitation of their investigation was an underreporting of use and perceptions of risks. Schmidt et al. recommended that future research focus on legalization and the impact on students' perceptions.

Other researchers investigated the impact MML and RML had on public health and safety (Lake et al., 2019; Maier et al., 2017). Lake et al. (2019) investigated the legalization of marijuana and its impact on public safety. To identify public safety concerns, they reviewed five scientific databases from Canada and the United States, including Medline, Embase, Academic Search complete, Cumulative Index to Nursing and Allied Health Literature, and Web of Science. Lake et al. used arrests rates to assess the impact on public safety. The research in Canada was limited since most of it was completed before legalization. They determined that one in three persons aged 18-24 used marijuana in Canada, and 81% of drug offenses by youth aged 12-17 was for marijuana-related offenses. Marijuana-related offenses included possession, use, and other convictions linked to marijuana use. They found differences between users' arrest rates across the subgroups of age and ethnicity in the United States.

Lake et al. (2019) also determined that ethnic minority's marijuana-related arrests decreased by more than 80% after Washington and Colorado state legislatures legalized it. After the legalization of marijuana, adult arrests for use and possession fell below 80%, but in Colorado, youth aged 12-17 experienced a 2% increase in arrests. In addition, African American and Hispanic youth arrests increased more than any other youth group by over 4%. Lake et al. agreed with Geiger-Oneto and Simkins (2017) and Schmidt et al. (2016) that legalization did not

impact use behaviors. They found unanticipated improvements to public health and safety. The improvements included reductions in opioid use, drug use disorders, and a reduction in motor vehicle fatalities. Lake et al. recommended that after marijuana-related regulations change, patterns of arrests across subgroups of students be monitored.

Lake et al. (2019) investigated the impact of legalization on public safety using arrest data from two states. In contrast, Maier et al.'s (2017) study was more extensive than Lake et al.'s (2019) study since they used data from all 50 states over 4 years. They investigated the relationship between crime and arrest rates and the legalization of marijuana. Maier et al. found that after legalization, there was a lower rate of property-related crimes like burglary and larceny. However, unlike Lake et al. (2019), they could not link legalization to use behaviors using arrest rates. Maier et al. (2017) concluded that the relationship between the legalization of marijuana and arrest rates was very complex. They attributed the complexities to the variations in reasons why people commit crimes, but they were unable to determine what reasoning contributed to a person's decision to commit a crime. They indicated that a limitation of their investigation was that only two states had legalized marijuana, which resulted in a minimal amount of information on the effect. Maier et al. recommended that future research focus on changes in MML and RML and changes in crime and arrest rates.

Researchers across the United States investigated the impact of MML and RML. Yu et al. (2020) investigated the relationship between the change in MML and RML and the frequency of marijuana use. They used an age-period-cohort model to analyze the National Survey on Drug Use and Health data and reviewed data over 37 years. They compared the changes in MML and RML and the frequency of marijuana use. Yu et al. found that marijuana use increased proportionately with the passage of MML and RML. They disagreed with Lake et al. (2019) and

Geiger-Oneto and Simkins (2017) that legalization efforts had no impact on marijuana use-related behaviors. They found that the periods of variation of MML and the frequency of marijuana use were statistically significant, but the periods of variation of RML and the frequency of use were not statistically significant. They concluded that increases in the frequency of marijuana co-occurred with fluctuations in MML and RML. Yu et al. attributed the co-occurrence to the changes in MML and RML.

Frequency of Marijuana Use Among College Students

Researchers used various designs, conducted studies in various settings, and included different sample sizes to investigate the frequency of marijuana use among college students. Researchers compared the frequency of marijuana use before and after the passage of MML and RML and across the demographic variables of gender, ethnicity, and relationship. This section is a review of those researchers' findings.

Miller et al. (2017) investigated the frequency of marijuana use among college students who attended a state university in the Pacific Northwest after the passage of MML and RML. They used a repeated cross-sectional survey design and included data from the National College Health Assessment. They found that the frequency of marijuana use increased from 12 to 22% after the passage of the RML and MML. Miller et al. compared marijuana use across gender within the past 30 days and found male students were between 2 to 7% more likely to self-report marijuana use than females, but after the passage of RML, females were more likely to fall into the higher increase of use category than males. Across ethnicity, Miller et al. found African American and Caucasian college students primarily fell into the highest use category, and Asian students primarily fell into the lowest use group.

Although Caucasian college students fell into the highest use category, Miller et al. (2017) found they did not fall into the highest use group after the passage of the RML. Other noteworthy findings included the following: (a) African American and Hispanic college students consistently fell into the highest use group, with the use rates increasing by 14% in 2014 alone representing an 88% increase for African American students and a 93% increase for Hispanic college students; (b) the increase in use rates was statistically significant for Hispanic college students but not for African American college students; (c) the increase in use rates for African American and Hispanic college students were 8 to 9 times greater than Asian and Caucasian students after the passage of RML. They concluded that marijuana use among college students increased after the passage of RML. Miller et al. determined the generalization of their findings was limited as they investigated only one university and recommended future research focus on more universities, in more states with differing levels of MML and RML and use a within-subjects design.

Like Miller et al. (2017), Park et al. (2021) sought to determine the frequency of marijuana use among college students at one university after the passage of RML; however, and unlike Miller et al. (2017), Park et al. (2021) compared the frequency of use by gender. They used two regression analyses: one with only women and another with only men. Park et al. compared the students' frequency rates across three time periods: (a) within the past 30 days, (b) 12 months, and (c) over a lifetime. Their findings aligned with Miller et al.'s (2017) findings as men had higher use rates than women. Park et al. attributed the differences between men and women to psychological factors, including peer association and women's knowledge of the medical-related consequences of frequent marijuana use. Park et al.'s study was limited in scope as they included students from only one university, thereby limiting the generalizability of their

findings. Park et al. stressed the need to expand the body of knowledge regarding the frequency of marijuana use at universities by using random sampling procedures and investigating other demographic variables and their influence on marijuana use among college students.

While Miller et al. (2017) and Park et al. (2021) investigated the frequency of marijuana use after the passage of MML and RML and across various subgroups of users, Bae and Kerr (2020) investigated the frequency of marijuana use among college students before and after the passage of RML. Their investigation was more extensive than Miller et al.'s (2017) study and Park et al.'s (2021) study because they included a random sampling of college students from 48 states. Bae and Kerr (2018) used pre-existing data from the 2008-2018 National College Health Assessment II. They used a logistic regression model and found marijuana use increased among college students who attended colleges in states with RML. Bae and Kerr agreed with Miller et al. (2017) and Park et al. (2021) that male college students were more likely to fall into the highest use category than females, and females were more likely to fall into the highest increase in use category after RML. They noted that their findings might lack generalizability because of their low response rate and their use of a cross-sectional design. Bae and Kerr recommended that future research focus on the frequency of marijuana use as users emerge into adulthood and include the status of MML and RML in various states.

While Bae and Kerr's (2020) research investigated the frequency of marijuana use before and after the passage of RML and included 48 states, Pearson et al. (2016) investigated the frequency of marijuana use among college students from 11 universities in states with varying policies regarding the legality of marijuana. Their sample was composed of students from the 11 universities' psychology departments who had consumed marijuana 30 days before the study. Pearson et al. created a marijuana use questionnaire to determine the frequency of marijuana use.

They discovered that over 50% of college students had consumed marijuana during their lifetime. In addition, they determined that the average use rates over the previous 30 days were over 25%. Pearson et al. also discovered a positive correlation between the frequency of marijuana use and use-related consequences. They found that nearly one in 10 students reported experiencing 19 or more (out of 50) negative consequences associated with the use of marijuana. The consequences were as follows: (a) driving a car while high; (b) saying or doing embarrassing things; (c) consuming marijuana when they had no plan to use marijuana; (d) feeling unsteady, sluggish, or in a fog the morning after marijuana use; (e) injuring someone; (f) getting into physical fights; (g) having unprotected sex; and (h) damaging property or doing something disruptive. A limitation of their study was an overrepresentation of females in their sample (67%). They suggested that future research focus on establishing guidelines for safe use of marijuana and “antecedents and sequels” to use (p. 88).

Pearson et al. (2017) conducted a follow-up study that included the same sample as Pearson et al.'s (2016) study; however, in their 2017 study, they distinguished subpopulations of marijuana users and determined the traits the students exhibited. They discovered that college students who frequently used marijuana were heterogeneous and exhibited a diverse range of traits, and by identifying those traits through latent profile analysis, colleges increased their capacity to develop targeted intervention strategies. Pearson et al. (2017) agreed with Miller et al. (2017), Park et al. (2021), and Bae and Kerr (2020) that females had a higher increase in use rates than males after the passage of RML.

Researchers investigated the frequency of marijuana use at different college campuses and found college students exhibited a diverse range of traits and behaviors (Pearson et al., 2017). In contrast, Pro et al. (2018) investigated the relationship between the frequency of

marijuana use and microaggressions among college students. They randomly selected non-Caucasian students who attended a large university in the Midwest United States. Pro et al. used the 28-item Racial and Ethnic Microaggressions Scale to assess the frequency of microaggressions and conducted a logistic regression analysis to assess the relationship between microaggressions and marijuana use among students. Microaggressions included five scales: (a) assumptions of criminality, (b) assumptions of inferiority, (c) assumptions of similarities (like food choices), (d) microinvalidations; for example, someone says, “I don’t see color,” and (e) media microaggressions; this could include someone commenting on a person of a certain ethnicity being portrayed positively in a movie (p. 379). College students who used marijuana at least once a month were considered regular marijuana users.

Pro et al. (2018) found that approximately one-third of college students used marijuana at least once a month. They agreed with Miller et al. (2017) and Park et al. (2021) that males had higher use rates than females. Pro et al. (2018) disagreed with Miller et al. (2017) that Asian students routinely fell into the lowest use group. Pro et al. (2018) also concluded that ethnic minority men suffered more racial microaggressions than women. Racial microaggressions are verbal or behavioral slights or insults (Sue et al., 2007). These insults stem from a misunderstanding by one racial group of another racial group's beliefs, values, or behaviors (Sue et al., 2007). A limitation of their study was the low response rate (4%). Pro et al. recommended that future research investigate the frequency of marijuana use and racial microaggressions, micro invalidations, and media microaggressions.

While Pro et al. (2018) focused on the relationship between the frequency of marijuana use and microaggressions, Wright et al. (2021) investigated the frequency of marijuana use and the relationship between marijuana use and psychotic experiences, including the prevalence of

hallucinations and delusions. They used a cross-sectional design and randomly selected approximately 100 students from one college in a large city in the Northeast United States between 2010 and 2017. They used various statistical tests to assess the frequency of weekly marijuana use for the previous month. The frequency of marijuana use was assessed by “either the Substance Use Questionnaire or the Consumptive Habits Questionnaire-Revised” (p. 199). Wright et al. agreed with Miller et al.’s (2017), Park et al.’s (2021), and Pro et al.’s (2018) findings that males were more likely to use marijuana than females ($M = 0.80$ vs. $M = 0.38$). They concluded that participants who frequently used marijuana were more likely to have “hallucination experiences and delusional ideation” (p. 202). The limitations of Wright et al.’s (2021) study include: (a) incomplete responses by participants, (b) a disproportionately high female population (71%), (c) the inability to generalize findings because of the use of a cross-sectional design, and (d) the limited scope of the study’s sample (only one university). Wright et al. recommended that future research investigate the relationship between the frequency of marijuana use, doses, and psychotic experiences.

As researchers investigated the relationship between frequent marijuana use and mental health, Patterson et al. (2020) investigated the frequency of marijuana use as it related to alcohol use. They used a random sample of college students from two community colleges, four public 4-year universities, and one Historically Black College and University in the Southeast United States. Patterson et al. used a cross-sectional design and included a sample of approximately 3,400 students. They determined the frequency of marijuana use over four months and used bivariate analyses to determine the frequency of co-users (alcohol and marijuana) and marijuana users. They found that students who were co-users of marijuana and alcohol had the highest use rates.

