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Social Anxiety and Substance Use in College Students: Understanding the Potential Role of Substance Use Expectancies and Fear of Evaluation

Abstract

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Degree Type

Dissertation/Thesis

Degree Name

Master of Arts (MA)

Department

Psychology

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Keywords

Psychology, Social Anxiety, Substance Use, Fear of Evaluation

Subject Categories

Clinical Psychology

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Contents

Introduction.....	4
Literature Review.....	5
Methodology.....	18
Results.....	24
Discussion.....	29
Limitations.....	33
Implications and Future Directions.....	34
References.....	37
Tables and Figures.....	51
Appendices.....	60

Social Anxiety and Substance Use in College Students: Understanding the Potential Role of Substance Use Expectancies and Fear of Evaluation

College marks a period of transition from late adolescence to young adulthood. Individuals entering college are faced with a variety of novel social situations, such as moving to a new place, meeting new people, attending social gatherings, and getting into serious relationships. For individuals with social anxiety, these social situations can be distressing, and to cope with these distressing social situations, socially anxious college students may use various coping strategies. One of these strategies is alcohol use. Research has revealed mixed results for the relationship between social anxiety and alcohol use, but studies have generally found a positive link between social anxiety and alcohol use (Neighbors, Fossos, Woods, Fabiano, Sledge & Frost, 2007; Stewart, Morris, Mellings, & Komar, 2006). Alcohol use behaviors among individuals with social anxiety also are influenced by outcome expectancies, which are the perceived consequences of alcohol use. Alcohol expectancies can be categorized as either positive or negative. The co-occurrence between social anxiety and alcohol-related problems has been found to cause greater levels of impairment than either condition alone (Howell, Buckner & Weeks, 2016). Therefore, the identification of factors related to alcohol use among socially anxious individuals could have important implications for treatment and prevention. This paper reviews the literature on social anxiety and alcohol use expectancies and presents the findings of a study that evaluates the predictive ability of social anxiety and alcohol use expectancies on alcohol use.

Research has revealed that marijuana use has continued to increase over the past five years for college students and in 2020 reached the highest level in over three-and-a-half decades. Recreational cannabis use has been legalized in twenty-three states. However, given the limited

research on the relationship between social anxiety and cannabis use, it is difficult to predict how this might affect cannabis use by socially anxious individuals. It also would be helpful to understand how cannabis use expectancies affect cannabis use. Thus, this study explores the predictive ability of social anxiety and cannabis use expectancies on cannabis use.

Social anxiety is a multifaceted construct, and it is important to consider which specific facets contribute to substance use. Fear of negative and positive evaluation are hallmark cognitive components of social anxiety. However, there is limited literature for understanding the relationship between fear of evaluation and substance use. Hence, this study attempted to determine whether fear of evaluation as an independent construct of social anxiety is a significant predictor of substance use (alcohol and cannabis).

Social Anxiety

Social anxiety refers to a condition where individuals fear and tend to avoid social and performance situations in which they anticipate negative evaluations by others (Aderka, Haker, Marom, & Hermesh, 2013; Jefferies & Ungar, 2020). Individuals with social anxiety tend to perceive social situations as dangerous and fear scrutiny from others, which leads to feelings of anxiety. Anxiety may be experienced as somatic symptoms (sweating, blushing, shaking), cognitive symptoms (mental blanks), and/or arousal symptoms (hypervigilance) (Clark, 2001). An extreme and persistent fear of embarrassment and humiliation forms the hallmark of social anxiety (American Psychiatric Association, 2013). Socially anxious individuals may avoid social situations, including public speaking, expressing opinions, and socializing with peers (Stein & Stein, 2008).

Clark and Wells (1995) introduced a model of social phobia that provides a cognitive behavioral formulation of social anxiety. According to this model, an individual's early life

experiences lead to the development of a set of faulty beliefs and assumptions about themselves and the social world. These assumptions predispose individuals with social anxiety to appraise particular social situations as dangerous and to predict that they will be unable to meet the standards for performance.

This model discusses several psycho-pathological processes that can prevent individuals with social anxiety from invalidating their faulty beliefs. First, a key component of negative self-processing is the shift in attention to detailed monitoring of the self. This process also can cause an enhancement in awareness of feared anxiety responses. Individuals with social anxiety may experience somatic symptoms, like sweating, shaking, and blushing, and become hypervigilant of these symptoms. This tendency interferes with processing the situation and other people's behavior, which further serves to maintain negative self-impression. Second, socially anxious individuals tend to engage in safety behaviors (e.g., substance use, avoiding eye contact, or shaking hands) that are intended to reduce the risk of negative evaluation and rejection. When engagement in safety behaviors leads to the non-occurrence of the feared catastrophe, relief from social anxiety symptoms typically is attributed to the use of safety behaviors. Clark and Wells (1995) further suggest that individuals with social anxiety demonstrate a deficit in performance that is induced by their anxiety, and they overestimate the negative evaluation of their performance by others. Finally, the model discusses that individuals with social anxiety tend to review social events and interactions in detail and this review is biased by focusing on failures, negative feelings and experiences in the situation, and cues that are indicative of disapproval from others.

According to a theoretical model developed by Hofmann (2007), individuals with social anxiety disorder perceive the social standard as being high and doubt their ability to make

desirable impressions which makes them apprehensive in social situations. Like the Clark and Wells (1995) model, this model suggests that socially anxious individuals exaggerate the probability of a negative outcome in social situations and overestimate the potential social costs associated with the event. This model further posits that individuals with social anxiety disorder perceive little control over their anxiety response in social situations and consider their social skills to be poor and inadequate, which may lead them to anticipate social mishaps, use safety behaviors, or engage in post-event rumination (Hofmann, 2007).

Rapee and Heimberg's (1997) cognitive-behavioral model is similar to the Clark and Wells (1995) model but proposes that individuals with social anxiety give significant importance to being positively evaluated by others yet generally view others as critical and assume that evaluation will be inherently negative (Penney & Abbott, 2014). According to this model, socially anxious individuals create a mental representation of themselves as would be seen by others in a social situation. This mental representation is formed based on past experiences, internal and external cues, and is often exaggerated in a negative sense. Individuals' attentional resources are allocated to simultaneously monitor their own behavior as well as potential external signs of threat (Penney & Abbott, 2014).

Social Anxiety in College Students

According to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; American Psychiatric Association, 2013), the median age of onset of social anxiety disorder in the US is 13 years. As individuals undergo the transition from adolescent years to young adulthood, they are likely to experience novel social situations, and impairments associated with social anxiety disorder would persist into adulthood (Leigh & Clark, 2018). Jefferies and Ungar (2020) conducted a study to explore the prevalence of social anxiety in young adults (ages 16-29

years) in seven different countries around the world - Brazil, China, Indonesia, Russia, Thailand, the US, and Vietnam. Results revealed that over a third of participants met the threshold for Social Anxiety Disorder and concluded that these levels of social anxiety were significantly higher than those previously reported. Results also revealed that the US has higher rates of social anxiety when compared to other countries included in the study and that those aged 18–24 may be most at risk.

Research has revealed that social anxiety has become increasingly common in traditional-aged college students (Schry, Roberson-Nay, & White, 2012), particularly when we take a dimensional approach and consider sub-clinical social anxiety. The prevalence rate of social anxiety disorder has been found to be approximately 19% in undergraduate students (Van Ameringen, Mancini, & Farvolden, 2003). However, when considering sub-clinical social anxiety, Strahan (2003) reported that about 33% of college students experience symptoms of social anxiety. College is a period of transition. College students are likely to face novel and potentially anxiety-provoking social situations, e.g., meeting new people, moving to a new place, participating in lectures (Burke & Stephens, 1999; Terlecki, Ecker, & Buckner, 2014). College can be highly distressing for individuals with social anxiety due to its high degree of demand for socialization (Nordstrom, Goguen, & Hiester, 2012). Higher levels of social anxiety can affect functioning in various domains and lower general well-being (Mineka, Watson, & Clark, 1998). College students with social anxiety may experience interpersonal problems and social isolation. Undergraduate students with high levels of social anxiety are less assertive and viewed as being more vulnerable to threats (Schry, Roberson-Nay, & White, 2012). To cope with distressing social situations encountered in college, socially anxious college students may use cognitive avoidance (e.g., distraction) or behavioral avoidance (e.g., using substances).

Fear of Evaluation

Fear of evaluation is a commonly associated and well-researched cognitive component of social anxiety that influences the experience of social anxiety in an individual (Clark & Wells, 1995; Hofmann, 2007; Rapee & Heimberg, 1997). Watson and Friend (1969) describe the fear of negative evaluation (FNE) as a feeling of apprehension about others' evaluations and the expectation that others would evaluate the individual negatively. It is also associated with experiencing distress over negative evaluations by others and avoidance of evaluative situations.

Recently, research studies have indicated that individuals with social anxiety are also characterized by high levels of fear of positive evaluation (FPE) (Weinbrecht, Roepke, & Renneberg, 2020). This complimentary construct of social anxiety can be described as feelings of discomfort in the face of favorable evaluation which may result in behavioral avoidance of such occasions (Reichenberger, Smyth, & Blechert, 2018). Fear of positive evaluation is related to being put in the spotlight and having to perform up to this new level of expectations (Weeks, Jakatdar, & Heimberg, 2010). The psycho-evolutionary framework can be used to understand the purpose served by these two components of social anxiety. Negative evaluations may result in a decrease in social status leading to social exclusion whereas positive evaluations may result in a relative increase in social rank which might result in conflicts with more dominant group members. Thus, avoiding positive and negative evaluations ensures a stable intermediate position in the social hierarchy, thereby serving a protective function for persons prone to social anxiety (Reichenberger, Smyth, & Blechert, 2018).

