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Social Anxiety and Cannabis-Related Impairment: The Roles of Anxiety Sensitivity and Intolerance of Uncertainty

Emily Robin Jeffries
Louisiana State University and Agricultural and Mechanical College, emily.jeffries.7@gmail.com

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SOCIAL ANXIETY AND CANNABIS-RELATED IMPAIRMENT: THE ROLES OF
ANXIETY SENSITIVITY AND INTOLERANCE OF UNCERTAINTY

A Thesis

Submitted to the Graduate Faculty of
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master of Arts

in

The Department of Psychology

by
Emily R. Jeffries
B.A., University of Cincinnati, 2012
May 2016

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ABSTRACT

Cannabis use is associated with many negative consequences. Identification of factors associated with cannabis could inform prevention and treatment efforts. Social anxiety appears to be one risk factor for cannabis-related problems. Thus, it is important to identify malleable cognitive vulnerability factors that may play a role in the social anxiety-cannabis problems relationship. Anxiety sensitivity (AS) is the fear of anxiety-related bodily sensations and is composed of three subfacets: physical, cognitive, and social concerns. AS is associated with greater social anxiety and may play a role in cannabis-related impairment. Intolerance of uncertainty (IU) refers to a tendency to respond negatively to uncertain situations. IU is associated with social anxiety and may play a role in cannabis-related problems. The current study sought to examine the associations of AS subfacets and IU with cannabis problems as well as the direct and indirect (via AS subfacets and IU) effects of social anxiety on cannabis problems among 220 current (i.e., past three-month) cannabis users. Consistent with prior research, social anxiety was positively related to cannabis problems. All AS subfacets and IU were positively related to cannabis problems. Social anxiety was indirectly related to cannabis problems through AS-social concerns and IU but not through AS-physical concerns or AS-cognitive concerns. When AS-social concerns and IU were tested simultaneously, social anxiety remained indirectly related to cannabis problems only through IU. Results highlight the importance of considering IU in treatment efforts for individuals experiencing cannabis-related impairment.

CHAPTER 1: INTRODUCTION

1.1 Cannabis

Cannabis is the most commonly used illicit drug in the United States with 7.5% of

individuals aged 12 or older reporting past-month use and approximately one in four users

experiencing enough distress and/or impairment related to their use that a diagnosis of cannabis

use disorder (CUD) is warranted (Substance Abuse and Mental Health Services Administration,

2014). Further, rates of CUD have risen over the past decade (Compton, Grant, Colliver, Glantz,

& Stinson, 2004). Cannabis use is associated with a number of negative health consequences

(e.g., chronic respiratory tract symptoms such as coughing and wheezing; Bloom, Kaltenborn,

Paoletti, Camilli, & Lebowitz, 1987; Tashkin, 1990), poorer educational outcomes (e.g., lower

GPA; for review see Lynskey & Hall, 2000), and an increase in risky behaviors (e.g., seat belt

disuse; Begg & Langley, 2000; Shrier, Emans, Woods, & DuRant, 1997). Further,

discontinuation of cannabis use is associated with a number of withdrawal symptoms (e.g.,

increases in anxiety and irritability and decreases in appetite; Kouri & Pope, 2000). Given that

cannabis use is associated with a number of negative outcomes, it is important to understand

variables related to cannabis use and use-related problems. Such knowledge could inform

treatment and prevention efforts.

1.2 Social Anxiety and Cannabis

Social anxiety has been identified as one risk factor for cannabis-related impairment (for

review see Buckner, Heimberg, Ecker, & Vinci, 2013; Buckner et al., 2008). Social anxiety

disorder (SAD) is characterized by a marked or intense fear of social situations in which the

individual may be scrutinized or evaluated by others (American Psychiatric Association, 2013).

Among individuals with a lifetime diagnosis of cannabis dependence, the lifetime prevalence of

SAD was found to be 29% (Agosti, Nunes, & Levin, 2002). This is much higher than the lifetime prevalence of other anxiety disorder diagnoses (6.9% to 18.5%; Agosti et al., 2002). Further, the lifetime prevalence of SAD in individuals diagnosed with cannabis dependence is much higher than the 12-month prevalence of SAD diagnosis within the general population (6.8%; Kessler, Chiu, Demler, & Walters, 2005). Findings from one longitudinal study indicate that SAD may show some specificity as a risk factor for developing cannabis dependence (Buckner et al., 2008). In this study, 22% of adolescents with a diagnosis of SAD developed cannabis dependence by age 30 compared with only 5% of adolescents with no SAD diagnosis. Further, a diagnosis of SAD was the only anxiety disorder diagnosis related to later cannabis dependence. This relationship remained even after controlling for other anxiety disorder diagnoses. Moreover, epidemiological data suggest that among those with SAD and CUD, the onset of SAD precedes the onset of CUD in the majority of individuals (Buckner, Heimberg, Schneier, et al., 2012).