Patterson et al.'s (2020) findings concerning gender were the same as Miller et al.'s (2017), Park et al.'s (2021), Pro et al.'s (2018), and Wright et al.'s (2021) findings as males had higher marijuana use rates than females. They also discovered that frequent marijuana use was associated with attending a historically Black college but was not directly associated with being African American. They attributed the association with attending a historically Black college and the lack of an association with being African American to a lack of research on the frequency of marijuana use at historically Black colleges. Wright et al. noted that the inclusion of colleges from only one southeastern state and the low survey response rate were limitations, and these limitations negatively influenced the generalizability of their findings. Comparing the marijuana use rate only and the combined alcohol-marijuana use rate was not possible because of the low survey response rate. They recommended that future research focus on creating education models to identify the psychosocial factors to reduce frequent alcohol and marijuana use.

While several researchers focused on the frequency of marijuana use and the varying ethnicities of the user, Mercado et al. (2017) investigated the frequency of marijuana use, by Mexican American college students and acculturation. Acculturation included changes in behavior that occurred because of interactions between two cultures. Their sample was composed of students from a medium-sized Hispanic-serving institution on the Texas-Mexico border. Approximately 75% of the sample population were females, and all participants were of Hispanic American ethnicity.

Mercado et al. (2017) used a single-item inquiry method to assess the frequency of marijuana use "at the present time" (p. 283). They used logistic regression analyses across variables. Mercado et al. agreed with Miller et al. (2017), Park et al. (2021), Pro et al. (2018), and Wright et al. (2021) that the frequency of marijuana use was lower among females than

males ($p < .001$). Mercado et al. also found a negative association between acculturation level and marijuana use across gender, with a higher acculturation level resulting in a lower level of marijuana use. They attributed the negative association to the increased level of academic achievement and social integration among students who attended the IHL. The limitations of this investigation included the use of a single inquiry to determine the frequency of marijuana use and a low response rate. Mercado et al. recommended that future research use multiple methods of assessing the frequency of marijuana use and include participants from various age groups, different geographical locations, and different ethnicities.

While researchers focused on acculturation by Mexican American college students, Ecker et al. (2019) investigated the influence that ethnicity and the norms of parents and friends had on the frequency of marijuana use. They used a random sample of college students from two universities in the Northeast United States. Their sample was predominantly female because one of the two universities admitted only female students. Concerning race, approximately 86% of the sample was Caucasian.

Ecker et al. (2019) used the "Marijuana Use Form" to determine participants' frequency of marijuana use in the past three months and throughout their lives (p. 15). They used the "Core Institute's Campus Assessment of Alcohol and Other Drug Norms" to assess the frequency of marijuana use among the participants' friends (p. 15). The Core Institute's Campus Assessment of Alcohol and Other Drug Norms consisted of 8-point Likert-scale items, ranging from 0 = never used marijuana to 7 = used marijuana daily. A three-item questionnaire with response items ranging from 1 = strong disapproval to 7 = strong approval was used to assess participants' perceptions of their parents' and friends' responses to their regular marijuana use. Ecker et al. conducted an analysis of variance to determine the frequency of marijuana use across ethnic

groups. Their findings were consistent with Miller et al. (2017) that African American college students had a higher frequency of marijuana use than Caucasian students (3.01 vs. 4.71, $p = .022$).

Ecker et al. (2019) also found that African American student's marijuana use was linked to parental norms. When the perception of injunctive parental norms increased, marijuana use among African American students increased at a higher rate than Caucasian students. They determined that friends of the same gender tended to share commonalities in their frequency of marijuana use more than friends of different genders. Ecker et al. concluded that ethnicity and gender contributed to the frequency of marijuana use for college students. A limitation of their investigation included the use of a small number of male participants. They recommended that future research investigate the frequency of marijuana use across gender and identify predictors of marijuana use among historically underrepresented groups.

The Benefits of Marijuana Use

Recent trends in the legalization of marijuana led to increased use; as a result, researchers sought to understand the benefits (Babayeva et al., 2016; Bhattacharyya et al., 2017). Researchers found marijuana use had medical and mental health benefits for its users (Babayeva et al., 2016; Pergam et al., 2017). Babayeva et al. (2016) investigated the potential benefits of marijuana use on 339 patients with Parkinson's disease who received varying doses of THC (the active ingredient in marijuana) after the passage of MML. They determined that patients who received lower THC doses experienced hypnotic or calming effects, antipsychotic, antioxidant, and neuroprotective effects. They also found that THC was beneficial in treating the symptoms associated with cancer, acquired immune deficiency syndrome, glaucoma, chronic and severe pain, seizure/epilepsy, elevated heart rate, and multiple sclerosis. Babayeva et al. suggested

future research focus on the absence of standardization and regulation, dosing, side effects, and marijuana's potential interactions with other medical treatments.

While Babayeva et al.'s (2016) investigation was limited to patients with Parkinson's disease and occurred after the passage of MML, Pergam et al. (2017) focused on cancer patients. Pergam et al. used an anonymous cross-sectional survey of 926 adult cancer patients to investigate marijuana use after the passage of MML and RML. Pergam et al. agreed with Babayeva et al. (2016) as THC was beneficial in relieving medical symptoms by relieving pain and nausea or upset stomach. In addition, Pergam et al. found THC was beneficial in the treatment of anorexia, depression, and insomnia. They discovered that more than 65% of the patients had used marijuana before, over 20% were actively using marijuana in their treatment regimen, and 74% wanted additional information about marijuana from cancer service providers. More than half of the users indicated that the passage of MML and RML positively impacted their choice to use marijuana. They noted that cancer patients were more amenable to discussing marijuana as a component of their treatment regimen after the passage of the MML and RML. Pergam et al. determined their survey responses were limited because they only included English-speaking patients. Pergam et al. recommended that future research focus on designing educational resources for cancer patients and include the benefits.

Troup et al. (2016) investigated the relationship between the frequency of marijuana use and mood disorders by college students after legalization in Colorado. They used a cohort of 178 college students and conducted a 3-year longitudinal study. They agreed with Babayeva et al. (2016) in that THC was beneficial in treating depression and anxiety in Parkinson's disease patients. They also agreed with Pergam et al. (2017) as THC was beneficial in treating insomnia. They acknowledged several limitations with their study, including a small sample size, a lack of

control of the strength and type of phytocannabinoids, the use of self-reported data, ambiguity regarding participants' drug use, and the inconsistent definition of depression. Their recommendations aligned with that of Babayeva et al. (2016) concerning the need for standardizing doses. Troup et al. stressed the need to conduct further research on the effects of frequent marijuana use on mood disorders.

Like other researchers, Bhattacharyya et al. (2017) investigated the frequency of marijuana use and mood disorders, but they focused on whether THC caused anxiety or anxiety disorders. They examined 14 healthy male adults who did not have a family history of psychiatric illness and had minimum marijuana use. Their investigation was unique as it applied a singular stimulus of an instance of fear on healthy adults. They found that with a modest amount of THC, participants demonstrated an intense level of anxiety. They agreed with Babayeva et al. (2016) and Troup et al. (2016) regarding the benefit of the calming effects of marijuana seen in patients with Parkinson's disease. They noted limitations in the generalizability of their findings across users with variations in their patterns of use, doses, and genders. Bhattacharyya et al. suggested future research focus on marijuana use, anxiety disorders, target different traumas, and include different genders.

Several researchers investigated the relationship between marijuana use and medical and mental health disorders. Grigorian et al.'s (2019) study differed since they investigated outcomes with trauma patients hospitalized before and after the legalization of marijuana in California. They described the pre-legalization period as between 2013-2016 and the post-legalization period as 2017. They found that in the pre-legalization period, the number of THC-positive patients was 1,564, and in the post-legalization period, it was 491. They attributed the differences to the number of years, trauma center system changes, and additional hospital compliance

measures. Grigorian et al. found that the frequency of marijuana use (which was determined by THC in urine) was over 46% during the post-legalization period and 39% in the pre-legalization period, which represented a 7% increase. They agreed with Babayeva et al. (2016) that THC was beneficial in treating the symptoms associated with cancer, glaucoma, acquired immune deficiency syndrome, and multiple sclerosis. They also agreed with Babayeva et al. (2016) and Pergam et al. (2017) by concluding that THC was beneficial in treating chronic pain. They also concurred with Pergam et al. (2017) that THC was beneficial in relieving nausea and anorexia. Grigorian et al. noted the inability to generalize their findings as they included participants from a single trauma center in California. They recommended that future research focus on drug counseling and motivation.

The Risks of Marijuana Use

Recent trends in the legalization of marijuana led to increased use; as a result, researchers sought to understand the risks (Babayeva et al., 2016; Bhattacharyya et al., 2017). Babayeva et al. (2016) investigated marijuana use and Parkinson's disease. They found that patients who used THC were at risk of experiencing memory deficits, reduced attention spans, mood and anxiety disorders, elevated heart rate, and increased hunger. Several researchers determined that marijuana users experienced anxiety (Babayeva et al., 2016; Troup et al., 2016). Troup et al. (2016) investigated frequent marijuana use and mood disorders; they agreed with Babayeva et al. (2016) as marijuana users had an increased risk of experiencing anxiety. In addition, they indicated that infrequent users had a greater risk of experiencing depression and anxiety than frequent users. Troup et al. discovered that the frequency of marijuana use, or dose impacted patient outcomes. They attributed the impact to the range of phytocannabinoids consumed, an inability control dosage, and a lack of understanding regarding the potential effects.

Bhattacharyya et al. (2017) also agreed with Babayeva et al. (2016) and Troup et al. (2016) that marijuana users had an increased risk of experiencing anxiety. Bhattacharyya et al. (2017) examined 14 healthy male adults and found they demonstrated an intense level of anxiety when given a modest amount of THC. Bhattacharyya et al. recommended that future research should focus on marijuana use and anxiety.

While researchers investigated the frequency of marijuana use and medical and mental health disorders, Desai et al.'s (2018) investigation was more extensive than other researchers' investigations. They conducted a 5-year nationwide inpatient assessment of hospital admissions that included recreational marijuana users admitted to the hospital, their rates of mortality, and events associated with the cardiovascular system. Desai et al.'s examined data from the National Inpatient Sample from 2010-2014 and analyzed over 400,000 hospitalizations. Their demographic findings included a steady increase in marijuana use across genders, with males at over 60% and females at less than 37%. They found that over 30% of the admissions were related to the use of recreational marijuana; of those, 92% were in urban hospitals, 20% of the hospital admissions were for mood disorders, and 3% of the emergency admissions were for suicide. The prominent ethnic groups were Caucasian (54%), African Americans (31%), and Hispanics (9%). They agreed with Babayeva et al. (2016) that patients who consumed marijuana were at risk of experiencing an elevated heart rate. They also agreed with Babayeva et al. (2016), Troup et al. (2016), and Bhattacharyya et al. (2017) that marijuana users risked experiencing anxiety. They also discovered that patients risked experiencing "worse global functioning, longer durations of manic episodes, and increased suicidal ideations" (p. 11). A limitation of their study was the inability to determine causation as they used pre-existing data. Desai et al. recommended

clinicians include marijuana screening during hospital admissions, aftercare, and follow-up screening.

Researchers investigated medical and mental health risks and marijuana-related hospitalizations. In addition, they investigated the risks of frequent marijuana use on college students' academic performance (Blavos et al., 2019; Lake et al., 2019). Blavos et al. (2019) investigated the frequency of marijuana use among college students in 37 states after the passage of the MML. They used pre-existing data from the Core Alcohol and Drug Survey. They determined that college students who frequently used marijuana were 4% more likely to not do well on an exam, 19% more likely to earn a grade point average below a C and were at risk of not graduating. Blavos et al. concurred with Pearson et al.'s (2016) findings concerning the consequences of frequent marijuana use, as they found students were 35% more likely to be hurt or injured, 9% more likely to experience memory loss, and 9% more likely to engage in activity they later regretted. Blavos et al. recommended that future research investigate the impact of not only MML but also RML.

Wang et al.'s (2019) investigation was like Blavos et al.'s (2019) regarding the sample population but was more extensive. Their investigation included college students from all 50 states, and they examined the frequency of marijuana use by state relative to the passage of MML and RML. Their investigation included pre-existing data from the Researcher Abuse, Diversion, and Addiction-Related Surveillance System College Survey. They investigated the frequency of use in the previous 3 months. They agreed with Blavos et al.'s (2019) determination that students' who frequently used marijuana risked experiencing poor academic performance, which they described as higher levels of absenteeism, low-grade point averages, and low degree completion rates.