Studies have shown that FNE and FPE are unique constructs (Reichenberger et al., 2015; Weeks et al., 2008). FNE and FPE account for independent variance in social anxiety but can produce greater levels of impairment when occurring together (Reichenberger, Smyth, &

Blechert, 2018). Weeks and Howell (2012) also proposed and found strong support for the 'Bivalent Fear of Evaluation Model' which states that FNE and FPE may be related but are distinct components of social anxiety.

Social anxiety is a multifaceted construct, and it is important to consider which specific facets contribute to substance use. Villarosa-Hurlocker et al. (2018) tested a sequential mediation model of the cognitive (i.e., fear of negative evaluation) and behavioral (protective behavioral strategies) mechanisms to predict whether fear of negative evaluation predicts the drinking behaviors of students with social anxiety and found that FNE accounts for the relationship between interaction social anxiety disorder and alcohol-related negative consequences. In another study of college students, Howell, Buckner and Weeks (2016) explored the found that FPE significantly predicted alcohol use problems, above and beyond FNE.

Although both FNE and FPE are well-researched cognitive components of social anxiety, there is limited literature for understanding the relationship between fear of evaluation and substance use (alcohol and cannabis). Current research attempted to bridge this gap in the literature and examined the relationship between these two individual and independent constructs of social anxiety and substance use. Understanding the role of FNE and FPE in substance use will help design interventions that will assess for and target these constructs when treating co-occurring social anxiety and substance use problems.

Substance Use Behaviors

Lipari and Jean-Francois (2016) presented the combined findings of data from the 2011 to 2014 National Surveys on Drug Use and Health (NSDUHs) of substance use among full-time and part-time college students ages 18 to 22 years. On an average day for both full-time and part-time college students, alcohol and marijuana were the most frequently used substances.

Alcohol consumption has been long associated with college life. Recreational drinking has been found to be common among college students and the integration of substance use into the normative tradition of the college experience is one of the significant challenges in addressing college campus substance use (Terlecki, Buckner, Larimer, & Copeland, 2015; Welsh, Shentu, & Sarvey, 2019). Furthermore, challenges associated with beginning college life, like adjustment to new social networks, separation from family, and increased academic pressures, may lead to increased alcohol consumption (Welsh et al., 2019).

In a national survey conducted by Substance Abuse and Mental Health Services Administration (SAMHSA, 2013) it was found that full-time college students were more likely to be current (59.4%), binge (39%), or heavy drinkers (12.7%) as compared to part-time students or unenrolled individuals (50.6% current, 33.4% binge, and 9.3% heavy drinkers).

In a 2020 study sponsored by the National Institute on Drug Abuse at The National Institutes of Health, annual marijuana use has continued to increase over the past five years for college students and has reached the highest level in over three-and-a-half decades in 2020. Some studies also have demonstrated an escalation in cannabis use during college years with each successive year (Arria, 2008). The impact of cannabis use on memory and learning and its negative role in academic and health outcomes for college students is well established by previous studies (Welsh et al., 2019).

The recreational consumption of cannabis products has been legalized in several states in America. Given the increase in substance use behaviors among college students and the legalization of cannabis use for recreational use, it is important to analyze the potential predictors of substance use (alcohol and cannabis) among college students.

Social Anxiety and Alcohol Use

The relationship between social anxiety and alcohol use has been well-researched; however, research has revealed mixed results. Social anxiety is highly comorbid with alcohol use disorders and social anxiety premediates alcohol use (e.g., Davidson et al., 1993; Kessler et al., 2005). Several studies have found a positive relationship between social anxiety and alcohol use, for both use quantity and use frequency (Neighbors et al., 2007; Stewart et al., 2006). According to Buckner and Schmidt (2009), those who use alcohol to cope with their anxiety symptoms are at a higher risk for problems related to alcohol. Terlecki, Ecker, and Buckner (2014) found that social anxiety symptoms for college students are related to heavier drinking behaviors in social situations and more drinking problems as compared to those who do not experience social anxiety symptoms. Schry and White (2013) found that individuals with high social anxiety tend to report greater drinking behaviors to cope in social situations. In another study, individuals with high social anxiety are more likely to go to social events if alcohol is present (Buckner & Heimberg, 2010).

Some studies also have found an inverse relationship between social anxiety and alcohol use (Neighbors et al., 2007; Stewart et al., 2006). Schry and White (2013) conducted a meta-analysis to examine the relationship between social anxiety and alcohol variables in college students. Results revealed that social anxiety was negatively correlated with alcohol use variables and college students with high social anxiety drank less frequently, consumed less alcohol, and consumed fewer drinks. Ham, Bonnin, and Hope (2007) attempted to examine the relationship between drinking motives and social anxiety and results indicated that social anxiety was negatively related to weekly alcohol use and unrelated to alcohol-related problems.

Finally, some studies have found a non-significant relationship between social anxiety and drinking quantity and frequency (Buckner, Ecker, & Proctor, 2011; Buckner et al., 2006; O'Grady et al., 2011; Schmidt, & Taylor, 2006).

A potential reason for these mixed findings may be the lack of a standard definition of constructs such as 'alcohol use,' 'drinking behaviors,' and 'problematic drinking.' Researchers differ in their conceptualization of alcohol use and problematic drinking. Some research has only focused on the quantity and frequency of substance alcohol consumption, whereas others also have included alcohol-related problems. Another reason for the mixed findings in the relationship between social anxiety and alcohol use may be the wide variety of methods and measures. Certain measures only focus on the quantity and frequency of alcohol consumption. In the current study, the Alcohol Use Disorders Identification Test (AUDIT; Babor et al., 1992) was used to assess alcohol use behaviors among college students. This measure examined not only the frequency and quantity of use but also the negative consequences of alcohol use which can be helpful in determining whether a person's drinking has become problematic.

Alcohol Use Expectancies

Alcohol use expectancies can be described as people's beliefs about the effects of consuming alcohol that tend to influence their drinking behavior (Ham & Hope, 2005). According to Bandura's Social Cognitive Theory, drinking behavior is partly influenced by outcome expectancies of consuming alcohol which represents alcohol-related reinforcement (Young et al., 2006). According to the Expectancy Theory (Brown et al., 1980), a combination of high positive outcome expectancies and low negative outcome expectancies of alcohol use leads to excessive consumption of alcohol (Burke & Stephens, 1999).

Alcohol expectancies typically are categorized as either positive or negative. Positive outcome expectancies refer to beliefs that alcohol use will contribute to pleasant or beneficial outcomes (Blume & Guttu, 2015). Brown and colleagues (1980) identified six distinct positive expectancies related to alcohol use: tension reduction and relaxation, increased social assertiveness, physical and social pleasure enhancement, arousal and aggression, global positive changes, and sexual enhancement. Negative expectancies refer to the beliefs that alcohol use will lead to undesirable outcomes, such as cognitive and behavioral impairment, risk and aggression, depressant effects, and negative self-perception (Fromme & Kaplan, 1993; Ham et al., 2002; Ham et al., 2016).

Alcohol expectancies are predictors of drinking behaviors and have been linked to the quantity of drinking (Bot, Engels, & Knibbe, 2005; Carrigan et al., 2009; Gilles et al., 2006; Ham & Hope, 2005). Previous research has also demonstrated that alcohol expectancies are associated with greater alcohol use among young adults (Fromme et al., 1993; Ham et al., 2005). The relationship between positive alcohol use expectancies and drinking behaviors has been supported by a considerable amount of past research. However, research related to the predictive role of negative alcohol expectancies has revealed inconsistent results. Some studies have revealed that negative alcohol use expectancies are related to problematic drinking (Zamboanga et al., 2010). Other studies have found a negative association between negative alcohol use expectancies and drinking (Fromme & D'Amico, 2000; Nicolai et al., 2010), and some studies report that negative alcohol expectancies and alcohol use/abuse are unrelated (Neighbors et al., 2007; Zamboanga et al., 2006).

Social anxiety has been found to be positively related to social assertiveness expectancies and social and tension reduction expectancies (Burke & Stephen, 1997; Burke & Stephens,

1999; Ham, Hope, White, & Rivers, 2002; O'Hare, 1990). Socially anxious individuals having tension reduction expectancies may use alcohol to “self-medicate” and control their anxiety (Kushner et al., 1990; Tran et al., 1997). However, research is lacking in understanding the relationship between negative alcohol use expectancies and social anxiety. This study used the Comprehensive Effects of Alcohol Questionnaire (*CEOA*; Fromme, Stroot, & Kaplan, 1993) to assess both positive and negative alcohol use expectancies.

Social Anxiety and Cannabis Use

The relationship between social anxiety and cannabis use is ambiguous in the limited extant research, with mixed results. A meta-analysis of 18 studies that included measures of social anxiety and at least one cannabis-related variable of interest among young adults revealed a small but statistically significant positive association between social anxiety and cannabis problems. The association between social anxiety and cannabis use frequency was found to be non-significant (Single et al., 2022). However, another research study found social anxiety to be unrelated to cannabis use frequency among young adults (Cloutier et al., 2022).