Although findings are mixed in terms of the association between social anxiety and frequency of cannabis use (Buckner, Bonn-Miller, Zvolensky, & Schmidt, 2007; Buckner, Ecker, & Cohen, 2010; Buckner & Schmidt, 2008; Ecker, Richter, & Buckner, 2014; Griffin, Botvin, Scheier, & Nichols, 2002; Oyefeso, 1991), there appears to be a clear relationship between social anxiety and cannabis-related problems (Buckner, Heimberg, Matthews, & Silgado, 2012; Buckner & Schmidt, 2008; Buckner et al., 2008; Ecker et al., 2014; Lynskey et al., 2002). Among nonclinical samples, social anxiety is incrementally associated with cannabis-related problems after controlling for other relevant variables (e.g., cannabis use frequency, alcohol use disorder symptoms, major depressive disorder, other anxiety disorders; Buckner, Mallott, Schmidt, & Taylor, 2006; Buckner & Schmidt, 2009; Buckner, Schmidt, Bobadilla, & Taylor, 2006). Further, SAD is associated with faster transition from first use to experiencing cannabis-

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related problems among adolescent boys (Marmorstein, White, Loeber, & Stouthamer-Loeber, 2010) and among men (Buckner, Heimberg, Schneier, et al., 2012). Additionally, SAD is more strongly associated with cannabis dependence than cannabis abuse (Buckner, Heimberg, Schneier, et al., 2012; Buckner et al., 2008), suggesting that individuals with SAD may have a higher risk for developing more severe problems related to their cannabis use.

Despite high rates of co-occurring social anxiety and cannabis-related problems, little empirical work has been done to elucidate the nature of this relationship. Consistent with tension-reduction theory (Conger, 1956), individuals with social anxiety may use cannabis to cope with their chronically elevated anxiety, and using cannabis in this way may increase their risk for developing cannabis-related problems (cf. Buckner, Heimberg, Matthews, et al., 2012). In line with this hypothesis, among cannabis using young adults, social anxiety was related to using cannabis to cope with negative affect, which mediated the relationship between social anxiety and cannabis-related problems (Buckner, Bonn-Miller, et al., 2007). Individuals with elevated social anxiety were more likely to use cannabis in social situations and to avoid these situations if cannabis was not available (Buckner, Heimberg, Matthews, et al., 2012). Further, using cannabis in social situations mediated the relationship between social anxiety and cannabis-related problems. During a public speaking challenge, individuals with SAD reported greater craving of cannabis than those without SAD (Buckner, Silgado, & Schmidt, 2011) and participants who completed a social interaction task reported greater cannabis craving than those who completed a neutral reading task (Buckner, Ecker, & Vinci, 2013).

Taken together, these data suggest that there is a robust relationship between social anxiety and problematic cannabis use, yet some studies have yielded inconsistent results. For example, social anxiety and SAD were not associated with the expectation that using cannabis

would result in reductions in negative affect (Buckner & Schmidt, 2008, 2009). Given these inconsistencies, it may be that other variables play a role in the relationship between social anxiety and cannabis-related problems. An important next step is to elucidate mechanisms by which the social anxiety-cannabis problems relationship may function.

1.3 Potential Mediators of the Social Anxiety-Cannabis Problems Relationship

      1.3.1 Anxiety Sensitivity. Anxiety sensitivity (AS) is a malleable (Otto, Pollack, Fava, Uccello, & Rosenbaum, 1995; Schmidt et al., 2007), relatively stable (Rodriguez, Bruce, Pagano, Spencer, & Keller, 2004) risk factor (Zvolensky, Schmidt, Bernstein, & Keough, 2006) that reflects a fear of anxiety-related sensations due to beliefs that these sensations have detrimental physical, psychological, or social consequences (McNally, 2002). For example, an individual with high AS who experiences a racing heart might believe this sensation is a sign of a heart attack. On the other hand, individuals with low AS may believe this sensation is unpleasant, but benign (Taylor, Koch, & McNally, 1992). AS is composed of one higher order factor (i.e., global AS) with three correlated lower order factors: physical concerns (i.e., fear of physical symptoms of anxiety, such as heart palpitations), cognitive concerns (i.e., fear of cognitive symptoms of anxiety, such as racing thoughts), and social concerns (i.e., fear of publicly observable symptoms of anxiety, such as blushing; Taylor et al., 2007). AS is distinctive from trait anxiety (Taylor, Koch, & Crockett, 1991) and is thought to amplify anxiety responses (Reiss, 1991). In other words, when people with high AS get anxious, they become anxious about a feared stimulus *and* their own anxiety, which further exacerbates their anxiety reaction (cf. Collimore & Asmundson, 2014).

      Although early work implicated AS in the etiology and maintenance of panic disorder (McNally, 2002; Reiss, 1991; Taylor et al., 1992), it has since been shown that elevated levels of

AS are associated with numerous other forms of psychopathology (Deacon & Abramowitz, 2006; Otto et al., 1995; Taylor, 1999), including SAD/social phobia (Asmundson & Stein, 1994; Deacon & Abramowitz, 2006; Harvey, Richards, Dziadosz, & Swindell, 1993; Orsillo, Lilienfeld, & Heimberg, 1994; Rodriguez et al., 2004; Taylor et al., 1992). Further, AS was incrementally associated with social performance anxiety and social interaction anxiety among university students after controlling for other relevant factors (e.g., neuroticism, anxiety, depression, gender, negative affect; Keough, Riccardi, Timpano, Mitchell, & Schmidt, 2010; Norr et al., 2013; Norton, Cox, Hewitt, & McLeod, 1997). Moreover, all three AS subfacets have been found to be positively correlated with social anxiety in both clinical and non-clinical samples (Allan, Capron, Raines, & Schmidt, 2014; Belcher & Peters, 2009; Grant, Beck, & Davila, 2007; Noel, Lewis, Francis, & Mezo, 2013; Wheaton, Deacon, McGrath, Berman, & Abramowitz, 2012).