Wang et al. (2019) also found that students normalized marijuana use by not perceiving it as a risk to their mental health or financial well-being. Wang et al. concluded that if the legalization and decriminalization efforts in the United States continued, then college students' frequency of use and the normalization of their perceptions of risk would increase while their academic proficiency would decrease. They noted two limitations: a small sample size and the setting (2-year colleges and trade schools); hence, their findings may not be generalizable. Wang et al. recommended future research use longitudinal research to determine the impact of frequent marijuana use on academic performance.

The Literature Gap

There is a gap in the literature regarding the frequency of marijuana use by California university students. Researchers have not investigated the frequency of marijuana use among California university students based on gender and ethnicity. A review of the related literature revealed that marijuana use by college students increased and varied across demographic subgroups before and after the passage of MML and RML in various states (Bae & Kerr, 2020; Miller et al., 2017). Researchers found that college students' frequency of marijuana use was coincident with the change in marijuana legislation (Wang et al., 2019; Yu et al., 2020). Miller et al. (2017) found that marijuana use among college students nearly doubled from 12 to 22% after the passage of MML and RML. Researchers also concluded that male students self-reported higher use rates than females, but females had higher increases in use rates after the passage of RML (Bae & Kerr, 2020; Blavos et al., 2019; Miller et al., 2017). Researchers determined that before and after the passage of MML and RML, African American and Hispanic college students were more likely to have higher use rates than Caucasian students; as a result, they recommended future research focus on patterns of use and identify subgroups of student users (Bae & Kerr,

2020; Miller et al., 2017). Researchers also recommended that future research investigate the impact of the passage of MML and RML. Researchers determined that the implementation process associated with MML and RML should include provisions for the health and safety of college students (Bae & Kerr, 2020; Pro et al., 2018).

Summary

Historically, marijuana legislation has vacillated (California Cannabis Portal, n.d.; Thallman, 2019). As early as 1905, state legislators perceived that the accessibility of marijuana would impact the frequency of its use and result in negative implications for the user. Over time legislators and citizens recognized the medical benefits of marijuana, which included alleviating the suffering of patients with cancer, acquired immune deficiency syndrome, and Parkinson's disease (Babayeva et al., 2016; Grigorian et al., 2019). Legislators and citizens also recognized the benefits of legalizing marijuana, including fewer marijuana-related arrests, prosecutions, incarcerations, and increased tax revenues (Geiger-Oneto & Simkins, 2017; Petersen, 2016). The result was the passage of the Adult Use of Marijuana Act in 2018, which also legalized the recreational use of marijuana in California (CDPH, n.d.).

School administrators face several challenges because of the passage of RML in California (Bae & Kerr, 2020; Hall & Lynskey, 2016). The first challenge is that when RML passed in other states, the frequency of marijuana use by college students increased and use rates varied across demographic subgroups of college students (Bae & Kerr, 2020; Patterson et al., 2020). After the passage of the RML, female college students' use increased more than males (Miller et al., 2017; Park et al., 2021), and the frequency of marijuana use was consistently higher in African American and Hispanic college students when compared to Caucasian and Asian students (Bae & Kerr, 2020; Ecker et al., 2019; Miller et al., 2017).

The second challenge is that as marijuana use rates increased, the negative consequences of frequent marijuana use also increased (Pearson et al., 2016). Pearson et al. (2016) found that over a 30-day period, 1 in 10 college students experienced 19 or more negative consequences (out of 50) because of frequent marijuana use. Consequences included a lack of motor control, diminished interpersonal skills, negative self-perception and self-care, and negative academic performance (Pearson et al., 2016). The negative academic performance included high absenteeism rates, poor performance on exams resulting in lower grades, and low degree completion rates (Pearson et al., 2016; Wang et al., 2019). The challenges include the need to comply with Drug Free School Communities Act compliance measures, to aid students who may be at risk of substance abuse, and to assist students with completing their degree (Kinzie & Hurtado, 2017; Safe Supportive Learning, n.d.).

Tinto's (1975) theory of social integration focused on the factors contributing to college degree completion. His theory was appropriate for this study because he identified the behavioral characteristics of students who failed to persist, which included a lack of social integration, and low levels of academic performance. His work was used to determine what demographic characteristics were important to study and why. Since Tinto focused on the gender and ethnicity of 4-year college students, this research focused on the frequency of marijuana use among 4-year college students based on gender and ethnicity.

Tinto's theory was an appropriate theoretical framework because researchers found that the behavioral characteristics of students who failed to persist in Tinto's study were like the behavioral characteristics of the college students who frequently used marijuana (Bae & Kerr, 2020; Blavos et al., 2019; Vidourek et al., 2018). Bae and Kerr (2020) noted that college students who frequently used marijuana had adverse academic outcomes. Blavos et al. (2019) determined

that students who used marijuana frequently spent less time studying and were at an increased risk of dropping out of school. Kogan et al. (2017) concluded that college-aged adults who frequently used marijuana socially disengaged with not only non-user groups but also schools and civil organizations and had poor interpersonal skills. The behavioral characteristics of students with low levels of persistence and students who frequently use marijuana are similar. Tinto (1975) recommended that future research focus on why students fail to persist. He believed that determining the demographic and behavioral characteristics of students was necessary to determine if those characteristics were contributing factors in the differing levels of persistence.

Researchers advocated for further study on the frequency of marijuana use across subgroups of students to clarify the impact of the passage of MML and RML and to ensure the implementation process promoted the informed and responsible use of marijuana by college students (Bae & Kerr, 2020; Pro et al., 2018). Wang et al. (2019) concluded that if states continue to pass MML and RML, students' frequency of marijuana use will likely increase. In addition, their perception of risk will continue to decrease, and their academic performance will likely continue to decrease. A review of the related literature revealed that researchers had not investigated the frequency of marijuana use by California university students based on gender and ethnicity.

CHAPTER THREE: METHODS

Overview

The purpose of this quantitative causal-comparative study was to determine the frequency of marijuana use among California university students based on gender and ethnicity. Chapter Three includes a description of the study's research design, research questions, sample population, instrumentation, and methods for collecting and analyzing data. Chapter Three also presents the ethical considerations.

Design

Researchers who use a causal-comparative research design conduct a nonexperimental study after the fact that includes pre-existing groups, categorical variables, and determines if a difference exists between groups on the dependent variable; however, they do not manipulate the independent variable or establish causal relationships between the independent and dependent variables (Gall et al., 2007). A causal-comparative design is appropriate for this study because the data was collected after the fact, included pre-existing groups, and was categorical. The causal-comparative design was also appropriate because the independent variable was not manipulated, and no causal relationships were established between the independent and dependent variables. Finally, the causal-comparative design was appropriate for this investigation since it was determined whether there was a difference between groups on the dependent variable.

The dependent variable for this study was the frequency of marijuana use. The independent variables for this study were the gender and ethnicity of the participants. Because the independent variables were categorical, a nominal scale was used (Gall et al., 2007). The

categories for gender were male and female while the categories for ethnicity were African American, Asian American, Caucasian American, and Hispanic American.

Research Questions

RQ1: Is there a difference in the frequency of marijuana use by California university students based on gender?

RQ2: Is there a difference in the frequency of marijuana use by California university students based on ethnicity?

Hypotheses

H₀₁: There is no difference in the frequency of marijuana use by California university students based on gender.

H₀₂: There is no difference in the frequency of marijuana use by California university students based on ethnicity.

Participants and Setting

Participants were a random sample of college students who attended one of five California state universities during the fall 2021 and the spring semesters of 2022. The California state university system is the largest public university system in the United States (CSU, n.d.). The system has 23 college campuses and eight off-campus centers, and it enrolls over 480,000 students annually. The 100,000 plus California state university students across five campuses were the population for this study. The demographics of the student population across the five California state universities are as follows: (a) gender: 56% = females and 43% = males, (b) race: 48% = Hispanic, 26% = Caucasian, 16% = Asian, and 6% = African American and approximately 80% of the population were in the 18-to 25-year-old range.

By using random sampling, researchers can choose a subset of participants from the

population, reduce bias, and give each participant an equal chance of being selected (Gall et al., 2007). The Qualtrics tool was used to assist in the process of identifying the sample from the population, determining the participants who meet this study's inclusion criteria, to verify each participant, and tracking their participation in the study. In addition, the Qualtrics tool was used to distribute information designed to encourage participation. The Qualtrics tool was also used to ensure the validity of the responses and determine if a participant completed the survey more than once. Qualtrics is a certified research survey organization that meets the standards required by the Code of Federal Regulations 45.46 (Federal Guidelines for Human Research, n.d.; Qualtrics, n.d.).

An Olejnik chart was used to determine the required sample size of 144 participants and to detect an effect with confidence (Gall et al., 2007). When assuming a medium effect size, a sample of 144 is large enough to reject the null hypothesis with a statistical power of .7 at the .05 alpha level (Gall et al., 2007). An analysis of the student population currently enrolled in the California state university system revealed demographic indicators. These demographic indicators suggested the sample for this study should consist of the naturally occurring groups of the gender classifications of male and female and the ethnicities of African American, Asian American, Hispanic American, and Caucasian American (California State Universities (CSU), n.d.). These demographic indicators were appropriate as they represented the naturally occurring population of students currently enrolled at California state universities (CSU, n.d.). The sample consisted of 167 participants. Of the 167 participants, 20.4% ($n = 34$) were male and 79.6% ($n = 133$) female. The racial/ethnic demographics of the sample were as follows: Hispanic = 70.6% ($n = 118$), 13.2% = Caucasian ($n = 22$), African American = 10.2% ($n = 17$), and Asian = 6% ($n = 10$), the participants ages ranged from 18-25. The sample included students who attended five

California state universities.

This study occurred during the fall 2021 semester and the spring 2022 semester, and the setting was virtual via the Qualtrics online survey tool. O’Niell (2004) discussed the advantages and disadvantages of an online survey tool. The advantages are reduced costs, higher response rates, an increased capacity to cover the geographical area of the sample, and fewer survey errors and omissions among participants; conversely, the disadvantages are the increased risk of bias in the data collection process and breaches in the security and confidentiality of the data. Instances of bias in the data collection process were reduced by using a random sample, ensuring every member of the population had an equal opportunity to participate in the study, and using an objective survey tool (Gall et al., 2007).

Instrumentation

The Cuttler and Spradlin (2017) Daily Sessions, Frequency, Age of Onset, and Quantity of Cannabis Use Inventory (DFAQ-CU) was the instrument used in this study (Appendix A). Researchers use the DFAQ-CU because it is a valid and reliable instrument for scientifically measuring the frequency, quantity, and age of onset of marijuana use and characterizing marijuana use based on demographic factors (i.e., gender, race). Cuttler and Spradlin (2017) found most cannabis use instruments were valid and reliable but were designed to identify marijuana use disorders; however, there was a lack of instruments designed to determine the frequency, quantity, and age of onset of marijuana use. They sought to address this lack of instruments by developing the DFAQ-CU inventory.

Cuttler and Spradlin (2017) believed the DFAQ-CU was the first valid and reliable instrument for measuring frequency, age of onset, and quantity of marijuana use; however, they noted that no peer-reviewed studies used the DFAQ-CU. They established the reliability and

validity of the DFAQ-CU by comparing it to other instruments that assessed marijuana use, dependence, and disorders and chose the results from the highest performing instruments.

According to Annaheim (2013), the highest performing instruments were chosen based on their high reliability, validity coefficients, and psychometric properties. She found the highest performing instruments were as follows: (a) the Timeline Followback, which is a popular valid, and reliable measure of recent marijuana use; (b) the Cannabis Abuse Screening Test, which measures the risk of cannabis use disorders and dependence; (c) the Cannabis Use Disorders Identification Test-Revised, which measures cannabis misuse; (d) the Marijuana Screening Inventory, which measures adverse effects associated with cannabis use; (e) the Cannabis Use Problems Identification Test, which measures risky, problematic cannabis use.

To assess the validity of the DFAQ-CU instrument, Cuttler and Spradlin (2017) compared participant scores. A sample of 2,630 college students completed the DFAQ-CU. A subsample of 645 marijuana users completed the Timeline Followback, the Cannabis Abuse Screening Test, the Cannabis Use Disorders Identification Test-Revised, the Marijuana Screening Inventory, and the Cannabis Use Problems Identification Test. Cuttler and Spradlin compared the results and found the frequency factor of the DFAQ-CU had high convergent validity with the Marijuana Smoking History Questionnaire and the Timeline Followback instruments on the number of days of marijuana use. They also determined that the DFAQ-CU frequency factor had excellent predictive validity or the ability to predict use disorders and problems compared to the Cannabis Abuse Screening Test, Cannabis Use Disorders Identification Test-Revised, Cannabis Use Problems Identification Test, and Marijuana Screening Inventory instruments.