Some previous research also indicated that, in young adult samples, social anxiety is negatively associated with cannabis use severity, and global negative effect expectancies fully mediates this relationship (Blasi et al., 2017; Buckner & Schmidt, 2008). Finally, research has revealed that social anxiety is related to cannabis-related problems (Buckner et al., 2012; Foster et al., 2016).

The legalization of recreational cannabis in many different states might affect the relationship between social anxiety and cannabis use. For example, individuals with social anxiety might now feel more comfortable using cannabis, given its legalization. Legalization also likely will increase cannabis use among peers, such that socially anxious individuals might be

more exposed to cannabis use in social situations (e.g., parties), which may affect their cannabis consumption. Thus, the current study aims to examine the relationship between social anxiety and cannabis use by using the Cannabis Use Disorder Identification Test-Revised (*CUDIT-R*; Adamson et al., 2010), which assesses for use frequency and cannabis-related problems.

Cannabis Use Expectancies

Cannabis expectancies refer to the perceived cognitive, physical, and/or behavioral effects or outcomes of using cannabis (Kristjansson et al., 2012; Schafer & Brown, 1991). Some of the positive expectancies related to using cannabis include social facilitation, relaxation/tension reduction, and perceptual/cognitive enhancement; whereas, negative expectancies are related to the negative consequences of cannabis use, such as having cravings and physical effects (e.g., munchies) and global negative effects, like becoming careless (Anthenien et al., 2021).

Cannabis use expectancies have been associated with both the quantity of use and dependence. Most studies have indicated expectancies related to positive outcomes to have greater effects and heavier levels of cannabis use whereas negative expectancies have mostly been related to less frequent to no-use of cannabis (Altman et al., 2019; Brackenbury et al., 2016; Kristjansson et al., 2012; Lauritsen & Rosenberg, 2016; Linkovich-Kyle & Dunn, 2001; Schafer & Brown, 1991).

Studies have indicated that undergraduate college students with higher social anxiety have a higher vulnerability to cannabis-related problems and cannabis use disorder (Buckner et al., 2007; Buckner, Schmidt, Bobadilla, & Taylor, 2006). Among cannabis-using undergraduates, those with positive expectancies have a higher frequency of engaging in marijuana use (Simons & Arens, 2007). Previous studies have found that the negative link between social anxiety and

cannabis use severity is fully mediated by global negative effect expectancies (Blasi et al., 2017; Buckner & Schmidt, 2008).

Although the relationships between cannabis use, social anxiety, and cannabis use expectancies have been studied in the past, studies have focused largely on the negative expectancies of cannabis. The current study explored the relationship between cannabis use expectancies (both positive and negative) and cannabis use.

Current Study and Hypotheses

The main goal of the current study was to test whether social anxiety, substance use expectancies, and fear of evaluation are significant predictors of substance use in college students ages 18 to 24 years. Previous studies have revealed mixed results regarding the relationship between social anxiety and substance use, as mediated by substance use expectancies. This study aimed to understand these relationships by extending the focus on a prominent cognitive component of social anxiety – fear of evaluation. Thus, we proposed a study using a three-stage hierarchical multiple regression with substance use (alcohol use and cannabis use) as the outcome variables.

Hypothesis 1: examined the ability of social anxiety symptoms, alcohol use expectancies, and fear of evaluation to predict alcohol use (figure 1).

Hypothesis 1a: predicted that after controlling for demographic control variables, social anxiety symptoms would contribute significantly to the regression model and positively predict alcohol use.

Hypothesis 1b: predicted that alcohol use expectancies would be positive predictors of alcohol use and would contribute significantly to the regression model when controlling for control variables and social anxiety symptoms.

Hypothesis 1c: predicted that fear of evaluation would have a positive predictive ability for alcohol use and would contribute significantly to the regression model when controlling for social anxiety symptoms and alcohol use expectancies.

Hypothesis 2: examined the ability of social anxiety symptoms, cannabis use expectancies, and fear of evaluation to predict cannabis use (figure 2).

Hypothesis 2a: predicted that after controlling for demographic control variables, social anxiety symptoms will contribute significantly to the regression model and positively predict cannabis use.

Hypothesis 2b: predicted that cannabis use expectancies have a positive predictive ability of cannabis use and will contribute significantly to the regression model when controlling for demographic variables and social anxiety symptoms.

Hypothesis 2c: predicted that fear of evaluation has a positive predictive ability of cannabis use and will contribute significantly to the regression model when controlling for social anxiety symptoms and cannabis use expectancies.

Method

Participants

Participants were undergraduate students currently enrolled in a college or university in the United States and recruited through Amazon Mechanical Turk. Participants received a monetary benefit of 50 cents. The study aimed to collect data from participants aged 18 to 24 years old to help make the sample more homogenous. An a priori power analysis indicated that approximately 120 participants would be needed to find a moderate effect.

Data initially were collected from 271 individuals. On MTurk, the inclusion criteria were set for the participants to be college students within the age range of 18 to 25 years and currently

residing in the United States; despite this request, a number of individuals participated who did not meet these criteria. Specifically, data from 85 participants older than 24 years of age were excluded. Data from 9 participants were excluded because they were not current college students. Furthermore, data from 25 participants were excluded because they were living in a state where recreational cannabis use is not legalized (this criterion was not explicitly stated on MTurk to potential participants but was implemented later to increase homogeneity). Finally, data from 27 participants who did not respond to one or more of the measures were deleted. MTurk does not provide the option of setting specific inclusion criteria for the data set. This resulted in the deletion of a large amount of data from individuals that did not meet the inclusion criteria.

The final sample of 125 participants consisted of 83 males (66%) and 42 females (34%) between the ages of 18 to 24 years ($M = 22.82$, $SD = 1.53$). In terms of race/ethnicity, 120 participants identified as “Caucasian” (96%), 3 participants identified as “Hispanic or Latino/a” (2%), and 2 participants identified as “American Indian, Alaskan Native, or Native Hawaiian” (2%). Regarding participant’s current year in college, 86 participants reported being a senior or in Year 4 (69%), 23 were juniors or in Year 3 (18%), 14 were sophomores or in Year 2 (11%), and 2 reported being a freshman or in Year 1 (2%).

Procedure

Participants signed up for the study online using Amazon Mechanical Turk and were informed that they would receive 50 cents. Participants were presented with informed consent; if they agreed, then they completed the surveys online through Qualtrics. At the end of the study, participants were presented with a debriefing form for the study that they could print. Measures

(aside from the demographic form) were counter-balanced and presented in random order to avoid order effects.

Measures

Demographic Questionnaire

Participants completed a demographic questionnaire requesting basic information, including age, sex, and race/ethnicity.

Social Anxiety Symptoms

The Social Interaction Anxiety Scale (SIAS; Mattick & Clark, 1998) was used to assess the symptoms of social anxiety. The SIAS assesses reactions of fear and/or anxiety to various social interaction situations. It is a 20-item self-report measure that is rated on a 5-point Likert scale (ranging from 0 = “*not at all characteristic or true of me*” to 4 = “*extremely characteristic or true of me*”). A sample item from this scale is “I have difficulty talking with other people.” A total score is calculated by summing the item scores and a higher score indicates greater symptom severity. The SIAS has shown high levels of internal consistency as indicated by α ranging from .88 to .93 (Heimberg et al., 1993; Mattick & Clarke, 1998; Osman et al., 1998) and high levels of internal validity that ranges from .84 to .90 (Osman et al., 1998). The test-retest reliability is also high as indicated by r 's ranging from .91 to .93 (Heimberg et al., 1993; Mattick & Clarke, 1998). The SIAS has high concurrent validity and has been positively correlated with scores on the Fear of Negative Evaluation Scale, the Social Avoidance and Distress Scale, the Social Phobia subscale of the Fear Questionnaire, the Interaction Anxiety and Audience Anxiety Scales, and the Social Phobia and Anxiety Inventory (Leary, 1983; Mattick and Clarke, 1989; Ries et al., 1996).

Fear of Negative Evaluation

The Brief Fear of Negative Evaluation Scale II (*BFNE-II*, Leary, 1983) was used to assess fear of negative evaluation. It is a shorter version of the 30-item Fear of Negative Evaluation scale created by Watson and Friend (1969). The BFNE- II is a 12-item self-report measure, and each item is rated on a 5-point Likert scale (ranging from 1 = “not at all characteristic of me” to 5 = “entirely characteristic of me”). A sample item from this scale is “I am usually worried about what kind of impression I make.” An elevated total score on the BFNE-II suggests a higher endorsement of fear of negative evaluation. The BFNE-II has shown high levels of internal consistency with α 's ranging from .81 to .97 (Leary, 1983; Collins et al., 2005; Weeks et al., 2005) and high test-retest reliability ($r = .94$; Collins et al. 2005). The BFNE -II also is correlated strongly to the original version of the scale ($r = .96$; Leary, 1983).

Fear of Positive Evaluation

The Fear of Positive Evaluation Scale (*FPES*, Weeks & colleagues, 2008) was used to assess one's fear of being evaluated positively. It is a 10-item self-report measure, and the items are rated on a 10-point Likert scale (ranging from 0 = “not at all true” to 10 = “very true”). A higher total score suggests higher levels of fear of positive evaluation. A sample item is “I feel uneasy when I receive praise from authority figures.” The FPES has demonstrated good internal consistency with α 's ranging from .80 to .86 (Fergus et al., 2009; Rodebaugh et al., 2012; Weeks et al., 2008; Weeks et al., 2012). It also has strong test-retest reliability with $r = .80$ (Weeks et al., 2008; Weeks et al., 2012).