It has been posited that AS is important in the development and maintenance of substance use and related problems (cf. Reiss, 1991). Consistent with tension-reduction theory (Conger, 1956), individuals with elevated AS may utilize drugs/alcohol to cope with their heightened levels of anxious responding (Reiss, 1991; Stewart & Kushner, 2001). In line with this hypothesis, AS was incrementally associated with coping motives for cannabis use after controlling for other relevant variables among adult current cannabis users (e.g., frequency of cannabis use, frequency of alcohol use, negative affectivity, other motives for cannabis use; Bonn-Miller, Zvolensky, & Bernstein, 2007; Hecimovic, Barrett, Darredeau, & Stewart, 2014; Johnson, Mullin, Marshall, Bonn-Miller, & Zvolensky, 2010; Smits, Bonn-Miller, Tart, Irons, & Zvolensky, 2011; Zvolensky et al., 2009) and adult daily cigarette smokers (Norberg, Olivier, Schmidt, & Zvolensky, 2014). Further, among female undergraduate students, AS was

significantly associated with the use of alcohol and drugs to cope with anxiety and depression (Stewart, Karp, Pihl, & Peterson, 1997). Moreover, AS was significantly associated with coping-motivated cannabis use among adolescents (Comeau, Stewart, & Loba, 2001).

Emerging data suggests that global AS may not be associated with cannabis-related problems (Buckner, Bonn-Miller, et al., 2007); rather, the AS subfacets may be differentially related to cannabis-related problems. In an ecological momentary assessment that monitored antecedents of subsequent cannabis use, the AS-cognitive concerns subfacet (but not global AS or the physical or social concerns subfacets) was associated with severity of cannabis-related problems at baseline (Buckner, Zvolensky, et al., 2011). Further, the AS-cognitive concerns subfacet and the AS-social concerns subfacet each interacted with cannabis craving to predict subsequent cannabis use (Buckner, Zvolensky, et al., 2011). Further, among adult current cannabis users, AS was robustly related to cannabis withdrawal symptoms after controlling for relevant factors (e.g., past month cannabis use) and this was especially true for AS-cognitive concerns (Bonn-Miller, Zvolensky, Marshall, & Bernstein, 2007). Although global AS has been found to be unrelated to cannabis-related problems, it appears that the specific subfacets of AS are related to cannabis-related problems.

Consistent with prior research on psychological factors and substance use (Simons, 2003; Simons & Gaher, 2005), AS does not appear to be associated with level or frequency of drug/alcohol use. Among a sample of undergraduate students, levels of AS did not significantly differ between individuals who reported drug/alcohol use in the past 30 days and those who denied drug/alcohol use in the past 30 days (Stewart et al., 1997). Among adult regular cigarette smokers, AS was not associated with status or frequency of cannabis use (Buckner, Zvolensky, Jeffries, & Schmidt, 2014; Norberg et al., 2014; Zvolensky, Bonn-Miller, et al., 2006). Further,

among adolescents, AS was not associated with a lifetime prevalence of cannabis use (Malmberg et al., 2010). Global AS and AS subfacets were unrelated to cannabis use frequency among adult cannabis users (Bonn-Miller, Zvolensky, & Bernstein, 2007; Bonn-Miller, Zvolensky, Marshall, et al., 2007; Buckner, Bonn-Miller, et al., 2007; Buckner, Zvolensky, et al., 2011; Zvolensky et al., 2009). Interestingly, it seems that levels of AS may actually be lower in individuals who use cannabis/hashish and report cannabis as their drug of choice (Norton, Rockman, et al., 1997; Stewart et al., 1997). Taken together, it seems that AS is unrelated to level or frequency of substance use in general, and cannabis use more specifically.

Consistent with tension-reduction theory (Conger, 1956), and given that AS is related to coping motives for cannabis use (e.g., Bonn-Miller, Zvolensky, & Bernstein, 2007), which are associated with cannabis-related problems (Buckner, Bonn-Miller, et al., 2007), it follows that at least some aspects of AS may be associated with cannabis-related problems. Emerging data suggest that the AS-cognitive concerns subfacet may be especially related to cannabis-related problems and withdrawal (Bonn-Miller, Zvolensky, Marshall, et al., 2007; Buckner, Zvolensky, et al., 2011). Given that only one known study has examined the relationship between AS subfacets and cannabis-related problems specifically, replication is necessary to confirm that the AS-cognitive concerns subfacet is associated with cannabis-related problems.

1.3.2 Intolerance of Uncertainty. Another anxiety-related vulnerability factor is intolerance of uncertainty (IU), which is conceptually related to AS, yet distinct (Carleton, Sharpe, & Asmundson, 2007). IU is a malleable (Boswell, Thompson-Hollands, Farchione, & Barlow, 2013; Dugas & Ladouceur, 2000; Ladouceur, Gosselin, & Dugas, 2000; Mahoney & McEvoy, 2012) cognitive vulnerability factor that affects how a person perceives, interprets, and responds to uncertain situations (Dugas, Schwartz, & Francis, 2004). More specifically,

individuals who are intolerant of uncertainty believe that uncertainty is stressful and that uncertain situations should be avoided (Buhr & Dugas, 2002). IU is related to worry, yet distinct, and is seen as an antecedent to worry (Buhr & Dugas, 2002; Ladouceur, Talbot, & Dugas, 1997). Further, manipulation of IU affects worry, which suggests that IU is causally associated with worry (Ladouceur et al., 2000).