The DFAQ-CU instrument includes multiple-choice, closed-ended questions and a

scoring key, thereby allowing each participant to respond as specified in the survey tool and increasing the study's objectivity (Gall. et al., 2007). Cuttler and Spradlin included pictures of the various methods of administering marijuana; consequently, the quantity and frequency factors of the DFAQ-CU were more precise and easier to compare than those of the other instruments. They also discovered that subjectivity among participants was less likely with the DFAQ-CU because of a rating scale with beginning and ending rating points, a clear description of the term regular use, and a standardized scoring procedure for assessing the psychometric properties, thereby increasing the scientific rigor of the DFAQ-CU.

The DFAQ-CU instrument includes 39-items and three subscales to measure frequency, age of onset, and quantity of marijuana use (Cuttler & Spradlin, 2017). The three subscales include 22 of the 39 items. The 22 items are core items that measure marijuana use, with nine items measuring frequency, four items measuring the age of onset, and nine items measuring the quantity of marijuana use. Cutler and Spradlin (2017) created three subscales so that the frequency, quantity, and age of onset of marijuana use increased when participants' scores increased. The nine frequency-related items on the DFAQ-CU are 2, 3, 6, 7, 8, 9, 10, 11, and 12, and each item has a continuous rating scale, ranging from 0-12, with scores on the higher end of the range indicating an increased average frequency of use. For example, if participants reported their last marijuana use was in the last 24 hours, their score would be a 10. If they reported their last marijuana use was 6-9 months ago, their score would be a three. The range of scores for the frequency-related items is 0-108, with scores on the higher end of the range indicating an increased average frequency of use among participants (Cuttler & Spradlin, 2017).

The DFAQ-CU also includes Item 2b, which is an additional item about frequency. Item 2b is a follow-up item for participants who indicated they used marijuana "today." Participants

completing the follow-up item reported how they felt. A follow-up item was used to remove participants who experienced the effects of marijuana use while completing the DFAQ-CU (Cuttler & Spradlin, 2017). The DFAQ-CU was administered online via the Qualtrics tool. Cutler and Spradlin noted that participants needed approximately 30 minutes to complete the DFAQ-CU. They concluded that the reliability coefficient Cronbach's alpha of the frequency factor showed excellent reliability at .95, and the marijuana quantity and age of onset factors showed good reliability with values ranging from .81 to .88. Given its reliability coefficients, the DFAQ-CU was appropriate for determining the frequency of marijuana use among California university students based on gender and ethnicity. Because Cuttler and Spradlin labeled the DFAQ-CU as open access, no permission was needed to use it.

Procedures

Before conducting the study, an online application was submitted to the Liberty University Institutional Review Board. Upon receiving approval from the Institutional Review Board, the California state university chancellor's office was contacted, and approval was sought to contact administrators and students in their system. A request for permission letter (Appendix B) was sent to the chancellor's office. In addition, representatives from the chancellor's office received a copy of the DFAQ-CU, the demographic questionnaire (Appendix C), and a copy of the participants' rights and consent form (Appendix D). The request for permission letter explained the purpose of the study. Upon receiving chancellor approval, the 23 California state universities were contacted to determine which would be willing to participate in the study. A letter was then sent to school administrators explaining the purpose of the study (Appendix E). In addition to the letter, school administrators received a copy of the DFAQ-CU inventory, and a copy of the participants' rights and consent form.

Upon receiving approval from the university administrators, the Qualtrics site was used to distribute the documents mentioned above via direct, marketing channels, and social media channels. Students' social media channels were provided an introductory message (Appendix F). Student's emails included an introductory letter (Appendix G). To participate in this study, participants had to be a California state university student and be at least 18 but no more than 25 years old.

Once students agreed to participate in the study, they were instructed to click on the Qualtrics hyperlink. The first page of the DFAQ-CU instrument contained a description of the purpose of the study, the instructions for completing the instrument, a statement assuring that participation in the study was voluntary, the procedures for ensuring participant confidentiality, and a statement informing participants that they could withdraw from the study at any time without penalty, and that the study was anonymous.

Upon meeting the study's inclusion criteria, students were forwarded to the DFAQ-CU. To ensure confidentiality and data security, the data was stored on a password-protected file (Qualtrics, n.d.). Before beginning the DFAQ-CU, students provided the following demographic information: age, gender, and ethnicity. Students had up to 30 minutes to complete the DFAQ-CU. After completing the inventory, participants were redirected to a page in which they were thanked for their time.

The results were reviewed each week. After receiving 200 completed survey responses, the data were retrieved and stored on an external hard drive and kept in a locked file cabinet. To protect participants' identity and to maintain confidentiality, data security, and privacy, all hard copies of the completed DFAQ-CU and other study attachments were stored in a secure envelope. All data was loaded into a Microsoft Excel spreadsheet and then uploaded into SPSS.

Data Analysis

An independent samples *t* test was used to address RQ1 and to test H₀₁. The independent samples *t* test was used to determine the differences in the dependent variable of the frequency of marijuana use and the independent variable of gender, which had two groups. The independent samples *t* test was appropriate for this analysis because there was only one dependent variable and an independent variable with two groups (male and female) (Gall et al., 2007). The independent samples *t* test was also appropriate for this study because the independent variable was categorical and consisted of two groups. The dependent variable was measured on a continuous scale, and it was determined if there was a difference between the groups on the dependent variable.

Before running the independent samples *t* test, the data were inspected for extreme outliers and tested for the assumption of normality and the assumption of equal variance. Box and whisker plots of the dependent variable for each independent variable group were inspected for extreme outliers. The Kolmogorov-Smirnov test was used to test for the assumption of normality since there were more than 50 participants. Levene's Test of Equality of Error Variance tested the assumption of equal variance. The *F* statistic was used to determine the assumption of equal variance. Failing to reject the null hypothesis was warranted at the 95% confidence level with the alpha level set at .025, and descriptive statistics were reported for all groups of the independent variable.

A one-way analysis of variance (ANOVA) was used to address RQ2 and to test H₀₂. The ANOVA was used to determine the differences in the dependent variable of the frequency of marijuana use and the independent variable of ethnicity, which had four groups. Warner (2013) posited that researchers should use an ANOVA to compare mean scores on a dependent variable

across three or more naturally occurring groups and to compare the amount of between-group variance in the individual scores and the number of within-group scores on the dependent variable. Researchers also use an ANOVA when they measure the dependent variable on a continuous scale, and they have an independent variable that is categorical with more than two groups (Gall et al., 2007). The ANOVA was an appropriate statistical method for this study because the dependent variable was measured on a continuous scale, and the independent variable was categorical with four groups (African American, Asian American, Caucasian American, and Hispanic American). The ANOVA was also appropriate since it could be used to determine if there was a difference between the four ethnic groups on the dependent variable of the frequency of marijuana use.

Before running the ANOVA, the dataset was tested for the assumption of normality and the assumption of equal variance. The Kolmogorov-Smirnov test was used to test for the assumption of normality since there were more than 50 participants. Levene's Test of Equality of Error Variance tested the assumption of equal variance. The F statistic was used to determine the assumption of equal variance. Failing to reject the null hypothesis was warranted at the 95% confidence level with the alpha level set at .025, and descriptive statistics were reported for all groups of the independent variable.

To limit the risk of Type I errors across multiple statistical tests (independent samples t test and the ANOVA), the Bonferroni correction was used. According to Warner (2013), the Bonferroni method is a commonly used correction designed to limit Type I errors when multiple significance tests are performed. The Bonferroni correction ensured the "entire set of significance tests" was evaluated with an acceptable risk of falsely rejecting the null hypothesis at an alpha level of .05/2 or .025 alpha (Warner, 2013, p. 98).

CHAPTER FOUR: FINDINGS

Overview

This chapter presents the study's quantitative results and addresses the research questions to determine if there was a statistically significant difference between California university students based on gender and ethnicity. This chapter presents descriptive statistics for the independent and dependent variables. The results of the causal-comparative study are presented and explained in this chapter.

Research Questions

RQ1: Is there a difference in the frequency of marijuana use by California university students based on gender?

RQ2: Is there a difference in the frequency of marijuana use by California university students based on ethnicity?

Null Hypotheses

Ho1: There is no difference in the frequency of marijuana use by California university students based on gender.

Ho2: There is no difference in the frequency of marijuana use by California university students based on ethnicity.

Descriptive Statistics

One hundred and sixty-seven California state university students participated. The data were collected from five California state universities. The university's geographical areas included the northern, central, and southern part of the state and the schools were equally diverse. Although 231 students completed the survey, only 167 were included in the final data

analysis. Table 1 provides descriptive statistics for Research Question 1, while Table 2 provides the descriptive statistics for Research Question 2.

Table 1

Descriptive Statistics: RQ1 Marijuana Use Across Genders

Gender	<i>n</i>	<i>M</i>	<i>SD</i>
Male	34	20.29	20.05
Female	133	20.07	23.26

Table 2

Descriptive Statistics: RQ2 Marijuana Use Across Ethnic Groups

Ethnicity	<i>n</i>	<i>M</i>	<i>SD</i>
African American	17	24.47	31.45
Asian	10	24.50	18.97
Caucasian	22	25.63	20.01
Hispanic	118	17.86	21.74

Results

Null Hypothesis 1

An independent samples *t* test was planned to test null hypothesis 1. The frequency of marijuana use mean scores were categorized by gender and compared across gender groups. The independent samples *t* test was appropriate for this analysis since it was used to compare the mean scores of two different groups about one dependent variable (Warner, 2013).

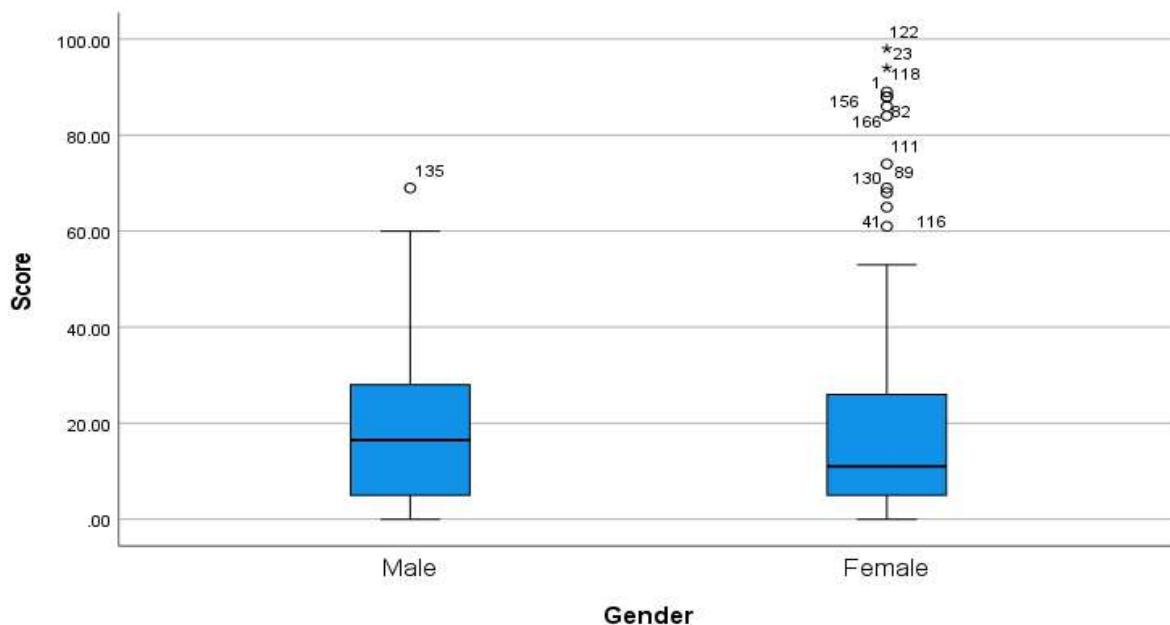
Data Screening

Before conducting the independent samples t test, data screening was completed.

Boxplots were produced to determine if there were any extreme outliers. A review of the boxplots revealed there were 13 outliers and no extreme outliers. Figure 1 includes the box plot for null hypothesis 1. Upon additional review, it was determined that the outliers were not the result of an error in measurement or a data entry error. These 13 cases were legitimate frequency of marijuana use scores reported by participants the decision was made to continue with the independent samples t test and the analysis was run with the cases.