Drinking Behavior

The Alcohol Use Disorder Identification Test (*AUDIT*; Babor et al., 1992) was used to assess drinking behavior in participants. It is a 10-item self-report measure that was developed

by the World Health Organization (WHO) to assess alcohol consumption, drinking behaviors, and alcohol-related problems. It includes questions to assess the frequency and amount of alcohol intake (items 1-3), alcohol dependence (questions 4-6) as well as problems related to alcohol consumption (items 7-10). The score on AUDIT can range from 0 to 40, with scores of 8 or more indicating hazardous alcohol use. Some of the sample items are “how often do you have a drink containing alcohol?”, “Have you or someone else been injured because of your drinking?” The AUDIT has strong internal consistency with Cronbach’s Alpha ranging from .81 - .93 (Kokotailo et al., 2004; Pal et al., 2004; Reinert & Allen, 2002, 2007) and good test-retest reliability with r ranging from .84 to .95 (Dybek et al., 2006; Kim et al., 2008; Selin et al., 2003). The validity of the AUDIT as an AUD screening instrument among university students has been demonstrated in studies done by Kokotailo et al. (2004) and Adewuya (2005).

Alcohol Expectancies

The Comprehensive Effects of Alcohol Questionnaire (*CEOA*; Fromme, Stroot, & Kaplan, 1993) was used to assess alcohol use expectancies among the participants. It is a 38-item self-report measure that measures both positive (sociability, tension reduction, liquid courage, and sexuality) and negative (self-perception, cognitive and behavioral impairments, and risk and aggression) alcohol expectancies and the items are rated on a 4-point Likert scale (ranging from 1 = “disagree” to 4 = “agree”). The positive alcohol outcome expectancies make up for a total of 20 items. A sample item is “It would be easier to express my feelings.” The negative alcohol outcome expectancies make up the remaining 18 items. A sample item is “I would have difficulty thinking.” The CEOA has good internal consistency with α 's ranging from .66 to .84 (Ham et al., 2005) and good test-retest reliability with r ranging from .66 to .81. It has also

demonstrated sufficient construct validity and an adequate amount of structural and internal validity (Fromme, Stroot, & Kaplan, 1993).

Cannabis Use Behavior

The Cannabis Use Disorder Identification Test-Revised (*CUDIT-R*; Adamson et al., 2010) was used to assess cannabis use behaviors among the participants. It is an 8-item self-report measure designed to identify potentially problematic or harmful recent cannabis use. It contains two items for each of the 4 domains: consumption, cannabis problems (abuse), dependence, and psychological features. Questions 1-7 are scored on a 0-4 scale whereas Question 8 is scored 0, 2, or 4. Scores of 8 points or more indicate hazardous cannabis use. Scores of 12 or more indicate a possible cannabis use disorder. The CUDIT demonstrates adequate reliability, with Cronbach's Alpha ranging from .73 - .84 (Adamson & Sellman, 2003; Loflin et al., 2017). CUDIT-R also demonstrates good convergent and concurrent validity (Bruno et al., 2009).

Cannabis Use Expectancies

Marijuana Expectancies Questionnaire- Brief (MEEQ-B) is a 6-item list of expectations regarding marijuana use adapted from the original 48-item Marijuana Effect Expectancy Questionnaire (MEEQ; Schafer & Brown, 1991). The questionnaire can be used by those with and without marijuana use histories. The scale is comprised of six lower-order scales: Cognitive and Behavioral Impairment, Relaxation and Tension Reduction, Social and Sexual Facilitation, Perceptual and Cognitive Enhancement, Global Negative Effects, and Craving and Physical Effects. Items are rated using a Likert scale ranging from *strongly disagree* (1) to *strongly agree* (5). A total score that is closer to 5 reflects greater potential negative expectancies for marijuana. The MEEQ-B has demonstrated adequate internal consistency ($\alpha = 0.42$ to 0.60) and similar

stabilities ($r = 0.36$ and 0.43) to the original MEEQ ($r = 0.21$ to 0.56 ; Aarons et al., 2001; Torrealday et al., 2008).

Results

Preliminary Analyses

Preliminary analyses include descriptive statistics for the means, standard deviations, and internal consistencies (α) for the scales and subscales used in the study (see Table 1). The SIAS, AUDIT, CEOA, and CUDIT had good to excellent internal consistency as demonstrated by alpha values ranging from $.81$ to $.90$.

The internal consistency for the Brief Fear of Negative Evaluation Scale – II was low, $\alpha = .25$. However, in a study by Weeks et al. (2005), the psychometric properties of the scale were evaluated, leading to the adoption of a 2-factor solution for analysis with the first factor consisting of all straightforwardly worded items (BFNE-S) and the second consisting of all reverse-scored items (BFNE-R). They also concluded that BFNE-S is a more suitable measure for assessing fear of negative evaluation and has greater psychometric validity compared to BFNE-R. Therefore, for the purpose of the current study, BFNE-S was chosen as the primary measure for fear of negative evaluation, and BFNE-R scores were excluded from the analysis. The internal consistency of BFNE-S was found to be acceptable, with Cronbach's alpha (α) of $.79$.

The Fear of Positive Evaluation Scale (FPES) also exhibited questionable internal consistency, as indicated by $\alpha = .66$. To address this concern, an examination of the literature for this scale was conducted, focusing on a study by Weeks et al. (2008) that explored the psychometric properties of the FPES among undergraduate samples. The researchers of this study concluded that although it is important to include the two reverse-scored items for the

evaluation of internal consistency, the eight straightforward items are a better fit for assessing fear of positive evaluation and that the reverse-scored items should not be included in calculating the total FPES score. In alignment with this recommendation, our study exclusively utilizes the scores from the eight straightforward items (FPES-S) for analysis. However, these scores require careful interpretation as some of the participants in the study may have engaged in response biases. It should be noted that the internal consistency for FPES-S was found to be .911.

The seven subscales of the Comprehensive Effects of Alcohol also exhibited inadequate levels of internal consistency, ranging from .44 to .71. However, previous research has supported a model of CEOA with two global dimensions of positive and negative expectancies (Gilson, Judd, & Bryant, 2019). On grouping the scores of individual subscales based on positive and negative expectancies, the 2 subscales demonstrated adequate to good internal consistency (alpha values .802, .795).

The internal consistency of the MEEQ-B ($\alpha = .651$) was comparable to previous research, where alpha values ranged from .42 to .60 (Torrealday et al., 2008). Although the internal consistency for positive expectancies ($\alpha = .33$) was lower than that reported in a 2008 study by Torrealday et al. ($\alpha = .60$), the internal consistency for negative expectancies ($\alpha = .604$) was found to be greater than what was reported by Torrealday et al. ($\alpha = .42$). It is important to note that Cronbach's alpha is sensitive to sample size and Low Cronbach α can be expected for scales with only three items (Torrealday et al., 2008).

The mean scores for the measures used in the study were elevated when compared to previous research to help examine the validity of the measures for this sample. The mean value obtained for SIAS was 52.96, which is higher than that reported in previous research (Purdon et al., 2001). The mean scores for Brief Fear of Negative Evaluation – II ($M = 39.02$) and Fear of

Positive Evaluation Scale ($M = 60.48$) were also elevated when compared to previous studies (Carleton et al., 2005; Rodebaugh et al., 2004; Weeks et al., 2008). The mean value for AUDIT ($M = 21.42$) is higher than that reported in previous research where the mean ranges from 7.00 – 7.45 (Kokotailo, 2004). The mean values for the Comprehensive Effects of Alcohol scales and its subscales were slightly elevated than those reported in previous research (Fried & Dunn, 2012; Herschl et al., 2012).

The Social Interaction Anxiety Scale (SIAS) has a cutoff score of 36 to indicate probable social anxiety (Peters, 2000). In this study, 96% of the participants had the SIAS score above 36. For the Alcohol Use Disorder Identification Test (AUDIT), WHO has recognized that a score of 1 to 7 suggests low-risk consumption, a score of 8 to 14 suggests harmful alcohol consumption and a score of 15 or more is indicative of possible alcohol dependence. In the current study, 9% of the participants had scores between 8-14, and 90% of the participants had a score of 15 or higher. For Cannabis Use Disorder Identification Test – Revised (CUDIT-R), a score of 8 or more indicates hazardous cannabis use, and a score of 12 or more indicates a possible cannabis use disorder (Adamson et al., 2010). In the current study, 90% of the participants had a score of 12 or more.