Although early work implicated IU in the etiology and maintenance of worry and generalized anxiety disorder (Buhr & Dugas, 2006; GAD; Dugas, Buhr, & Ladouceur, 2004; Dugas, Freeston, & Ladouceur, 1997; Dugas, Marchand, & Ladouceur, 2005; Dugas, Schwartz, et al., 2004), it has since been posited that it is a fundamental component of all anxiety disorders (cf. Carleton et al., 2007). Indeed, recent empirical work has demonstrated that IU may be an important factor in other anxiety disorders (Carleton et al., 2014; Holaway, Heimberg, & Coles, 2006; Tolin, Abramowitz, Brigidi, & Foa, 2003; Yook, Kim, Suh, & Lee, 2010), including SAD (Boelen & Reijntjes, 2009; Boelen, Vrinssen, & van Tulder, 2010).

Among nonclinical samples, IU has been found to be incrementally associated with social anxiety and social avoidance after controlling for a number of theoretically relevant variables (e.g., neuroticism, fear of negative evaluation, anxiety sensitivity, gender, negative affectivity, trait anxiety; Boelen & Reijntjes, 2009; Carleton, Collimore, & Asmundson, 2010; Norr et al., 2013). Among undergraduate students, IU was incrementally associated with social interaction and social performance anxiety after controlling for fear of negative evaluation and worry (Whiting et al., 2014). Further, among adolescents, IU was robustly associated with social anxiety after controlling for negative affectivity, gender, and age (Boelen et al., 2010).

Although there seems to be a robust association between IU and social anxiety in nonclinical samples, findings among clinical samples have been mixed. For example, one study

found that IU was not correlated with social interaction anxiety among individuals diagnosed with an anxiety and/or depressive disorder (Boswell et al., 2013). Yet, findings from another study indicated that individuals with SAD had significantly higher levels of IU than undergraduate students and community participants (Carleton et al., 2012). Taken together, these data suggest that IU may play an important role in the development and maintenance of SAD.

Consistent with tension-reduction theory (Conger, 1956) and recent work finding that IU is associated with coping motives for alcohol use (Kraemer, McLeish, & O'Bryan, 2015; Oglesby, Albanese, Chavarria, & Schmidt, 2015), IU may be associated with cannabis-related problems. Yet, no known studies have examined the relationship between IU and cannabis use or related problems. It is plausible that individuals who cannot tolerate uncertainty may use cannabis to cope with ambiguous situations. This might be particularly relevant for socially anxious individuals, given that uncertainty is inherent in social situations (cf. Boelen & Reijntjes, 2009).

1.4 Current Study and Aims

The current study set out to fill gaps in the literature on social anxiety and cannabis use and related problems in several ways. First, the study aimed to examine if social anxiety is related to frequency of cannabis use. Given that the majority of prior work has found no relation between social anxiety and cannabis use frequency (Buckner, Bonn-Miller, et al., 2007; Buckner et al., 2010; Buckner & Schmidt, 2008; Ecker et al., 2014), it was hypothesized that we would replicate this finding. Second, the study aimed to replicate prior work (e.g., Buckner, Heimberg, Matthews, et al., 2012; Buckner & Schmidt, 2008; Buckner et al., 2008; Ecker et al., 2014; Lynskey et al., 2002) that social anxiety is positively related to cannabis problems. Third, the

study aimed to replicate prior work that social anxiety is related to AS subfacets (Allan et al., 2014; Belcher & Peters, 2009; Grant et al., 2007; Noel et al., 2013; Wheaton et al., 2012) and IU (e.g., Boelen & Reijntjes, 2009; Carleton et al., 2010; Whiting et al., 2014).

Fourth, the study aimed to replicate prior work (Bonn-Miller, Zvolensky, Marshall, et al., 2007) that AS subfacets are unrelated to frequency of cannabis use. Fifth, the study aimed to elucidate the relation of AS subfacets with cannabis problems. Consistent with tension-reduction theory (Conger, 1956) and past work (Buckner, Zvolensky, et al., 2011), we hypothesized that AS-cognitive concerns would be positively related to cannabis problems. Sixth, the study aimed to examine the relation of IU and cannabis use frequency. It was hypothesized that IU would be unrelated to cannabis use frequency given that extant work has found no relation between other psychological factors and cannabis or other substance use frequency (Bonn-Miller, Zvolensky, & Bernstein, 2007; Buckner, Bonn-Miller, et al., 2007; Buckner, Zvolensky, et al., 2011; Simons & Gaher, 2005; Zvolensky et al., 2009). Seventh, the study aimed to examine the association between IU and cannabis-related problems. In line with tension-reduction theory (Conger, 1956), it was hypothesized that IU would be positively related to cannabis problems.

Eighth, this study aimed to elucidate the relationship between social anxiety and cannabis problems by examining the mediational roles of AS subfacets and IU in the social anxiety-cannabis problems relationship. It was hypothesized that social anxiety would be indirectly related to cannabis problems through AS-cognitive concerns and IU. Given that prior work has observed gender differences in the social anxiety-cannabis problems relationship (Buckner, Mallott, et al., 2006), gender was assessed as a possible covariate to be included in the analyses.

Additionally, depression and cannabis use frequency were assessed as possible covariates given their associations with cannabis problems (e.g., Buckner, Bonn-Miller, et al., 2007; Buckner, Keough, & Schmidt, 2007).