Figure 1

Box Plot for Null Hypothesis 1



Assumption Testing

The independent samples t test requires a test of the equality of variance. Levene's Test of Equality of Variances was tenable with, $F(.111)$, $p = .739$. The independent samples t test also requires a test of normality. The assumption of normality was tested with the Kolmogorov-

Smirnov test. Table 4 provides the results of the test of normality. The Kolmogorov-Smirnov test revealed the assumption of normality was violated for the male and female groups with both p values $< .05$ at .031 for males, and .001 for females; therefore, the assumption of normality was not met. Warner (2013) noted that the independent samples t test is robust to some deviations from normality when the sample size is large. It was decided to continue with the independent samples t test.

Table 3*Kolmogorov-Smirnov Test for Null Hypothesis 1*

Gender	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
Male	.158	34	.031
Female	.194	133	.001

Independent Samples t test Results

An independent samples t test was used to test the null hypothesis regarding differences in male and female college students' frequency of marijuana use. Equal variance was assumed. There was no significant difference based on gender; thus, a failure to reject the null hypothesis was warranted; at the 95% confidence level where, $t(28) = .050.43, p = .960,$ ² (two-tailed) as shown in Table 4. The effect size was small, based on Cohen's $d = 0.010$. The frequency of marijuana use for males ($M = 20.29, SD = 20.05$) was only slightly higher than females ($M = 20.07, SD = 27.26$).

Table 4*Independent Samples t Test*

Score	F	Sig.	t	df	Sig. (2-tailed)
Equal Variances Assumed	.111	3	162	.161	.960
Equal variances not Assumed	.978	3	162	.405	.956

Null Hypothesis 2

A one-way analysis of variance (ANOVA) was conducted to test null hypothesis 2. The frequency of marijuana use mean scores were categorized by ethnicity and compared across four ethnic groups. The ANOVA was appropriate because it was used to compare the amount of between-group variance in individual mean scores with the amount of within-groups variance. In addition, there were three or more groups about one independent variable.

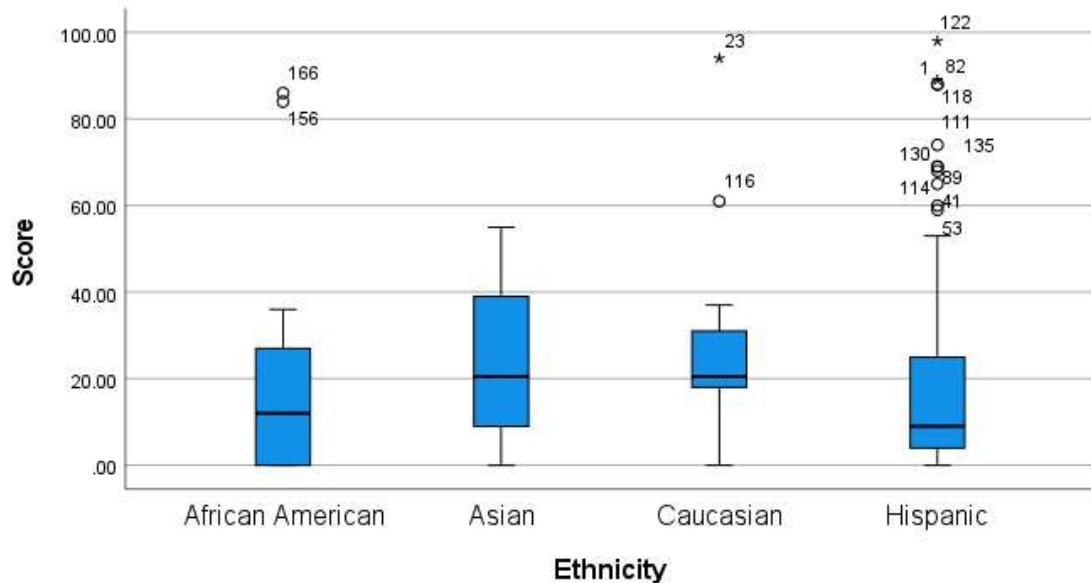
Data Screening

Before conducting the ANOVA, data screening was completed. According to Green and Salkind (2017), several assumptions must be met for the ANOVA. The first assumption is participants must represent a random sample and be independent. The second assumption is the data must be normally distributed. The third assumption is all groups must meet the homogeneity of variances (Green & Salkind, 2017). To elevate the likelihood of making the inferential leap from a sample to the accessible population a random sample should be used (Gall et al., 2007). The survey was distributed to five different California state universities via emails and social media. A random sample was achieved through distributing the survey to the accessible population of students which ensured all members had an equal and independent chance to complete it. A randomization of boxplots was used to determine if there were any extreme

outliers. Figure 2 includes the boxplot for null hypothesis 2. A review of the boxplots revealed that there were 13 outliers and no extreme outliers. Upon reviewing the boxplots further, it was determined that the 13 outliers were not the result of an error in either measurement or data entry, and the 13 outliers were legitimate frequency of marijuana use scores; thus, the decision was made to continue with the ANOVA.

Figure 2

Boxplot for Null Hypothesis 2



Assumption Testing

The test of the assumption of normality was completed using the Kolmogorov-Smirnov test. The Kolmogorov-Smirnov test revealed that the values were not normally distributed for three of the four groups: African American ($p = .001$), Caucasian ($p = .001$), and Hispanic ($p = .001$). However, the same was not true for the Asian American group where $p > .05$ at .308.

Table 5 provides results of the Kolmogorov-Smirnov test.

Table 5*Kolmogorov-Smirnov Test for Null Hypothesis 2*

Ethnicity	Kolmogorov-Smirnov ^a		
	Statistic	df	Sig.
African American	.220	17	.001
Asian	.173	10	.308
Caucasian	.195	22	.001
Hispanic	.204	118	.001

The ANOVA is very robust to deviations from normality, especially with a large sample size (Warner, 2013). Since the data were free of errors, the decision was made to continue with the ANOVA. Since several groups violated the assumption of normality, a non-parametric test was included with the ANOVA. A non-parametric test was appropriate for this analysis because it did not rely on assumptions about the shape or variation of the mean frequency of marijuana use scores (Warner, 2013). The non-parametric test incorporated into the ANOVA was the Kruskal-Wallis test. The Kruskal-Wallis test should be used as a non-parametric test if the assumptions of normality are violated (Gall et al., 2007). The Kruskal-Wallis test revealed a value for $p < .05$ at (.044), thereby minimizing the likelihood of Type 1 errors. The final assumption necessary for the ANOVA is the homogeneity of variance test. This test examines whether the population distributions have equal variances. The Levene's test revealed the assumption of equal variances was acceptable at $F(3, 162)$, $p = .161$. The assumption of equality of variances is tenable as shown in Table 6.

Table 6*Levene's Test of Equality of Variances*

Score	Levene Statistic	<i>df 1</i>	<i>df 2</i>	Sig.
Based on <i>M</i>	1.738	3	162	.161
Based on <i>Mdn</i>	.978	3	162	.405
Based on <i>Mdn</i> with adjusted <i>df</i>	.978	3	149.649	.405
Based on trimmed <i>M</i>	1.548	3	162	.204

ANOVA Test Results

An ANOVA was run to determine if there was a difference in the frequency of marijuana use scores based on ethnicity. The independent variable was ethnicity, and the dependent variable was frequency of marijuana use scores. Failing to reject the null hypothesis was warranted since at the 95% confidence level where $F(4, 162) = 1.180, p = .322$. Partial eta square was $\eta^2_{\text{part}} = .028$. The effect size was very small. There was not a statistical difference in frequency of marijuana use among African American ($M = 24.47, SD = 31.05$), Asian American ($M = 24.50, SD = 18.98$), Caucasian ($M = 25.64, SD = 20.01$), and Hispanic ($M = 17.86, SD = 21.74$) college students in California. See Table 7 for the results of the Tests of Between-Subjects Effects.

Table 7*Tests of Between-Subjects Effects*

Source	Type III SS	df	MS	F	Sig.
Corrected model	2397.967 ^a	4	162	1.180	.322
Intercept	15581.848	1	162	30.672	<.001
Ethnicity	2397.967	4	149.649	1.180	.322
Error	82299.638	162	162		
Total	152300.000	167			
Corrected total	84697.605	166			

a. R Squared = .028 (Adjusted R Squared = .004)

Summary

Chapter Four provided a summary of the data collected and the method for analyzing the data. The data analysis consisted of an investigation of the frequency of marijuana use by California university students based on gender and ethnicity. The descriptive statistics were reported as well as the results from the independent samples *t* test and the ANOVA. The analyses revealed that there was no statistically significant difference between either gender groups or ethnic groups; thus, failing to reject the null hypotheses was warranted. These statistical findings will be discussed in Chapter 5 in relation to the related research, the limitations, and the implications of these results.

CHAPTER FIVE: CONCLUSIONS

Overview

Chapter Five contains a discussion of the results of the statistical analysis, the implications of those results in reviewing related research, and considers the studied population. Chapter Five also contains a discussion of the limitations and suggestions for future research.

Discussion

The purpose of this quantitative causal-comparative study was to determine the frequency of marijuana use by California university students based on gender and ethnicity. The frequency of marijuana use was the dependent variable, while the independent variables were gender and ethnicity. Gender included male and female, and the ethnic groups included African American, Asian, Caucasian, and Hispanic California state university students. The sample for this study was composed of 167 students from five California state universities. This research discussed the following research questions:

RQ1: Is there a difference in the frequency of marijuana use by California university students based on gender?

RQ2: Is there a difference in the frequency of marijuana use by California university students based on ethnicity?

Null Hypothesis 1

H_0 1 was as follows: There is no difference in the frequency of marijuana use by California university students based on gender. The results of the independent samples *t* test indicated that although males had a higher frequency rate ($M = 20.29$) than females ($M = 20.07$), there was no significant difference between males and females. Since no significant difference was found failing to reject the null hypothesis was warranted. Although the failure to reject the

null hypothesis was warranted, the data revealed that the patterns of marijuana use among California state university students differed slightly based on gender.

While there was not a statistically significant finding, the data did show the mean of males to be slightly higher than females. Previous studies found males had higher use rates than females (Bae & Kerr, 2020; Desai et al., 2018; Mercado et al., 2017; Miller et al., 2017; Park et al., 2021; Patterson et al., 2020; Pro et al., 2018; Wright et al., 2021). In addition, 59.6% of the participants used marijuana during their lifetime. This finding aligned with that of Miller et al. (2017), Pearson et al. (2016), and Vidourek et al. (2018) who found that between 50 and 60% of college students consumed marijuana during their lifetime. Geiger-Oneto and Simkins (2017) findings were slightly lower at 47%.

Null Hypothesis 2

H_02 was as follows: There is no significant difference in the frequency of marijuana use by California university students based on ethnicity. Since there was no statistically significant difference between ethnicities, failing to reject the null hypothesis based on ethnicity was warranted. Although failing to reject the null hypothesis was warranted, the research revealed that the patterns of marijuana use among California state university students differed based on ethnicity.

While there was not a statistically significant difference in marijuana use rates between African American, Asian, Caucasian, and Hispanic college students, the research revealed that marijuana use rates were higher in Caucasian students than other ethnicities. The findings that Caucasian college students had higher marijuana use rates aligned with that of Vidourek et al. (2018) since they found that Caucasian students had higher use rates than non-Caucasian students. Miller et al.'s (2017) findings differed from this study's findings since they found that,

after the passage of RML's, African American and Hispanic college students consistently fell into the highest use group. The results of this study differed from Ecker et al.'s (2019) findings since they found African American students' use rates were higher than Caucasian students. Wu et al.'s (2016) findings also differed from the findings in this study since they found African American and Hispanic college students had higher use rates than Caucasians and Asian students.

This research revealed that Asian students use rates were slightly higher than African Americans and Hispanic students which differed from Miller et al.'s (2017) findings concerning Asian students. Miller et al. (2017) found Asian students routinely fell into the lowest use group. Pro et al.'s (2018) findings were aligned with this study's findings since they found that Asian students had higher use rates than African American and Hispanic students. Pro et al.'s findings differed from this study since they found Asian students use rates were also greater than Caucasian students use rates.