Zero-order correlations between the main study variables were computed (see Table 2), as these relationships sometimes differ from those seen in regression analyses when controlling for other variables. Social Anxiety, measured using the SIAS, was positively correlated with alcohol use, as measured by AUDIT ($r = .30, p < .01$). Social anxiety was also found to be positively correlated with cannabis use, as measured by CUDIT ($r = .26, p < .01$). Alcohol use expectancies using the CEOA ($r = .38, p < .01$), positive alcohol use expectancies using subscale CEOA_{positive} ($r = .29, p < .01$), and negative alcohol use expectancies using subscale CEOA_{negative}

($r = .42, p < .01$) were positively correlated with alcohol use. Cannabis use expectancies using the MEEQ-B ($r = .35, p < .01$), positive cannabis use expectancies using subscale MEEQ-B_{positive} ($r = .40, p < .01$), and negative cannabis use expectancies using subscale MEEQ-B_{negative} ($r = .21, p < .05$) were positively correlated with cannabis use. Fear of negative evaluation, as measured by the Brief Fear of Negative Evaluation Scale – II ($r = .17, p = .06$), and fear of positive evaluation, as measured by the Fear of Positive Evaluation Scale ($r = .14, p = .12$), had an insignificant positive correlation with alcohol use. Fear of negative evaluation also had an insignificant positive correlation with cannabis use ($r = .16, p = .08$). However, a significant positive correlation was found between fear of positive evaluation and cannabis use ($r = .24, p < .01$). Multicollinearity among various independent variables was examined to assess if they are independent of each other. Tests for multicollinearity were indicative of low levels of multicollinearity in the independent variables as the Tolerance Index Value did not drop below .2 and the Variance Inflation Factor Index Value was not greater than 5.

Main Hypotheses

Hypothesis 1 tested whether social anxiety, alcohol use expectancies, and fear of evaluation are significant predictors of alcohol use in college students aged 18-24 years. A hierarchical multiple regression analysis was conducted to predict alcohol use scores (Table 3). Step one used demographic variables – sex, age, and race/ethnicity of the participants as predictors and found that this model accounted for significant variance in alcohol use, $R^2 = .06$, $F(3, 121) = 2.73, p < .05$. Only age was found to be a statistically significant positive predictor, $\beta = .23, p < .05$. In step two, social anxiety was added to the model. Step two did not add significant variance, $\Delta R^2 = .01, F(1, 120) = 1.38$, and social anxiety was not a significant predictor, $\beta = .11, p = .24$. In step three, positive and negative alcohol use expectancies were

added to the model. The change in variance accounted for, $\Delta R^2 = .04$, was not significant ($F(2, 118) = 2.80, p = .07$). However, negative alcohol use expectancies was a significant positive predictor, $\beta = .38, p < .05$. Finally, in step four, fear of positive evaluation and fear of negative evaluation were added. This model accounted for significant variance in alcohol use, $\Delta R^2 = .07, F(2, 116) = 5.11, p < .01$. Both fear of negative evaluation ($\beta = -.39, p < .01$) and fear of positive evaluation ($\beta = .26, p < .05$) were significant predictors. Hence, hypothesis 1c was fully supported.

Hypothesis 2 tested whether social anxiety, cannabis use expectancies, and fear of evaluation are significant predictors of cannabis use in college students aged 18 to 24 years. A hierarchical multiple regression analysis was conducted to predict cannabis use scores (Table 4). Step one used demographic variables (i.e., sex, age, and race/ethnicity) as predictors. These variables did not account for significant variance in cannabis use, $R^2 = .04, F(3, 121) = 1.66, p = .18$. In step two, social anxiety added significant variance, $\Delta R^2 = .04, F(1, 120) = 5.72$, and was a significant predictor, $\beta = .23, p < .05$. Therefore, Hypothesis 2a was supported. Positive and negative cannabis use expectancies were added to the model in step three and significantly predict cannabis use over and above social anxiety, $\Delta R^2 = .09, F(2, 118) = 6.33, p < .01$. Only positive use expectancies was a significant predictor of cannabis use, $\beta = .38, p < .01$. These results partially support Hypothesis 2b. In step four, fear of positive evaluation and fear of negative evaluation were added to the model. Results indicate these variables do not significantly contribute to the variance in cannabis use, $\Delta R^2 = .02, F(2, 116) = 1.04, p = .35$. Hypothesis 2c was not supported.

Discussion

The primary objective of this study was to understand the extent to which social anxiety, substance use expectancies, and fear of evaluation serve as predictors of substance use among college students ages 18 to 24 years. Prior research has produced varied findings on the relationship between social anxiety and substance use, particularly when moderated by substance use expectancies. With the current study, we attempted to understand these relationships and draw focus on a hallmark cognitive facet of social anxiety – the fear of evaluation. A three-stage hierarchical multiple regression model was employed, with substance use (both alcohol and cannabis) as the dependent variable. Furthermore, the limitations and the clinical implications of the current study are discussed.

The zero-order correlations revealed a positive association between social anxiety and alcohol and cannabis use among college students. These results are consistent with prior research and suggest that college students experiencing symptoms of social anxiety may engage in increased alcohol and cannabis use to cope with their anxiety symptoms. (Terlecki, Ecker, and Buckner, 2014; Neighbors et al., 2007; Stewart et al., 2006; Single et al., 2022). This study found a positive correlation between alcohol use expectancies (positive and negative) and alcohol use. These findings are consistent with prior research (Fromme et al., 1993; Ham et al., 2005). Similarly, reiterating previous findings, positive cannabis use expectancies and cannabis use were found to be positively correlated (Simons & Arens, 2007). Moreover, a positive correlation was found between negative cannabis use expectancies and cannabis use. This positive correlation is unexpected, given that previous studies have typically indicated that negative expectations are related to reduced or no cannabis use (Altman et al., 2019; Linkovich-Kyle & Dunn, 2001). However, Buckner and Schmidt (2009) found a positive association between social

anxiety disorder and cognitive/behavioral impairment, and global negative expectancies.

Individuals with symptoms of social anxiety may seek cognitive or behavioral impairments as they expect that cannabis use will lead to a slower processing speed and reaction time. This effect could help individuals cope with rapid thoughts. The self-handicapping theory of substance use can also be used to understand these findings which suggests that individuals with social anxiety might anticipate cannabis to induce cognitive or behavioral impairments and they would assume that others also hold the same expectation. This would lead individuals to believe that their embarrassing actions would be attributed to the effects of cannabis, hence, leading to greater cannabis use (Buckner & Schmidt; 2009). A significant positive correlation was found between fear of positive evaluation and cannabis use. These findings suggest that investigating the role of fear of positive evaluation could inform future research and help in the development of effective treatment approaches.

Social Anxiety, Alcohol Use Expectancies, Fear of Evaluation, and Alcohol Use

Hypothesis 1 tested whether social anxiety, alcohol use expectancies, and fear of evaluation are significant predictors of alcohol use in college students ages 18 to 24 years. For the demographic variables, age was found to be a significant predictor of alcohol use. However, it is necessary to acknowledge that the study's participant pool was limited to individuals aged 18 to 24 years. It is likely that younger participants below the legal age of drinking might have underreported their alcohol consumption. This could potentially explain the observed relationship between age and alcohol use. Moreover, alcohol use could have risen with improved accessibility among the older participants.

Hypothesis 1a was that social anxiety symptoms will be a significant predictor of alcohol use after controlling for control variables (demographics). This hypothesis was not supported.

Similar findings have been reported in previous studies that did not find a relationship between social anxiety and alcohol use (Buckner, Ecker, & Proctor, 2011; Buckner et al., 2006; Ham & Hope, 2006; O'Grady et al., 2011). These findings indicate that it is important to assess and identify specific constructs of social anxiety that may predict alcohol use in college students. Hypothesis 1b predicted that alcohol use expectancies would predict alcohol use above and beyond the effects of the control variables and social anxiety symptoms. This hypothesis was not supported; however, negative alcohol use expectancies were found to be a statistically significant positive predictor of alcohol use. There have been a few studies that have found similar results (Zamboanga et al., 2010). Cognitive and behavioral impairments are one of the negative expectancies associated with alcohol use. It is plausible that individuals with symptoms of social anxiety may seek cognitive or behavioral impairments to cope with anxiety symptoms such as racing thoughts. It is also plausible that individuals with social anxiety symptoms may be more vulnerable to self-handicapping and may use it as a strategy to manage how others judge them. Hypothesis 1c predicted that fear of evaluation (positive and negative) will predict alcohol use above and beyond the effects of control variables, social anxiety symptoms, and alcohol use expectancies. This hypothesis was fully supported and both fear of negative evaluation and fear of positive evaluation were found to be significant predictors of alcohol use among college students. Individuals who experience a fear of evaluation may engage in greater levels of alcohol use to cope with the distress. To our knowledge, only a limited number of studies have explored the relationship between fear of evaluation and alcohol use therefore, these findings are noteworthy as they establish fear of positive evaluation and fear of negative evaluation as important cognitive constructs of interest for understanding alcohol use among college students.

Social Anxiety, Cannabis Use Expectancies, Fear of Evaluation, and Cannabis Use

Hypothesis 2 tested whether social anxiety, cannabis use expectancies, and fear of evaluation are significant predictors of cannabis use in college students aged 18 to 24 years. Results supported Hypothesis 2a, as social anxiety was a significant predictor of cannabis use. Prior research has either not found a significant relationship between the two variables or social anxiety has been found to be negatively associated with cannabis use severity (Blasi et al., 2017; Buckner & Schmidt, 2008; Cloutier et al., 2022; Single et al., 2022). One explanation for these contrasting findings could be the legalization of recreational cannabis use in many states. The current study only used data from participants who lived in a state where recreational cannabis use is legal. Individuals living in these states may have more accessibility to cannabis and may engage in greater cannabis use to cope with symptoms of social anxiety.