CHAPTER 2: METHOD

2.1 A Priori Power Analysis and Sample Size

The sample size necessary to achieve the recommended power of .80 (J. Cohen, 1988) was determined using the guidelines proposed by Fritz and MacKinnon (2007). Previous work investigating factors that may mediate the relationship between social anxiety and cannabis-related problems have observed effect sizes between small and small-to-medium for path α (i.e., the effect of X on M) and between small to medium and medium for path β (i.e., the effect of M on Y; Buckner, Bonn-Miller, et al., 2007; Buckner, Heimberg, Matthews, et al., 2012; Buckner & Schmidt, 2009; Buckner, Zvolensky, & Schmidt, 2012). Thus, the sample size necessary to detect small-to-medium effects for path α and path β was determined. The sample necessary to achieve .80 power and to detect small-to-medium effect sizes in maximum likelihood bootstrapping for testing indirect effects is 162 participants. Thus, our final sample of 220 should be sufficient to test study hypotheses.

2.2 Sample and Procedures

The sample was composed of undergraduate students recruited through psychology classes for research participation credit at Louisiana State University (LSU). Inclusion criteria for the current study included being an undergraduate student at LSU enrolled in a psychology course, being at least 18 years of age, and endorsing current (i.e., past three-month) cannabis use. Although 844 participants began the survey, 624 were excluded from the current study due to: being under the age of 18 ($n = 4$), not completing the entire survey ($n = 52$), and denial of past three-month cannabis use ($n = 568$). The final sample consisted of 220 (77.7 % female) current (i.e., past three-month) cannabis-users. The mean age of participants was 20.18 ($SD = 2.15$, ranged from 18 to 40). The racial/ethnic composition was 12.7 % non-Hispanic African

American or Black, 0.5% Hispanic African American or Black, 0.9% American Indian or Alaska

Native, 2.3% Asian, 77.3% non-Hispanic Caucasian, 0.9% Hispanic Caucasian, 4.1%

multiracial, and 1.4% "other".

Participants signed up for the survey using the LSU psychology department's online

survey sign-up system. Once enrolled, participants completed a battery of self-report measures

(see Measures section) online using a secure data collection website, www.surveymonkey.com.

Data were collected between January 2014 and October 2014. The University's Institutional

Review Board approved this study prior to data collection. Participants were first asked to

provide informed consent, and then begin the self-report measures. Data are stored on a secure

server in Dr. Buckner's research laboratory in 105 Audubon Hall on LSU's campus.

Participants' responses were identified by ID numbers to preserve confidentiality. A certificate

of confidentiality was obtained from the National Institute on Drug Abuse to further ensure

security and confidentiality.

2.3 Measures

2.3.1 Marijuana Use Form (MUF; Buckner, Bonn-Miller, et al., 2007). The MUF was

used to assess current (i.e., past three month) cannabis use. Participants rated their cannabis use

on a 0 (*less than once a month*) to 10 (*21 or more times a week*) scale. The MUF has

demonstrated good convergent validity with other measures of cannabis use (Buckner, Crosby,

Wonderlich, & Schmidt, 2012).

2.3.2 Marijuana Problems Scale (MPS; Stephens, Roffman, & Curtin, 2000). The MPS

is a self-report questionnaire used to assess 19 negative consequences associated with cannabis

use (i.e., cannabis-related problems) in the past 90 days. Participants rated the degree to which

marijuana has caused problems (e.g., "Problems in your family") on a 0 (*no problem*) to 2

(*serious problem*) scale. Number of problems was calculated by totaling the number of problems

participants endorse. The MPS has demonstrated good internal consistency (Stephens et al.,

2004). This measure demonstrated an adequate level of internal consistency (α = .76) in the

current sample.

2.3.3 Social Interaction Anxiety Scale (SIAS; Mattick & Clarke, 1998). The SIAS is a

20-item self-report questionnaire used to assess social interaction fears. Participants rated items

(e.g., "I have difficulty making eye contact with others") on a 0 (*not at all*) to 4 (*extremely*) scale.

The SIAS has shown excellent internal consistency, discriminant validity, and construct validity

(Mattick & Clarke, 1998). The measure demonstrated a good level of internal consistency (α =

.89) in the current sample. Further, the SIAS has consistently been found to be associated with

cannabis-related problems (e.g., Buckner, Heimberg, Matthews, et al., 2012; Buckner &

Schmidt, 2008; Buckner, Zvolensky, et al., 2012; Najolia, Buckner, & Cohen, 2012).

2.3.4 Anxiety Sensitivity Index-3 (ASI-3; Taylor et al., 2007). The ASI-3 is an 18-item

self-report questionnaire used to assess the physical, cognitive, and social factors of AS.

Participants rated items on a 0 (*very little*) to 4 (*very much*) scale. The ASI-3 is composed of

three subscales corresponding with the lower-order factors of AS. Example items from the

physical, cognitive, and social subscales include: "It scares me when my heart beats rapidly", "It

scares me when I am unable to keep my mind on tasks", and "It scares me when I blush in front

of people". The ASI-3 subscales have shown good to excellent internal consistency, convergent

validity, and discriminant validity (Norr et al., 2013; Taylor et al., 2007). In the current sample,

the ASI-3 total score (α = .93) and cognitive concerns subscale (α = .91) demonstrated excellent

internal consistency, the physical concerns subscale achieved good internal consistency (α = .88)

and the social concerns subscale achieved acceptable internal consistency (α = .74).

2.3.5 Intolerance of Uncertainty Scale (IUS; English version: Buhr & Dugas, 2002; Original French version: Freeston, Rhéaume, Letarte, Dugas, & Ladouceur, 1994). The IUS is a 27-item self-report questionnaire used to assess IU. Participants rated items (e.g., "Uncertainty makes me uneasy, anxious, or stressed") on a 1 (*not at all characteristic of me*) to 5 (*entirely characteristic of me*) scale. The IUS has shown excellent internal consistency, test-retest reliability, convergent validity, and discriminant validity (Buhr & Dugas, 2002; Norr et al., 2013). The measure demonstrated an excellent level of internal consistency ($\alpha = .96$) in the current sample.