Implications

This study provided a baseline of information on the California university student's frequency of marijuana use across gender and ethnicity. Since this research illustrated that failing to reject the null hypothesis was warranted, it implies that among the limited sample it did provide sufficient evidence to make a definitive conclusion. The conclusion is that this research implies that the frequency of marijuana use does not differ based on gender and ethnicity and the hypothesis test did not determine the effect. This implication can stem from several reasons including an inadequate sample size and low response rates across gender and ethnic groups.

Since there was no definitive evidence of an effect in this study no conclusions regarding Tinto's social integration theory can be asserted. The lack of an effect suggests that there are

limited practical applications. The lack of an effect also limits the ability to predict real world outcomes as described in Tinto's (1975) theory of social integration. The lack of definitive evidence of an effect could imply a need for additional research. Additional research may be needed to overcome the inadequateness of the sample of the population and may be used to support the generalization of the findings.

Limitations

The first limitation of this study was the research design. By using a causal-comparative research design, the independent variables were not manipulated (gender and ethnicity); hence no causal relationship could be determined between the independent variables (gender and ethnicity) and the dependent variable (frequency of marijuana use). The second limitation was unequal sample sizes across gender and ethnicity. Males were underrepresented, as males comprised approximately 20% of the sample. Therefore, the inferences made from the findings cannot be generalized to males. There was also had an overrepresentation of Hispanic participants, with Hispanics comprising approximately 70% of the sample. Thus, the inferences made from the findings cannot be generalized across ethnic groups. There was a very low response rate across historically underrepresented groups including African American males ($n = 0$). Another limitation is that the participants responses were self-reported; hence, there is no guarantee that participants provided accurate responses. Since there were only five of the 23 California state universities represented in the sample, they may not be representative of other universities in the state. Lastly, the use of cross-sectional data is a limitation because the behavior cannot be analyzed over time and cause and effect cannot be determined.

Recommendations for Future Research

Based on the findings, more research is recommended to further the understanding of marijuana use rates among college students based on gender and ethnicity. The recommendations for further study should focus on the following:

- 1.) Future researchers should ensure the comparison groups across gender and ethnicity are adequate. The number of participants in each comparison group should be representative of the population. The identification of proper comparison groups could be useful in understanding the patterns of marijuana use across subgroups and support the generalization of the findings across gender and ethnic groups.
- 2.) Future researchers should take the necessary steps to ensure a larger response rate across gender and ethnic groups. A larger response rate across gender and ethnic groups may enhance the ability to generalize the findings.
- 3.) Future researchers should ensure more California state universities are included in their research and should also consider including two-year, vocational, and private colleges and universities. The inclusion of additional colleges and universities should be included to guarantee a more thorough representation of college students in the state.
- 4.) Future researchers should also compile trend data on students to determine whether marijuana use is continuous or only happens during experimentation phases of life, like making the transition into college (Cho et al., 2015). Trend data could be used to better understand the frequency of marijuana use overtime and potentially determine the cause and effects of its use. This could also support the selective targeting of intervention and prevention measures.

5.) Lastly, future researchers should consider investigating the frequency of marijuana use based on gender and ethnicity using a qualitative design. This method may allow a better understanding what factors contributed to the user's choice to use marijuana.

REFERENCES

- Annaheim, B. (2013). Who is smoking pot for fun and who is not? An overview of instruments to screen for cannabis-related problems in general population surveys. *Addiction Research & Theory*, 21(5), 410-428. <https://doi-org.ezproxy.liberty.edu/10.3109/16066359.2012.735295>
- Babayeva, M., Assefa, H., Basu, P., Sanjeda, C., & Zvi, L. (2016). Marijuana compounds: A nonconventional approach to Parkinson's disease therapy. *Parkinson's Disease*, 2016, 1-19. <https://doi.org/10.1155/2016/1279042>
- Bae, H., & Kerr, D. C. R. (2020). Marijuana use trends among college students in states with and without legalization of recreational use: Initial and longer-term changes from 2008-2018. *Addiction*, 92(1), 1-10. <https://doi.org/10.1111/add.14939>
- Bahji, A., & Callum, S. (2019). International perspectives on the implications of cannabis legalization: A systematic review & thematic analysis. *International Journal of Environmental Research and Public Health*. 16, 1-9. <https://doi.org/10.3390/ijerph16173095>
- Bhattacharyya, S., Egerton, A., Kim, E., Rosso, L., Barros, D. R., Hammers, A., Brammer, M., Turkheimer, F. E., Howes, O. D., & McGuire, P. (2017). Acute induction of anxiety in humans by delta-9-tetrahydrocannabinol related to amygdala cannabinoid-1 (CB1) receptors. *Scientific Reports* 7, 1-15. <https://doi.org/10.1038/s41598-017-14203-4>
- Blavos, A. A., Glassman, T. J., Sheu, J., Thompson, A. J., & DeNardo, F. (2019). Relationships between state medical marijuana laws and college students' use of marijuana/other drugs. *Journal of Student Affairs Research and Practice*, 56(1), 19-31. <https://doi.org/10.1080/19496591.2018.1474761>

- California Cannabis Portal. (n.d.). <https://cannabis.ca.gov/cannabis-legislation/>
- California Department of Public Health. (n.d.). Manufactured cannabis safety branch: Legislation. <https://www.cdph.ca.gov/Programs/CEH/DFDCS/MCSB/Pages/Legislation.aspx>
- California State University. (n.d.). About Us. <https://www2.calstate.edu/csu-system/about-the-csu/Pages/default.aspx>
- Cho, S. B., Llaneza, D. C., Adkins, A. E., Cooke, M., Kendler, K. S., Clark, S. L., & Dick, D. M. (2015). Patterns of substance use across the first year of college and associated risk factors. *Frontiers in Psychiatry* 6, 1-9. <https://doi.org/10.3389/fpsyg.2015.00152>
- 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), 1-14. <https://doi.org/10.1371/journal.pone.0178194>
- Copyright: © 2017 Cuttler, Spradlin. This is an open access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium.
- Desai, R., Shamim, S., Patel, K., Sadolikar, A., Kaur, V. P., Siddhi, B., Patel, S., Savani, S., Mansuri, Z., & Mahuwala, Z. (2018). Primary causes of hospitalizations and procedures, predictors of in-hospital mortality, and trends in cardiovascular and cerebrovascular events among recreational marijuana users: A five-year nationwide inpatient assessment in the United States. *Cureus*, 10(8), 1-16. <https://doi.org/10.7759/cureus.3195>
- Drug Enforcement Administration (DEA). (n.d.). <https://www.dea.gov/factsheets/marijuana>
- Durkheim, E., Spaulding, J. A., & Simpson, G. (2002). *Suicide: A study in sociology*. Taylor and Francis Group.

- Ecker, A. H., Dean, K. E., Buckner, J. D., & Foster, D. W. (2019). Perceived injunctive norms and cannabis-related problems: The interactive influence of parental injunctive norms and race. *Journal of Ethnicity in Substance Abuse*, 18(2), 211-223. <https://doi.org/10.1080/15332640.2017.1333477>
- Escobedo, P., Allem, J. P., Baezconde-Garbanati, L., & Unger, J. B. (2018). Cultural values associated with substance use among Hispanic emerging adults in Southern California, *Addictive Behaviors* 77, 267-271. <https://doi.org/10.1016/j.addbeh.2017.07.018>.
- Federal Guidelines for Human Research. (n.d.). <https://www.hhs.gov/ohrp/regulations-and-policy/regulations/common-rule/index.html>
- Gall, M. D., Gall, J. P., & Borg, W. R. (2007). *Educational research: An introduction*. Pearson.
- Geiger-Oneto, S., & Simkins, T. (2017). A social identity perspective on the legalization of marijuana in the United States: The relative importance of status insecurity and group membership. *Journal of Macromarketing*, 38(2), 207-217. <https://doi.org/10.1177%2F0276146717744245>
- Grigorian, A., Lester, E., Lekawa, M., Figueroa, C., Kuza, C. M., Dolich, M., Schubl, S. D., Barrios, C., Jr., & Nahmias, J. (2019). Marijuana use and outcomes in adult and pediatric trauma patients after legalization in California. *The American Journal of Surgery*, 218(6), 1189-1194. <https://doi.org/10.1016/j.amjsurg.2019.08.020>
- Green, S. B., & Salkind, N. J. (2017). *Using SPSS for Windows and Macintosh: Analyzing and understanding data (8th ed.)*. Pearson.
- Hall, W., & Lynskey, M. (2016). Evaluating the public health impacts of legalizing recreational cannabis use in the United States. *Addiction*, 111, 1764-1773. <https://doi.org/10.1111/add.13428>

- Hall, W., & Weier, M. (2015). Assessing the public health impacts of legalizing recreational cannabis use in the USA. *Clinical Pharmacology & Therapeutics*, 97(6), 607-615.
<https://doi.org/10.1002/cpt.110>
- Health and Safety Code, California (n.d.). <http://leginfo.legislature.ca.gov/faces/codesdisplaySection.xhtml?lawCode=HSC§ionNum=11018.&highlight=true&keyword=marijuana>
- Horn, H., Böhme, B., Dietrich, L., & Koch, M. (2018). Endocannabinoids in body weight control. *Pharmaceuticals*, 11(2), 1-48. <https://doi.org/10.3390/ph11020055>
- Johnson, R. M., Fairman, B., Gilreath, T., Xuan, Z., Rothman, E. F., Parnham, T., & Furrow, Holden, C. D. M. (2015). Past 15-year trends in adolescent marijuana use: Differences by race/ethnicity and sex. *Drug and Alcohol Dependence*, 155, 8-15.
<https://doi.org/10.1016/j.drugalcdep.2015.08.025>
- Kelly, H. (2018). Cannabis is legal in California: What's different? *CSU System News*.
<https://www2.calstate.edu/csu-system/news/Pages/Cannabis-Is-Legal-in-California---What-Has-Changed.aspx>
- Kerr, W. C., Lui, C., & Ye, Y. (2017). Trends and age, period, and cohort effects for marijuana use prevalence in the 1984–2015. U.S. national alcohol surveys. *Addiction*, 113, 473-481.
<https://doi.org/10.1111/add.14031>
- Kinzie, J., & Hurtado, S. S. (2017). Taking advantage of student engagement results in student affairs. *New Directions for Student Services*, 2017, 35-46. <https://doi.org/10.1002/ss.20225>
- Kogan, S. M., Junhan, C., Brody, G. H., & Beach, S. R. H. (2017). Pathways linking marijuana use to substance use problems among emerging adults: A prospective analysis of young Black men, *Addictive Behaviors*, 72, 86-92. <https://doi.org/10.1016/j.addbeh.2017.03.027>

- Lake, S., Kerr, T., Werb, D., Haines-Saah, R., Fischer, B., Thomas, G., Walsh, Z., Ware, M. A., Wood, E., & Milloy, M. J. (2019). Guidelines for public health and safety metrics to evaluate the potential harms and benefits of cannabis regulation in Canada. *Drug and Alcohol Review*, 38(6), 606-621. <https://doi.org/10.1111/dar.12971>
- Maier, S. L., Mannes, S., & Koppenhofer, E. L. (2017). The implications of marijuana decriminalization and legalization on crime in the United States. *Contemporary Drug Problems*, 44(2), 125-146. <https://doi.org/10.1177%2F0091450917708790>
- Mercado, A., Ramirez, M., Sharma, R., Popan, J., & Avalos Latorre, M. L. (2017). Acculturation and substance use in a Mexican American college student sample. *Journal of Ethnicity in Substance Abuse*, 16(3), 276-292. <https://doi.org/10.1080/15332640.2016.1196630>
- Miller, A. M., Rosenman, R., & Cowan, B. W. (2017). Recreational marijuana legalization and college student use: Early evidence. *SSM - Population Health*, 3(C), 649-657. <https://doi.org/10.1016/j.ssmph.2017.08.001>
- Moreno-Rius, J. (2019). The cerebellum, THC, and cannabis addiction: Findings from animal and human studies. *Cerebellum*, 18(3), 593-604. <https://doi-org.ezproxy.liberty.edu/10.1007/s12311-018-0993-7>
- National Survey on Drug Use and Health. (n.d.).
<https://nsduhweb.rti.org/respweb/homepage.cfm>
- O'Niell, B. (2004). Collecting research data online: Implications for extension. *Journal of Extension*, 42(3), 1-3. <https://archives.joe.org/joe/2004june/tt1.php>