Hypothesis 2b predicted that cannabis use expectancies will predict cannabis use above and beyond the effect of social anxiety symptoms. This hypothesis was partially supported, and only positive use expectancies were found to be significant predictors of cannabis use. These findings are consistent with findings of prior research (Simons & Arens, 2007) and indicate that individuals experiencing symptoms of social anxiety may engage in cannabis use when they hold positive expectancies for outcomes such as social facilitation or tension reduction/relaxation. Hypothesis 2c predicted that fear of evaluation would be a significant predictor of cannabis use over and above the effects of social anxiety symptoms and cannabis use expectancies. This hypothesis was not supported. Research studying the relationship between fear of evaluation and cannabis use is limited and these results indicate that there may be other cognitive constructs of social anxiety that need to be explored to understand the predictors of cannabis use in college students.

It is also important to acknowledge that the current study took place post-COVID-19 pandemic. However, it may be essential to take into account the effects and consequences of the pandemic on certain variables utilized in the study, such as social anxiety and substance use.

Study Limitations

The study had several noteworthy limitations that need to be considered when interpreting the results. First, some of the measures used in the study showed comparatively low levels of internal consistency in this sample. These low levels are indicative of the presence of response biases, such as acquiescence bias or extreme response bias, especially because the study involved the use of measures that had reverse-scored items. Consequently, the findings should be approached with caution.

Another limitation lies in the method of data collection, which was done through Amazon Mechanical Turk (Mturk). Researchers have found Mturk to be a reliable and efficient tool for data collection and provide a more diverse pool of participants (Mortensen & Hughes, 2018; Buhrmester, Kwang, & Gosling, 2011). However, participants recruited through Mturk may not be representative of the general population and may be less likely to pay attention to the tasks which can reduce statistical power (Goodman, Cryder & Cheema, 2013). In a study done to understand the impact of careless/insufficient effort responses on counseling research using Amazon's Mechanical Turk, Kim and Oh (2022) found a high prevalence of careless/insufficient effort responses in the data from the MTurk sample as compared to data collected through data from face-to-face and email recruitment, samples. In the current study, several individuals participated in the study, even though they did not meet the inclusion criteria. This may be indicative of careless effort responses and deceitful reporting; therefore, the results should be interpreted with caution.

Additionally, the sample used in this study was predominantly composed of Caucasians (96%), ages 23-24 (71%), and Juniors or Seniors (87%). The lack of diversity in the sample limits the generalizability of the findings to the broader college population. Focusing on substance use research using crowdsourcing platforms, MTurk has been identified as a useful source of data collection for addiction research (Mellis and Bickel, 2020; Rung et al., 2022; Strickland and Stoops, 2019). However, it is essential to clearly report inclusion/exclusion criteria, information regarding data quality checks, reasons for excluding data, and participant compensation when conducting addiction research through MTurk (Mellis & Bickel, 2020; Rung et al., 2022). Kim and Hodgins (2017) also examined the reliability and validity of data obtained from alcohol, cannabis, and gambling populations on Amazon's Mechanical Turk. They found that 80 to 85% of the data were valid for addiction research however, they cautioned using MTurk with a sample of cannabis users.

Furthermore, it's essential to acknowledge that data collection involved participants to self-report current alcohol and cannabis use behaviors. Although confidentiality was emphasized in the study, it is possible that some participants may have underreported or overreported their substance use behaviors.

In conclusion, although the study offers valuable insights, these limitations emphasize the need for careful interpretation of its findings. These limitations can be addressed in future endeavors to provide a more comprehensive understanding.

Clinical Implications and Future Directions

The results of this study contribute to the literature on substance use in college students and it helps shed light on specific predictors of alcohol and cannabis use among college students— social anxiety symptoms, substance use expectancies, and fear of evaluation. Study

findings suggest that fear of evaluation is a significant predictor of alcohol use among college students. These results indicate a need for future research that is specifically focused on these hallmark constructs of social anxiety which can aid in the development of better-informed treatment strategies. It may be important for clinicians working with college students to take the fear of evaluation into account when treating alcohol use, especially because college students must face several novel social situations. Study findings underscore the importance of assessing negative alcohol expectancies and understanding alcohol use from a self-handicapping perspective and addressing it in treatment.

Findings regarding cannabis use among college students indicate that it can be helpful to assess for any positive expectancies regarding cannabis use as they can predict cannabis use. Clinicians may assess and treat social anxiety symptoms that may be leading to cannabis use among college students, especially in states where recreational cannabis use is legalized, and cannabis products are easily available.

Future studies may also attempt to understand alcohol use and cannabis use from a multidimensional approach and take into account factors like patterns of use, consequences of use, developmental and environmental factors, etc. Future research is needed to evaluate the generalizability of the study findings and to address the limitations of the current study. Future studies can aim to focus on a more diverse population. This study can also be replicated by employing data collection tools other than an online crowdsourcing platform. Moreover, future endeavors can explore and compare the differences in findings for similar variables in states where recreational cannabis use is legal versus where it is illegal which can further add to the credibility of the study findings. It may also be helpful to explore other cognitive constructs of

social anxiety, such as intolerance of uncertainty as predictors of cannabis use among college students.

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*Table 1**Descriptive Statistics for Each Measure*

Variable	Possible Range	Observed Range	<i>M</i>	SD	α
SIAS	0-80	1-67	52.96	9.66	.856
BFNE-II	12-60	24-48	39.02	3.62	.252
BFNE-S	8-40	11-40	31.01	4.76	.788
FPES	0-90	29-71	60.48	8.35	.655
FPES-S	0-72	17-70	56.65	10.62	.911
AUDIT	0-40	0-35	21.42	6.21	.809
CEOA	38-152	83-143	120.94	13.73	.904
CEOA-Pos	20-80	41-75	64.00	7.15	.802
SOC	8-32	16-31	25.45	3.01	.589
TR	3-12	5-12	9.70	1.57	.497
LC	5-20	6-20	16.12	2.28	.539
SEXL	4-16	6-16	12.73	1.91	.441
CEOA-Neg	18-72	32-68	56.94	7.53	.795
CBI	9-36	17-35	28.52	3.76	.707
RA	5-20	7-20	15.79	2.74	.686
SP	4-16	6-16	12.63	2.23	.654
CUDIT	0-32	0-30	17.52	5.65	.852
MEEQ-B	6-30	13-28	23.61	3.02	.651
MEEQ-B-Pos	3-15	7-15	11.94	1.65	.326

MEEQ-B-Neg	3-15	6-15	11.67	1.85	.604
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Note. Social Anxiety = Social Interaction Anxiety Scale (SIAS), Fear of Negative Evaluation = Brief Fear of Negative Evaluation Scale-II (BFNE-II), Brief Fear of Negative Evaluation Scale – Straightforward (BFNE-S), Fear of Positive Evaluation = Fear of Positive Evaluation Scale (FPES), Fear of Positive Evaluation Scale- Straightforward (FPES - S), Alcohol Use = Alcohol Use Disorder Identification Test (AUDIT), Alcohol Use Expectancies = Comprehensive Effects of Alcohol (CEOA), Positive Alcohol Use Expectancies = CEOA – Pos (SOC = Sociability, TR = Tension Reduction, LC = Liquid Courage, SEXL = Sexuality), Negative Alcohol Use Expectancies = CEOA – Neg (CBI = Cognitive & Behavioral Impairment, RA = Risk & Aggression, SP = Self-Perception), Cannabis Use = Cannabis Use Disorder Identification Test (CUDIT), Cannabis Use Expectancies = Marijuana Effect Expectancy Questionnaire (MEEQ-B), Positive Cannabis Use Expectancies = MEEQ-B-Pos, Negative Cannabis Use Expectancies = MEEQ-B-Neg.

Table 2
Pearson's Correlations Among All Scales

	SA	FNE	FPE	AU	AUE	AUE- P	AUE- N	CU	CUE	CUE- P	CUE- N
SA	-										
FNE	.768**	-									
FPE	.638**	.635**	-								
AU	.304**	.167	.139	-							
AUE	.653**	.591**	.556**	.380**	-						
AUE- P	.510**	.474**	.498**	.285**	.932**	-					
AUE- N	.706**	.627**	.542**	.422**	.938**	.749**	-				
CU	.259**	.156	.241**	.636**	.433**	.394**	.416**	-			
CUE	.708**	.595**	.610**	.380**	.656**	.594**	.631**	.348**	-		
CUE- P	.577**	.460**	.456**	.437**	.549**	.480**	.545**	.397**	.845**	-	
CUE- N	.643**	.561**	.590**	.231**	.581**	.542**	.545**	.214*	.880**	.489**	-

Note: * $p < 0.05$ ** $p < 0.01$

SA = Social Anxiety, FNE = Fear of Negative Evaluation, FPE = Fear of Positive Evaluation, AU = Alcohol Use, AUE = Alcohol Use Expectancies, AUE-P = Positive Alcohol Use Expectancies, AUE-N = Negative Alcohol Use Expectancies, CU = Cannabis Use, CUE = Cannabis Use Expectancies, CUE-P = Positive Cannabis Use Expectancies, CUE-N = Negative Cannabis Use Expectancies.