2.3.6 Depression Anxiety Stress Scale-21 (DASS-21; Antony, Bieling, Cox, Enns, & Swinson, 1998). The DASS-21 is a 21 item self-report questionnaire used to assess depression, anxiety, and stress. The depression subscale of this measure was used to control for depression. Participants rated the degree to which they have experienced negative emotional symptoms (e.g., "I felt down-hearted and blue") in the past week on a 1 (*Did not apply to me at all*) to 4 (*Applied to me very much, or most of the time*) scale. The DASS-21 depression subscale has demonstrated excellent internal consistency (Antony et al., 1998). The measure achieved a good level of internal consistency ($\alpha = .83$) in the current sample.

2.3.7 Infrequency Scale (IS; Chapman & Chapman, 1983). To identify random responders who may have provided random or grossly invalid responses, four questions (e.g., "I find that I often walk with a limp, which is the result of a skydiving accident") from the IS were included. As in prior online studies (e.g., A. Cohen, Iglesias, & Minor, 2009), individuals who endorsed three or more infrequency items were considered random responders and were excluded from the study ($n = 0$).

2.4 Data Analytic Strategy

     First, we examined if any covariates needed to be included in the analyses by conducting correlation analyses between depression, cannabis use frequency, cannabis-related problems, and social anxiety. Analysis of variance (ANOVA) was used to determine if gender was differentially related to social anxiety or cannabis-related problems. To test the first and second hypotheses that social anxiety would be unrelated to cannabis use frequency, yet related to cannabis-related problems, correlation analyses were conducted between social anxiety, cannabis use frequency, and number of cannabis-related problems. To test the third hypothesis that social anxiety would be related to AS subfacets and IU, correlation analyses were conducted between social anxiety, AS subfacets, and IU.

     To test the fourth and fifth hypotheses, that AS subfacets would be unrelated to cannabis use frequency yet AS-cognitive concerns would be related to cannabis-related problems, correlation analyses were conducted between AS subfacets, cannabis use frequency, and number of cannabis-related problems. To test the sixth and seventh hypotheses that IU would be unrelated to cannabis use frequency yet related to cannabis-related problems, correlation analyses were conducted between IU, cannabis use frequency, and number of cannabis-related problems.

     To examine the eighth hypothesis that social anxiety would be indirectly related to cannabis problems through AS-cognitive concerns and IU, analyses were conducted using PROCESS, a macro used with SPSS 23.0 that utilizes an ordinary least squares regression-based path analytical framework to test for both direct and indirect effects (Hayes, 2013), using bootstrap analyses with 10,000 resamples from which bias-corrected 95-percentile confidence intervals (CI) were estimated (Hayes, 2009; Preacher & Hayes, 2004, 2008). In a simple

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mediation model, the *total effect* is the effect of X on Y, which includes direct and indirect effects. The *direct effect* (c') is the portion of the effect of X on Y independent of the effect of X on Y through the mediator (M). The *indirect effect* is the difference between the total and direct effects and is used to test mediation. X is indirectly related to Y through M if the bias-corrected bootstrap confidence intervals for the indirect effect do not cross zero (Hayes, 2013). Statisticians assert that a significant direct effect of X on Y is not necessary to establish mediation given that X can be causally related to Y indirectly through M (Hayes, 2009, 2013). We planned to test five models. Specifically, we planned to test the effects of each AS subfacet (i.e., AS-physical concerns, AS-cognitive concerns, AS-social concerns), IU, and AS-cognitive concerns and IU simultaneously.

CHAPTER 3: RESULTS

3.1 Sample Characteristics and Correlations Between Study Variables

Participants used cannabis on average two or three times during the past month, 36% of participants used cannabis weekly, and 9.1% of participants used daily. See Table 1 for means, standard deviations, and correlations between study variables. Consistent with hypothesis, social anxiety was unrelated to cannabis use frequency, yet positively correlated with number of cannabis-related problems. Consistent with hypothesis, social anxiety was significantly positively correlated with all AS subfacets and IU. Consistent with prediction, AS subfacets were unrelated to cannabis use frequency and AS-cognitive concerns were significantly, positively correlated with cannabis-related problems. Counter to hypotheses, AS-physical concerns and AS-social concerns were both significantly positively correlated with cannabis-related problems. Also consistent with hypothesis, IU was unrelated to cannabis use frequency, yet significantly positively correlated with cannabis-related problems. Depression was significantly correlated with both social anxiety and cannabis-related problems and cannabis use frequency was significantly correlated with cannabis-related problems.

Table 1. Intercorrelations, Means, and Standard Deviations for Study Variables

Measure	1	2	3	4	5	6	7	8
1. Social anxiety								
2. Cannabis problems	.14*							
3. AS Physical	.26*	.14*						
4. AS Cognitive	.34*	.15*	.77**					
5. AS Social	.46*	.23**	.71**	.68**				
6. Intolerance of uncertainty	.39*	.25**	.45**	.57**				
7. Depression	.45*	.19*	.35**	.51**		.53**		
8. Cannabis use frequency	.01	.34**	.04	.09	.02	-.02	.16*	
M	19.4	2.40	3.20	3.06	4.78	52.26	5.87	2.51
SD	10.6	2.58	4.26	4.35	3.98	19.34	6.24	2.54

Note. $N = 220$; AS = Anxiety Sensitivity; Physical, Cognitive, and Social Concerns are subfacets of AS.
* $p < .05$; ** $p < .01$.