- Park, S.-Y., Yun, G. W., Constantino, N., & Ryu, S. Y. (2021). Gender differences in the risk and protective factors of marijuana use among U.S. college students. Advance online publication. *Journal of Health Psychology*, 1-13. <https://journals.sagepub.com/doi/10.1177/13591053211002248>
- Patterson, A., Vu, M., Haardörfer, R., Windle, M., & Berg, C. J. (2020). Motives for alcohol and marijuana use as predictors of use and problem use among young adult college students. *Journal of Drug Issues*, 50(4), 359–377. <https://doi.org/10.1177/0022042620917101>
- Pearson, M. R., Bravo, A. J., & Conner, B. T. (2017). Distinguishing subpopulations of marijuana users with latent-profile analysis. *Drug and Alcohol Dependence*, 172, 1-8. <http://dx.doi.org/10.1016/j.drugalcdep.2016.10.043>
- Pearson, M. R., Liese, B. S., & Dvorak, R. D. (2016). College student marijuana involvement: Perceptions, use, and consequences across 11 college campuses. *Journal of Addictive Behaviors*, 66, 83-89. <https://doi.org/10.1016/j.addbeh.2016.10.019>
- Pergam, S. A., Woodfield, M. C., Lee, C. M., Cheng, G., Baker, K. K., Marquis, S. R., & Fann, J. R. (2017). Cannabis use among patients at a comprehensive cancer center in a state with legalized medicinal and recreational use. *American Cancer Society Journal*, 123, 4488-4497. <https://acsjournals.onlinelibrary.wiley.com/doi/epdf/10.1002/cncr.30879>
- Petersen, K. (2016). The Compassionate Use Act of 1996. *Foundations of Law and Society*. <https://foundationsoflawandsociety.wordpress.com/2016/12/09/the-compassionate-use-act-of-1996/>
- Pro, G., Sahker, E., & Marzell, M. (2018). Microaggressions and marijuana use among college students. *Journal of Ethnicity in Substance Abuse*, 17(3), 375–387. <https://doi.org/10.1080/15332640.2017.1288191>

- Public Broadcasting System (PBS). (n.d.). Marijuana timeline: Busted: America's war on marijuana. <https://www.pbs.org/wgbh/pages/frontline/shows/dope/etc/cron.html>
- Qualtrics. (n.d.). *Student and faculty research*. <https://www.qualtrics.com/education/student-and-faculty-research/>
- Rense, S. (2021, April). Here are all the states that have legalized weed in the U.S. *Esquire*, 1-10. <https://www.esquire.com/lifestyle/a21719186/all-states-that-legalized-weed-in-us/>
- Safe Supportive Learning. (n.d.). <https://safesupportivelearning.ed.gov/sites/default/files/hec/product/dfscr.pdf>
- Salas-Wright, C. P., Vaughn, M. G., Todic, J., Cordova, D., & Perron, B. E. (2015). Trends in the disapproval and use of marijuana among adolescents and young adults in the United States: 2002-2013. *The American Journal of Drug and Alcohol Abuse*, 41(5), 392-404. <https://doi.org/10.3109/00952990.2015.1049493>
- Schmidt, L. A., Jacobs, L. M., & Spetz, J. (2016). Young people's more permissive views about marijuana: Local impact of state laws or national trend? *American Journal of Public Health*, 106(8), 1498-1503. <https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2016.303153>
- Sue, D. W., Capodilupo, C. M., Torino, G. C., Bucceri, J. M., Holder, A. M., Nadal, K. L., & Esquilin, M. (2007). Racial microaggressions in everyday life. Implications for clinical practice. *American Psychologist*, 62(4), 271-286. <https://doi.org/10.1037/0003-066x.62.4.271>
- Thallman, S. (2019). The history of cannabis use: Harry Anslinger and Prohibition. *Ohio Marijuana Card*. <https://www.ohiomarijuanacard.com/post/the-history-of-cannabis-use-harry-anslinger-and-prohibition>

- Tinto, V. (1975). Dropout from higher education: A theoretical synthesis of recent research. *Review of Educational Research, 45*(1), 89-125. <https://www.jstor.org/stable/1170024?seq=1>
- Tinto, V. (2017). Reflections on student persistence. *Student Success, 8*(2), 1-8. <http://dx.doi.org/10.5204/ssj.v8i2.376>
- Troup, L. J., Andrzejewski, J. A., Braunwalder, J. T., & Torrence, R. D. (2016). The relationship between cannabis use and measures of anxiety and depression in a sample of college campus cannabis users and non-users post state legalization in Colorado. *Peer J, 4*, 1-14. <https://doi.org/10.7717/peerj.2782>
- Vidourek, R. A., King, K. A., Merianos, A. L., Burbage, M., & Oluwoye, O. (2018). Marijuana use among college students and attitudes towards legalization. *American Journal of Health Studies, 33*(2), 1-17. <https://hecaod.osu.edu/marijuana-use-among-college-students-and-attitude-towards-legalization/>
- Wang, G. S., Haynes, C., Besharat, A., Le Lait, M. C., Green, J. L., Dart, R. C., & Roosevelt, G. (2019). Brief Report: Characterization of marijuana use in U.S. college students by state marijuana legalization status as reported to an online survey. *American Journal on Addictions, 28*, 266-269. <https://doi.org/10.1111/ajad.12870>
- Warner, R. M. (2013). *Applied statistics: From bivariate through multivariate techniques* (2nd ed.). Sage.
- World Health Organization. (2020). *Management of substance abuse: Cannabis*. https://www.who.int/substance_abuse/facts/cannabis/en/

- Wright, A. C., Cather, C., Farabaugh, A., Terechina, O., Pedrelli, P., Nyer, M., Fava, M., & Holt, D. J. (2021). Relationship between cannabis use and psychotic experiences in college students. *Schizophrenia Research*, 231, 198-204. <https://doi.org/10.1016/j.schres.2021.04.004>
- Wu, L., Zhu, H., & Swartz, M. S. (2016). Trends in cannabis use disorders among racial/ethnic population groups in the United States, *Drug and Alcohol Dependence* 165, 181-190. <http://dx.doi.org/10.1016/j.drugalcdep.2016.06.002>
- Yu, B., Chen, X., & Yan, H. (2020). Marijuana legalization and historical trends in marijuana use among US residents aged 12-25: Results from the 1979-2016 National Survey on Drug Use and Health. BioMed Central Public Health, 20(1), 156-160. <https://doi.org/10.1186/s12889-020-8253-4>

Appendix A

The Instrument

DFAQ-CU INVENTORY

Instructions: Please read each of the following questions and mark the response alternative that best describes your use of cannabis. *Note that the term cannabis is being used to refer to marijuana, cannabis concentrates, and cannabis-infused edibles.*

1. Have you ever used cannabis?

0 = No

1 = Yes

*If response = 0 then skip to end of questionnaire

2. Which of the following best captures when you last used cannabis?

1 = over a year ago

7 = last week

2 = 9 – 12 months ago

8 = this week

3 = 6 – 9 months ago

9 = yesterday

4 = 3 – 6 months ago

10 = today*

5 = 1 – 3 months ago

11 = I am currently high*

6 = less than 1 month ago

*If response = 10 (today) or 11 (I am currently high) then answer 2b below

2b. How high are you right now?

0 = I am not at all high

1 = I am a little bit high

2 = I am moderately high

3 = I am very high

4 = I am extremely high

3. Which of the following best captures the average frequency you currently use cannabis?

7 = once a week

1 = less than once a year

8 = twice a week

2 = once a year

9 = 3 – 4 times a week

3 = once every 3-6 months (2-4 times/yr))

10 = 5 – 6 times a week

4 = once every 2 months (6 times/yr)

11 = once a day

5 = once a month (12 times/yr)

12 = more than once a day

6 = 2 – 3 times a month

4. Which of the following best captures how long you have been using cannabis **at this frequency?**

- | | |
|-----------------------|-------------------------|
| 1 = less than 1 month | 7 = 2 – 3 years |
| 2 = 1 – 3 months | 8 = 3 – 5 years |
| 3 = 3 – 6 months | 9 = 5 – 10 years |
| 4 = 6 – 9 months | 10 = 10 – 15 years |
| 5 = 9 – 12 months | 11 = 15 – 20 years |
| 6 = 1 – 2 years | 12 = more than 20 years |

5. Before the period of time you indicated above, how frequently did you use cannabis?

- | | |
|---|---------------------------|
| 1 = less than once a year | 7 = once a week |
| 2 = once a year | 8 = twice a week |
| 3 = once every 3-6 months (2-4 times/yr.) | 9 = 3 – 4 times a week |
| 4 = once every 2 months (6 times/yr.) | 10 = 5 – 6 times a week |
| 5 = once a month | 11 = once a day |
| 6 = 2 – 3 times a month | 12 = more than once a day |

6. How many days of the past week did you use cannabis?

- | | |
|------------|------------|
| 1 = 1 day | 4 = 4 days |
| 2 = 2 days | 5 = 5 days |
| 3 = 3 days | 6 = 6 days |
| | 7 = 7 days |

7. Approximately how many days of the past month did you use cannabis? _____

8. Which of the following best captures the number of times you have used cannabis in your entire life?

- | | |
|--------------------------------|--|
| 1 = 1 – 5 times in my life | 6 = 501 – 1000 times in my life |
| 2 = 6 – 10 times in my life | 7 = 1001 – 2000 times in my life |
| 3 = 11 – 50 times in my life | 8 = 2001 – 5000 times in my life |
| 4 = 51 – 100 times in my life | 9 = 5001 – 10,000 times in my life |
| 5 = 101 – 500 times in my life | 10 = More than 10,000 times in my life |

9. Which of the following best captures your pattern of cannabis use throughout the week?

- 1 = I only use cannabis on weekends
- 2 = I only use cannabis on weekdays
- 3 = I use cannabis on weekends and weekdays

10. How many hours after waking up do you typically first use cannabis?

- | | |
|-----------------------------------|---------------------------------|
| 1 = 12 – 18 hours after waking up | 4 = 3 – 6 hours after waking up |
| 2 = 9 – 12 hours after waking up | 5 = 1 – 3 hours after waking up |
| 3 = 6 – 9 hours after waking up | 6 = within 1 hour of waking up |

7 = within ½ hour of waking up

8 = immediately upon waking up

11. How many times a day, on a typical weekday, do you use cannabis? _____

12. How many times a day, on a typical weekend, do you use cannabis? _____

13. What is the primary method you use to ingest cannabis?

- | | |
|---------------------------------|---|
| 1 = Joints | 5 = Hookah |
| 2 = Blunts (cigar sized joints) | 6 = Vaporizer (e.g., Volcano, Vape pen) |
| 3 = Hand pipe | 7 = Edibles |
| 4 = Bong (water pipe) | 8 = Other _____ |

14. Which of the following other methods to ingest cannabis do you use **regularly** (at least 25% of the time you use cannabis)? [Mark all that apply]

- | | |
|---------------------------------|---|
| 1 = Joints | 5 = Hookah |
| 2 = Blunts (cigar sized joints) | 6 = Vaporizer (e.g., Volcano, Vape pen) |
| 3 = Hand pipe | 7 = Edibles |
| 4 = Bong (water pipe) | 8 = Other _____ |

15. What is the primary form of cannabis you use?

- A = Marijuana***
 B = Concentrates (e.g., Oil, Wax, Shatter, Butane Hash Oil, Dabs)**
 C = Edibles*
 D = Other _____

16. What other forms of cannabis do you use **regularly** (at least 25% of the time you use cannabis)? [Mark all that apply]

- A = Marijuana***
 B = Concentrates (e.g., Oil, Wax, Shatter, Butane Hash Oil, Dabs)**
 C = Edibles*
 D = Other _____

****If response to questions 15 and 16 = 0 (None) then skip to question 29

***If responses to questions 15 or 16 = A (Marijuana) then answer questions 17-21

**If responses to question 15 or 16 = B (Concentrates) then answer questions 22-26

*If responses to question 15 or 16 = C (Edibles) then answer question 27

Note: If you use more than one form of cannabis then complete all of the associated questions listed above.

***If responses to questions 15 or 16 = A (Marijuana) then answer questions 17-21 below.

Please use the image below to refer to various quantities of marijuana. The image is not to scale; the dollar bill is included to help provide size perspective.

Deleted photo to comply with copyright.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5446174/bin/pone.0178194.s001.docx>

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For questions 17 to 19 below, clearly indicate the number of grams of marijuana you use with a number between 0 – 100. Do NOT include other forms of cannabis you may use (such as concentrates). You may use up to 3 decimals to indicate amounts under 1 gram.