Table 3

Hierarchical Regression Analysis for Variables Predicting Alcohol Use (N = 125)

Variable	B	SE	β	T	p
Step 1					
Sex of Participant	-.055	.239	-.020	-.232	.817
Age (in years)	.196	.074	.233	2.646	.009
Race/Ethnicity	-.203	.193	-.092	-1.049	.296
Step 2					
Sex of Participant	-.062	.239	-.023	-.259	.796
Age (in years)	.166	.078	.197	2.118	.036
Race/Ethnicity	-.136	.201	-.062	-.673	.502
Social Anxiety	.015	.013	.114	1.174	.243
Step 3					
Sex of Participant	-.048	.235	-.018	-.206	.837
Age (in years)	.155	.078	.184	1.999	.048
Race/Ethnicity	-.137	.200	-.062	-.683	.496
Social Anxiety	-.006	.017	-.043	-.337	.737
Positive Expectancies	-.037	.024	-.206	-1.570	.119
Negative Expectancies	.064	.027	.376	2.365	.020
Step 4					
Sex of Participant	.003	.231	.001	.012	.990
Age (in years)	.153	.075	.182	2.040	.044
Race/Ethnicity	-.129	.196	-.059	-.660	.510

Social Anxiety	.010	.021	.079	.507	.613
Positive Expectancies	-.045	.023	-.251	-1.931	.056
Negative Expectancies	.074	.026	.433	2.788	.006
Fear of Positive Evaluation	.031	.014	.256	2.143	.034
Fear of Negative Evaluation	-.106	.037	-.392	-2.834	.005

Note. $R^2 = .063$ for Step 1 ($p < .05$); $\Delta R^2 = .011$ for Step 2 ($p = .24$), $\Delta R^2 = .042$ for Step 3 ($p = .07$); $\Delta R^2 = .072$ for Step 4 ($p < .05$)

Table 4

Hierarchical Regression Analysis for Variables Predicting Cannabis Use (N = 125)

Variable	B	SE	β	T	p
Step 1					
Sex of Participant	.880	1.064	.074	.827	.410
Age (in years)	.655	.330	.177	1.983	.050
Race/Ethnicity	-.365	.862	-.038	-.424	.673
Step 2					
Sex of Participant	.822	1.044	.069	.787	.433
Age (in years)	.386	.343	.104	1.125	.263
Race/Ethnicity	.236	.882	.024	.267	.790
Social Anxiety	.135	.056	.230	2.392	.018
Step 3					
Sex of Participant	1.350	1.022	.113	1.321	.189
Age (in years)	.077	.343	.021	.224	.823
Race/Ethnicity	-.159	.855	-.016	-.186	.853
Social Anxiety	.004	.073	.007	.056	.956
Positive Expectancies	1.294	.378	.378	3.419	.001
Negative Expectancies	.095	.347	.031	.273	.785
Step 4					
Sex of Participant	1.449	1.030	.122	1.408	.162
Age (in years)	.081	.342	.022	.236	.814
Race/Ethnicity	-.123	.860	-.013	-.143	.887

Social Anxiety	.035	.091	.060	.382	.703
Positive Expectancies	1.259	.380	.367	3.312	.001
Negative Expectancies	.036	.360	.012	.100	.921
Fear of Positive Evaluation	.073	.064	.137	1.134	.259
Fear of Negative Evaluation	-.187	.163	-.158	-1.152	.252

Note. $R^2 = .040$ for Step 1 ($p = .18$); $\Delta R^2 = .044$ for Step 2 ($p < .05$), $\Delta R^2 = .089$ for Step 3 ($p < .05$); $\Delta R^2 = .015$ for Step 4 ($p = .36$)

Figure 1

Three-step hierarchical multiple regression for social anxiety symptoms, alcohol use expectancies, fear of evaluation, and alcohol use

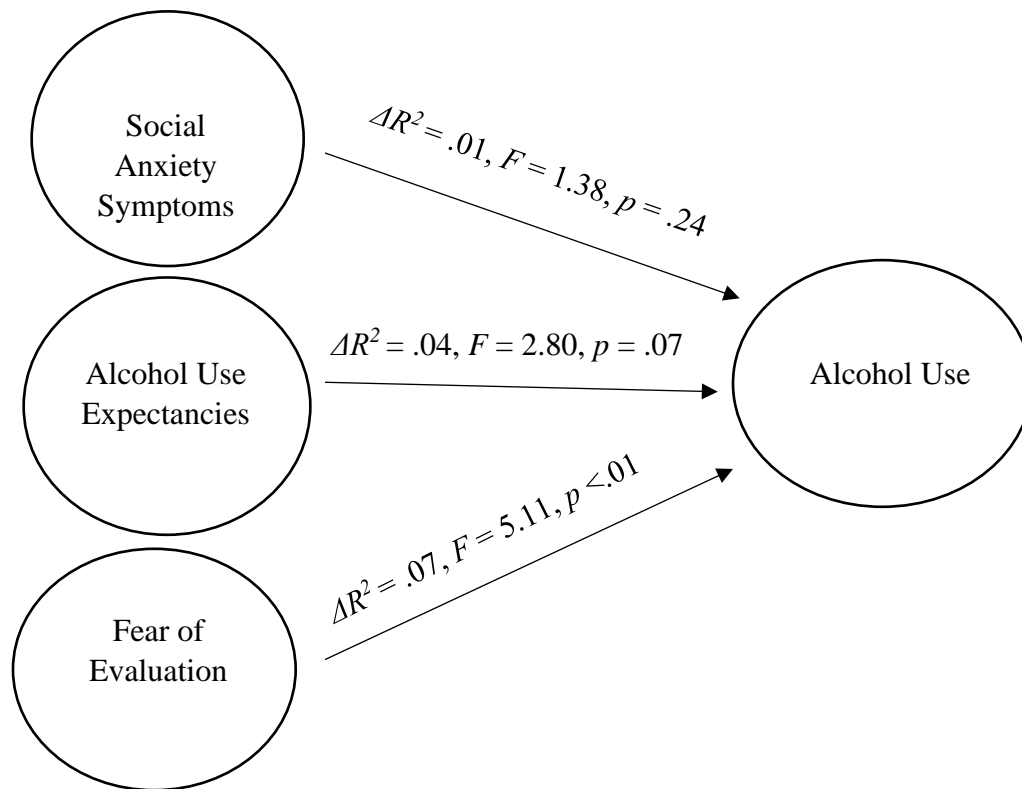
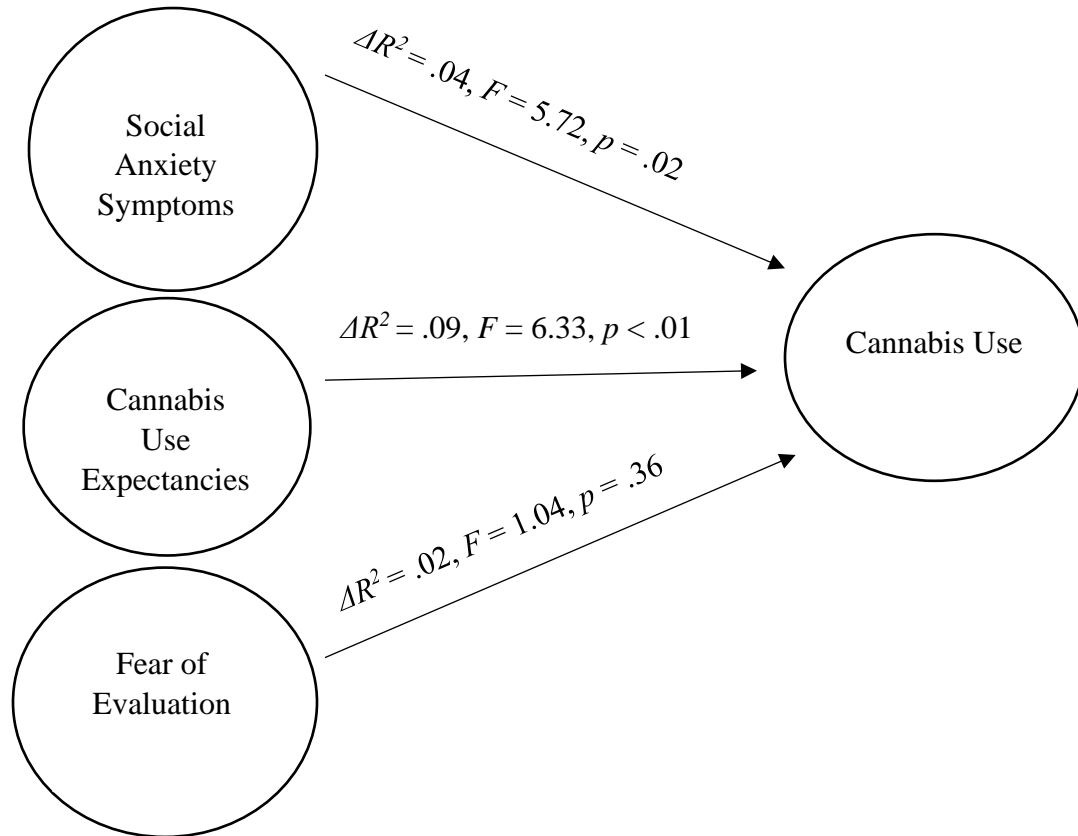


Figure 2

Three-step hierarchical multiple regression for social anxiety symptoms, cannabis use expectancies, fear of evaluation, and cannabis use



Appendix A**Demographic Form**

1. What is your sex?

- Female
- Male
- Non-Binary
- Other: _____

2. How old are you (in years)?

3. Are you a current college student?

- Yes
- No

4. What is your year in school?

- Year 1/Freshman
- Year 2/Sophomore
- Year 3/Junior
- Year 4/Senior

5. How do you usually describe yourself (can choose more than one)?

- Caucasian
- Black or African American
- Hispanic or Latino/a
- Asian or Pacific Islander
- American Indian, Alaskan Native, or Native Hawaiian
- Biracial or Multiracial
- Other

6. Is recreational cannabis use legal in your state?

Yes/No

Appendix B**Social Interaction Anxiety Scale (SIAS)**

Instructions: For each item, please circle the number to indicate the degree to which you feel the statement is characteristic or true for you. The rating scale is as follows:

0 = Not at all characteristic or true of me.