Gender was differentially related to cannabis problems, such that men ($M = 3.1$, $SD = 3.1$) endorsed more cannabis problems than women ($M = 2.2$, $SD = 2.4$), $F(1, 218) = 4.8$, $p = .03$, $d = 0.33$. Given that gender was differentially related to cannabis problems, correlation analyses were also conducted by gender (see Table 2). Social anxiety was positively correlated with cannabis problems and cannabis use frequency among men but not women and cannabis problems were positively correlated with AS subfacets among women but not men. Depression, cannabis use frequency, and gender were included as covariates in subsequent analyses.

Table 2. Correlations for Study Variables Separated by Gender

| Measure	1	2	3	4	5	6	7	8
1. Social anxiety		.43**	.22	.41**			.56**	.33**
2. Cannabis problems	.06		.08	.12	.23	.36*	.32*	.32*
3. AS Physical	.27*	.17*		.72**			.43**	.15
4. AS Cognitive	.32*	.16*	.78**				.63**	.27
5. AS Social	.46*	.25**	.72**	.70**			.47**	.16
6. Intolerance of uncertainty	.33*	.22**	.42**	.55**			.67**	.06
7. Depression	.41*	.14	.32**	.47**				.17
8. Cannabis use frequency	.03	.33**	.01	.02	-.02	-.04	.16*	

Note. AS = Anxiety Sensitivity; Physical, Cognitive, and Social Concerns are subfacets of AS. Correlations for women ($n = 171$) are presented below the diagonal (shaded area). Correlations for men ($n = 49$) are presented above the diagonal.
* $p < .05$; ** $p < .01$.

3.2 Tests of Direct and Indirect Effects

See Figure 1 for models testing indirect effects. The total effects model (with social anxiety and covariates) accounted for significant variance ($R^2 = .15$, $df = 4, 215$, $F = 9.38$, $p < .001$); however, social anxiety did not account for significant variance in cannabis-related problems ($B = 0.02$, $SE = 0.02$, $p = .292$, 95% CI = -0.02, 0.05) due to the variance accounted for by depression ($B = 0.04$, $SE = 0.03$, $p = .145$, 95% CI = -0.01, 0.10) and cannabis use frequency ($B = 0.31$, $SE = 0.07$, $p < .001$, 95% CI = 0.18, 0.44). In terms of social anxiety being indirectly related to cannabis problems through AS-cognitive concerns (Model A), the full model with AS-cognitive concerns accounted for significant variance ($R^2 = .15$, $df = 5, 214$, $F = 7.63$, $p < .001$);
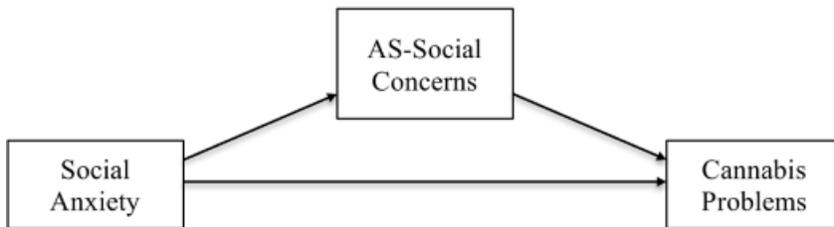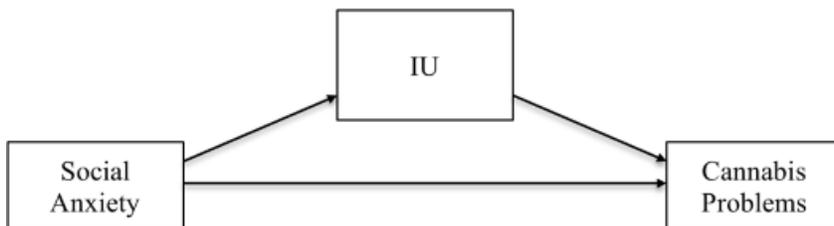
19
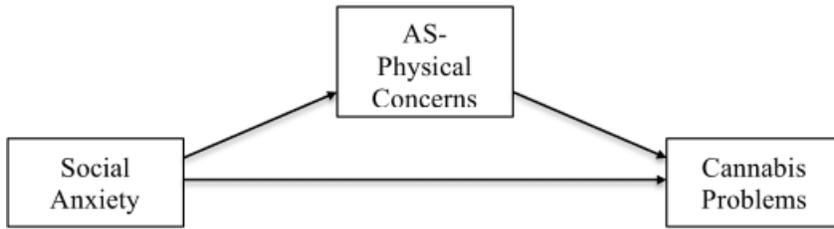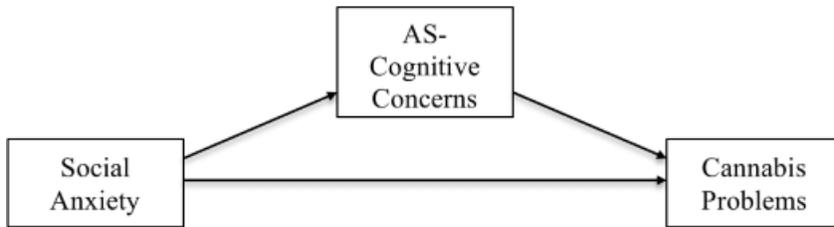
Model A