Note: 1/8 of a gram = 0.125 grams, 1/4 of a gram = 0.25 grams, 1/2 of a gram = 0.5 grams, 3/4 of a gram = 0.75 grams. 1/8 of an ounce = 3.5 grams, 1/4 of an ounce = 7 grams, 1/2 ounce = 14 grams, 1 ounce = 28 grams

17. In a typical session, how much marijuana do you personally use? _____

18. On a typical day you use marijuana, how much do you personally use? _____

19. In a typical week you use marijuana, how much marijuana do you personally use? _____

20. On a typical day you use marijuana, how many sessions do you have? _____

21. What is the average THC content of the marijuana you typically use? Leave blank if you do not know.

1 = 0 – 4%

5 = 20 – 24%

2 = 5 – 9%

6 = 25 – 30%

3 = 10 – 14%

7 = greater than 30%

4 = 15 – 19%

**If response to questions 15 or 16 = B (Concentrates) then answer questions 22-26 below

22. In a typical session you use cannabis concentrates, how many hits do you personally take? _____

23. On a typical day you use cannabis concentrates, how many hits do you personally take? _____

24. How many hits of cannabis concentrates did you personally take yesterday? _____

25. On a typical day you use cannabis concentrates, how many sessions do you have? _____

26. What is the average THC content of the concentrates you typically use? Leave blank if you do not know.

1 = 0 – 9	6 = 50 – 59%
2 = 10 – 19%	7 = 60 – 69%
3 = 20 – 29%	8 = 70 – 79%
4 = 30 – 39%	9 = 80 – 90%
5 = 40 – 49%	10 = greater than 90

***If response to questions 15 or 16 = C (Edibles) then answer question 27 below*

27. When you eat edibles how many milligrams of THC do you personally ingest in a typical session? _____

28. What is your current age? _____

29. How many years in total have you used cannabis? _____

30. How old were you when you FIRST tried cannabis? _____

31. Has there been any time in your life when you used cannabis regularly (2 or more times per month for 6 months or longer)?

- 0 = No
- 1 = Yes*

**If response = 1 (Yes) then answer questions 31b and 31c below*

31b. How old were you when you FIRST STARTED using cannabis regularly (2 or more? times/month)? _____

31c. Has there been any time in your life when you used cannabis on a daily or near daily basis for 6 months or longer?

- 0 = No
- 1 = Yes*

**If response = 1 (Yes) then answer question 31ci below*

31ci. How old were you when you FIRST STARTED using cannabis on a daily or near daily basis? _____

32. Which of the following best captures the average frequency that you used cannabis before the age of 16?

- 0 = more than once a day
- 1 = once a day

2 = 5 – 6 times a week
3 = 3 – 4 times a week
4 = twice a week
5 = once a week
6 = 2 – 3 times a month
7 = once a month

8 = once every 2 months (6 times/yr.)
9 = once every 3-6 months (2-4 times/yr.)
10 = once a year
11 = less than once a year
12 = never

33. Do you have a physician's recommendation to use cannabis for medicinal purposes?

- 0 = No
1 = Yes*
2 = Yes, but I use it for both medicinal and recreational purposes*

**If response = 1 or 2 (Yes) then answer questions 33b and 33c*

33b. Which medical condition(s) do you use cannabis for?

33c. What percentage of the time do you use cannabis for recreational (rather than medicinal) purposes? _____

DFAQ-CU Scoring

Daily Sessions Items: 20, 25

Frequency Items: 2, 3, 6, 7, 8, 9, 10, 11, 12

Age of Onset Items: 30, 31b, 31ci, 32

Marijuana Quantity Items: 17, 18, 19

Concentrate Quantity Items: 22, 23, 24,

Edibles Quantity Item: 27

Note: Standardize (z-transform) scores prior to calculating the mean of each of the 6 factors (daily sessions, frequency, age of onset, marijuana quantity, concentrate quantity, edibles quantity).

Screening/Characterization Items: 1, 2b, 4, 5, 13, 14, 15, 16, 21, 26, 28, 29, 31, 31c, 33, 33b, 33c

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Appendix B

Permission from Chancellor to Survey Students

November 1, 2021

Chancellor

California state university
401 Golden Shore
Long Beach, California 90802

Dear Chancellor:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a PhD. in Higher Education Administration: Educational Leadership. The title of my research project is frequency of marijuana use by California university students based on gender and ethnicity: A quantitative analysis. The purpose of my research is to determine the frequency of use of marijuana by college students based on their gender and ethnicity to establish a baseline of information on the profile of the college-based marijuana user in California.

I am writing to request your permission to utilize your students currently enrolled at any one of the 23 California State Universities for my research.

Participants will be asked to go to Qualtrics webpage and click on the link provided to complete the attached survey. The information shared in this project will be coded to ensure student privacy is protected. The data will be used to determine the current frequency of use of marijuana by students currently enrolled in a California state university. Participants will be presented with informed consent information prior to participating. Taking part in this study is completely voluntary, and participants are welcome to discontinue participation at any time.

Thank you for considering my request. If you choose to grant permission, please provide a signed statement on official letterhead indicating your approval or respond by email to. A permission letter document is attached for your convenience.

Sincerely,

Evelyn Anderson
Doctoral Candidate

Appendix C

Demographic Questionnaire

Please respond to the following questions:

Question: **Gender:** What is your gender?

Male _____

Female _____

Question: **Age:** What is your age?

18 years old _____

19 years old _____

21 years old _____

22 years old _____

23 years old _____

24 years old _____

25 years old _____

Question: **Ethnic origin:** Please specify your ethnicity?

Caucasian _____

Hispanic or Latino _____

African American _____

Asian American _____

Appendix D

Participant Rights and Consent Form

Title of the Project: Frequency of marijuana use by California university students based on gender and ethnicity.

Student: Evelyn L. Anderson, doctoral candidate, Liberty University

Principal Investigator: Evelyn L. Anderson, doctoral candidate, Liberty University

Invitation to be Part of a Research Study

You are invited to participate in a research study. To participate, you must be between the ages of 18 – 25 and a student at one of the 23 California state universities. Taking part in this research project is voluntary.

Please take time to read this entire form and ask questions before deciding whether to take part in this research project.

What is the study about and why is it being done?

The purpose of my research is to determine the frequency of use of marijuana by California university students based on gender and ethnicity. The study is being done to establish a baseline of information on the profile of the college-based marijuana user in California.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to do the following things:

1. Participants will be asked to complete a demographic survey at the beginning of the survey all your responses will be saved electronically but scrubbed of any personal identifiers.
2. Participants will be asked to complete the Daily Sessions, Frequency, Age of Onset, and Quantity of Cannabis Use Inventory (DFAQ-CU). All of your responses will be saved electronically but scrubbed of any personal identifiers.

How could you or others benefit from this study?

Participants should not expect to receive a direct benefit from taking part in this study.

What risks might you experience from being in this study?

The risks involved in this study are minimal, which means they are equal to the risks you would encounter in everyday life.

How will personal information be protected?

The records of this study will be kept private. Published reports will not include any information that will make it possible to identify a subject. Research records will be stored securely, and only the researcher will have access to the records. Data collected from you may be shared for use in future research studies or with other researchers. If data collected from you is shared, any

information that could identify you, if applicable, will be removed before the data is shared.

- Participant responses will be anonymous.
- Data will be stored on a password-locked computer and may be used in future presentations. After three years, all electronic records will be deleted.
- Data will be transcribed it will be stored on a password locked computer for three years and then erased. Only the researcher will have access to these transcripts.
- Confidentiality will be anonymous meaning the researcher, will not be able to link your data (e.g., survey responses, grades, etc.) to the specific participant who provided or are associated with the data.

Does the researcher have any conflicts of interest?

The researcher serves as student at Liberty University. To limit potential or perceived conflicts of interest the study will be anonymous, so the researcher will not know who participated. This disclosure is made so that you can decide if this relationship will affect your willingness to participate in this study. No action will be taken against an individual based on his or her decision to participate in this study.

Is study participation voluntary?

Participation in this study is voluntary. Your decision whether to participate will not affect your current or future relations with Liberty University or any of the 23 California state universities. If you decide to participate, you are free to not answer any question or withdraw at any time prior to submitting the survey without affecting those relationships.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please exit the survey and close your internet browser or inform the researcher that you wish to discontinue your participation, and do not submit your study materials. Your responses will not be recorded or included in the study.

Whom do you contact if you have questions or concerns about the study?

The researcher conducting this study is Evelyn L. Anderson. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact her at or. You may also contact the researcher's faculty sponsor.

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and would like to talk to someone other than the researcher, **you are encouraged** to contact the Institutional Review Board.

Your Consent

Before agreeing to be part of the research, please be sure that you understand what the study is about. You will be given a copy of this document for your records/you can print a copy of the document for your records. If you have any questions about the study later, you can contact the researcher/study team using the information provided.

By signing this document, you are agreeing to be in this study. Make sure you understand what the study is about before you sign. You will be given a copy of this document for your records. The researcher will keep a copy with the study records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.

I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

Printed Subject Name

Signature & Date

Appendix E

Permission Letter California State Universities

November 1, 2021

Fresno State University
5241 N. Maple Avenue
Fresno, California 93740

Dear Dr.:

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a PhD. in Higher Education Administration: Educational Leadership. The title of my research project is the frequency of marijuana use by California university students based on gender and ethnicity: A quantitative analysis. The purpose of my research is to determine the frequency of marijuana use by college students based on their gender and ethnicity to establish a baseline of information on the profile of the college-based marijuana user in California.

I am writing to request your permission to utilize your students currently enrolled at Fresno State University for my research.

Participants will be asked to go to Qualtrics webpage and click on the link provided to complete the attached survey. The information shared in this project will be coded to ensure student privacy is protected. The data will be used to determine the current frequency of use of marijuana by students currently enrolled in a California state university. Participants will be presented with informed consent information prior to participating. Taking part in this study is completely voluntary, and participants are welcome to discontinue participation at any time.

Thank you for considering my request. If you choose to grant permission, please provide a signed statement on official letterhead indicating your approval or respond by email. A permission letter document is attached for your convenience.

Sincerely,

Evelyn Anderson
Doctoral Candidate

Appendix F

Recruitment Template Social Media

Linked In and Reddit

ATTENTION STUDENTS: I am conducting research as part of the requirements for a PhD. In Higher Education Administration: Educational Leadership at Liberty University. The purpose of my research is to determine the frequency of marijuana use by California university students. To participate, you must be between the ages of 18-25 and currently enrolled at a California state university. Participants will be asked to anonymously complete the DFAQ-CU Inventory and a demographic survey. Both will take approximately 30 minutes to complete. If you would like to participate and meet the study criteria, please click [here](#):

Facebook

ATTENTION FACEBOOK FRIENDS: I am conducting research as part of the requirements for a PhD. in Higher Education Administration: Educational Leadership degree at Liberty University. The purpose of my research is to determine the frequency of marijuana use by California university students. To participate, you must be between the ages of 18-25 and currently attending a California state university. Participants will be asked to complete an anonymous online survey, which should take about 30 minutes. If you would like to participate, and meet the study criteria, please click the link provided at the end of this post.

To take the survey, click [here](#):

Twitter

Are you a California university student between the ages of 18-25? Click [here](#) for information about a research study on the frequency of marijuana use.

Appendix G

Letter of Introduction to Students

November 1, 2021

Student research participant

California state university
401 Golden Shore
Long Beach, California 90802

Dear student participant:

Participants must be between the ages of 18 and 25, currently enrolled in a California state university, and can provide informed consent. Participants, if willing, will be asked to go to the Qualtrics webpage and click on the link provided to complete a survey. The information shared in this project will be coded to ensure student privacy is protected. The data will be used to determine the current frequency of marijuana use by students currently enrolled in a California state university. Participants will be presented with informed consent information before participating. Taking part in this study is entirely voluntary, and participants are welcome to discontinue participation at any time. It should take approximately 30 minutes to complete the procedure listed. Participation will be completely anonymous, and no personal, identifying information will be collected.

A consent document is provided as the first page of the survey and is attached to this letter. The consent document contains additional information about my research. To participate, ([click here](#):). Because participation is anonymous, you do not need to sign and return the consent document unless you prefer to do so. After reading the consent form, please click “agree” to proceed to the survey. Doing so will indicate that you have read the consent information and would like to participate in the survey.

Sincerely,

Evelyn Anderson
Doctoral Candidate