1 = Slightly characteristic or true of me.

2 = Moderately characteristic or true of me.

3 = Very characteristic or true of me.

4 = Extremely characteristic or true of me.

1. I get nervous if I have to speak with someone in authority (teacher, boss, etc.).
2. I have difficulty making eye contact with others.
3. I become tense if I have to talk about myself or my feelings.
4. I find it difficult to mix comfortably with the people I work with.
5. I find it easy to make friends my own age.
6. I tense up if I meet an acquaintance in the street.
7. When mixing socially, I am uncomfortable.
8. I feel tense if I am alone with just one other person.
9. I am at ease meeting people at parties, etc.
10. I have difficulty talking with other people.
11. I find it easy to think of things to talk about.
12. I worry about expressing myself in case I appear awkward.
13. I find it difficult to disagree with another's point of view.
14. I have difficulty talking to attractive persons of the opposite sex.
15. I find myself worrying that I won't know what to say in social situations.
16. I am nervous mixing with people I don't know well.
17. I feel I'll say something embarrassing when talking.
18. When mixing in a group, I find myself worrying I will be ignored.
19. I am tense mixing in a group.
20. I am unsure whether to greet someone I know only slightly.

Appendix C

Brief Fear of Negative Evaluation Scale - II

Read each of the following statements carefully and indicate how characteristic it is of you according to the following scale:

1 = Not at all characteristic of me

2 = Slightly characteristic of me

3 = Moderately characteristic of me

4 = Very characteristic of me

5 = Extremely characteristic of me

1. I worry about what other people will think of me even when I know it doesn't make any difference.
2. It bothers me when people form an unfavorable impression of me.
3. I am frequently afraid of other people noticing my shortcomings.
4. I worry about what kind of impression I am making on someone.
5. I am afraid others will not approve of me.
6. I am afraid that people will find fault with me.
7. I am concerned about other people's opinions of me.
8. When I am talking to someone, I worry about what they may be thinking about me.
9. I am usually worried about what kind of impression I make.
10. If I know someone is judging me, it tends to bother me.
11. Sometimes I think I am too concerned with what other people think of me.
12. I often worry that I will say or do the wrong things.

Appendix D

Fear of Positive Evaluation Scale

Read each of the following statements carefully and answer the degree to which you feel the statement is characteristic of you, using the following scale. For each statement, respond as though it involves people that you do not know very well. Rate each situation from 0 to 9.

1. I am uncomfortable exhibiting my talents to others, even if I think my talents will impress them.
2. It would make me anxious to receive a compliment from someone that I am attracted to.
3. I try to choose clothes that will give people little impression of what I am like.
4. I feel uneasy when I receive praise from authority figures.
5. If I have something to say that I think a group will find interesting, I typically say it.
6. I would rather receive a compliment from someone when that person and I were alone than when in the presence of others.
7. If I was doing something well in front of others, I would wonder whether I was doing "too well".
8. I generally feel uncomfortable when people give me compliments.
9. I don't like to be noticed when I am in public places, even if I feel as though I am being admired.
10. I often feel under-appreciated, and wish people would comment more on my positive qualities.

Appendix E**The Alcohol Use Disorders Identification Test (AUDIT): Self-Report Version**

Choose the option that best describes your answer to each question.

Question	0	1	2	3	4
1. How often do you have a drink containing alcohol?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
2. How many drinks containing alcohol do you have on a typical day when you are drinking?	1 or 2	3 or 4	5 or 6	7 to 9	10 or more
3. How often do you have 5 or more drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
4. How often during the last year have you found that you were not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
5. How often during the last year have you failed to do what was normally expected of you because of drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
7. How often during the last year have you had a feeling of	Never	Less than monthly	Monthly	Weekly	Daily or almost daily

guilt or remorse after drinking?					
8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
9. Have you or someone else been injured as a result of your drinking?	No		Yes, but not in the last year		Yes, during the last year
10. Has a relative, a friend, a doctor, or another health worker been concerned about your drinking or suggested you cut down?	No		Yes, but not in the last year		Yes, during the last year
				Total	

Appendix F

Comprehensive Effects of Alcohol (CEOA)

Instructions: The following questions ask what you would expect to happen if you were under the influence of ALCOHOL. Choose from disagree to agree - depending on whether you expect the effect to happen to you if you were under the influence of alcohol. These effects will vary, depending upon the amount of alcohol you typically consume. This is not a personality test. We want to know what you would expect to happen if you were to drink alcohol, not how you are when you are sober. Example: If you are always emotional, you would not circle agree as your answer unless you expected to become more emotional if you drank.

When I drink alcohol, I expect that _____ :

1. I would be outgoing

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

2. My senses would be dulled

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

3. I would be humorous

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

4. My problems would seem worse

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

5. It would be easier to express my feelings

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

6. My writing would be impaired

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

7. I would feel sexy

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

8. I would have difficulty thinking

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

9. I would neglect my obligations

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

10. I would be dominant

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

11. My head would feel fuzzy

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

12. I would enjoy sex more

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

13. I would feel dizzy

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

14. I would be friendly

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

15. I would be clumsy

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

16. It would be easier to act out my fantasies

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

17. I would be loud, boisterous, or noisy

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

18. I would be feel peaceful

Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
19.	I would be brave and daring		
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
20.	I would feel unafraid		
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
21.	I would feel creative		
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
22.	I would be courageous		
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
23.	I would feel shaky or jittery the next day		
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
24.	I would feel energetic		
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
25.	I would act aggressively		
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
26.	My responses would be slow		
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
27.	My body would be relaxed		
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
28.	I would feel guilty		
Disagree	Slightly disagree	Slightly agree	Agree

1	2	3	4
29. I would feel calm			
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
30. I would feel moody			
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
31. It would be easier to talk to people			
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
32. I would be a better lover			
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
33. I would feel self-critical			
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
34. I would be talkative			
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
35. I would act tough			
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
36. I would take risks			
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
37. I would feel powerful			
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4
38. I would act sociable			
Disagree	Slightly disagree	Slightly agree	Agree
1	2	3	4

Appendix G**The Cannabis Use Disorder Identification Test-Revised (CUDIT-R)**

Have you used any cannabis over the past six months? Yes _____ No _____

If you answered “Yes” to the previous question, please answer the following questions about your cannabis use. Circle the response that is most correct for you in relation to your cannabis use over the past six months.

1. How often do you use cannabis?

Never (0)

Monthly or less (1)

2-4 times a month (2)

2-3 times a week (3)

4+ times a week (4)

2. How many hours were you “stoned” on a typical day when you had been using cannabis?

Less than 1 (0)

1 or 2 (1)

3 or 4 (2)

5 or 6 (3)

7 or more (4)

3. How often during the past 6 months did you find that you were not able to stop using cannabis once you had started?

Never (0)

Less than monthly (1)

Monthly (2)

Weekly (3)

Daily/almost daily (4)

4. How often during the past 6 months did you fail to do what was normally expected from you because of using cannabis?

Never (0)

Less than monthly (1)

Monthly (2)

Weekly (3)

Daily or almost daily (4)

5. How often in the past 6 months have you devoted a great deal of your time to getting, using, or recovering from cannabis?

Never (0)

Less than monthly (1)

Monthly (2)

Weekly (3)

Daily/almost daily (4)

6. How often in the past 6 months have you had a problem with your memory or concentration after using cannabis?

Never (0)

Less than monthly (1)

Monthly (2)

Weekly (3)

Daily or almost daily (4)

7. How often do you use cannabis in situations that could be physically hazardous, such as driving, operating machinery, or caring for children?

Never (0)

Less than monthly (1)

Monthly (2)

Weekly (3)

Daily/almost daily (4)

8. Have you ever thought about cutting down, or stopping, your use of cannabis?

Never (0)

Yes, but not in the past 6 months (2)

Yes, during the past 6 months (4)

Appendix H

Marijuana Effect Expectancy Questionnaire-Brief (MEEQ-B)

The following pages contain statements about the effects of marijuana. Answer each statement according to your own personal thoughts, feelings, and beliefs about marijuana. We're interested in what you think about marijuana, not what others might think. Whether or not you've had actual marijuana experience, you should answer in terms of how you think marijuana affects the typical or average user. Read each of the following statements according to the following scale:

1 = Strongly disagree

2 = Somewhat disagree

3 = Uncertain

4 = Somewhat agree

5 = Strongly agree

1. Marijuana makes it harder to think and do things.
2. Marijuana helps a person relax and feel less tense (helps a person unwind and feel calm).
3. Marijuana helps people get along better with others and it can help a person feel more sexual (talk more; feel more romantic).
4. Marijuana makes people feel more creative and perceive things differently (music sounds different; things seem more interesting).
5. Marijuana generally has bad effects on a person (people become angry or careless; after feeling high a person feels down).
6. Marijuana has effects on a person's body and gives people cravings (get the munchies/hungry; have a dry mouth; hard to stop laughing).