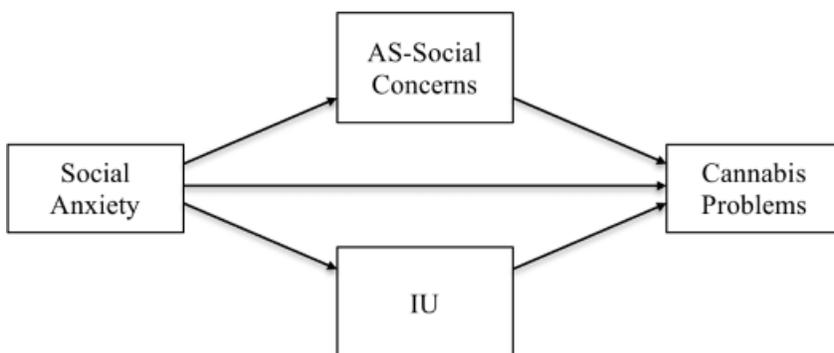**Model B**

Model C

Model D

Model E

Figure 1. Models Depicting Direct and Indirect Effects of Social Anxiety on Cannabis-Related Problems

however AS-cognitive concerns did not account for significant variance in cannabis-related problems ($B = 0.04$, $SE = 0.04$, $p = .404$, 95% CI = -0.05, 0.12). The direct effect of social anxiety on cannabis problems (controlling for AS-cognitive concerns and covariates) was nonsignificant ($B = 0.02$, $SE = 0.02$, $p = .359$, 95% CI = -0.02, 0.05). Regarding the test of the indirect effect, social anxiety was not indirectly related to cannabis-related problems through AS-cognitive concerns ($B = 0.002$, $SE = 0.003$, 95% CI = -0.003, 0.012).

In terms of social anxiety being indirectly related to cannabis problems through AS-physical concerns (Model B), the full model with AS-physical concerns accounted for significant variance ($R^2 = .15$, $df = 5$, 214, $F = 7.82$, $p < .001$); however, AS-physical concerns did not account for significant variance in cannabis-related problems ($B = 0.05$, $SE = 0.04$, $p = .219$, 95% CI = -0.03, 0.13). The direct effect of social anxiety on cannabis problems (controlling for AS-physical concerns and covariates) was nonsignificant ($B = 0.02$, $SE = 0.02$, $p = .369$, 95% CI = -0.02, 0.05). Regarding the test of the indirect effect, social anxiety was not indirectly related to cannabis-related problems through AS-physical concerns ($B = 0.003$, $SE = 0.004$, 95% CI = -0.002, 0.013).

In terms of social anxiety being indirectly related to cannabis problems through AS-social concerns (Model C), the full model with AS-social concerns accounted for significant variance ($R^2 = .18$, $df = 5$, 214, $F = 9.48$, $p < .001$), with AS-social concerns accounting for significant variance in cannabis-related problems ($B = 0.14$, $SE = 0.05$, $p = .004$, 95% CI = 0.05, 0.23). The direct effect of social anxiety on cannabis problems (controlling for AS-social concerns and covariates) was nonsignificant ($B = 0.001$, $SE = 0.02$, $p = .958$, 95% CI = -0.03, 0.04). Regarding the test of the indirect effect, social anxiety was indirectly related to cannabis-related problems through AS-social concerns ($B = 0.02$, $SE = 0.01$, 95% CI = 0.003, 0.035).

In terms of social anxiety being indirectly related to cannabis problems through IU (Model D), the full model with IU accounted for significant variance ($R^2 = .19$, $df = 5, 214$, $F = 10.22$, $p < .001$), with IU accounting for significant variance in cannabis-related problems ($B = 0.03$, $SE = 0.01$, $p < .001$, 95% CI = 0.01, 0.05). The direct effect of social anxiety on cannabis problems (controlling for IU and covariates) was nonsignificant ($B = 0.01$, $SE = 0.02$, $p = .724$, 95% CI = -0.03, 0.04). Regarding the test of the indirect effect, social anxiety was indirectly related to cannabis-related problems through IU ($B = 0.01$, $SE = 0.01$, 95% CI = 0.003, 0.029).

Given that social anxiety was not indirectly related to cannabis-related problems through AS-cognitive concerns, the third model (social anxiety being indirectly related to cannabis problems through AS-cognitive concerns and IU) was not tested. Rather, given that social anxiety was related to cannabis problems indirectly through AS-social concerns and IU, a model examining the indirect effects of these two variables simultaneously was tested (Model E). The full model with AS-social concerns and IU accounted for significant variance ($R^2 = .20$, $df = 6$, 213, $F = 9.02$, $p < .001$), with IU ($B = 0.03$, $SE = 0.01$, $p = .018$, 95% CI = 0.005, 0.048) accounting for significant variance in cannabis-related problems. AS-social concerns did not account for significant variance in cannabis-related problems ($B = 0.08$, $SE = 0.05$, $p = .105$, 95% CI = -0.02, 0.19). The direct effect of social anxiety on cannabis problems (controlling for AS-social concerns, IU, and covariates) was nonsignificant ($B = -0.002$, $SE = 0.02$, $p = .925$, 95% CI = --0.04, 0.03). Regarding the test of the indirect effect, the total indirect effect (with AS-social concerns and IU) was significant ($B = 0.02$, $SE = 0.01$, 95% CI = 0.01, 0.04) such that social anxiety was indirectly related to cannabis-related problems through IU ($B = 0.01$, $SE = 0.01$, 95% CI = 0.001, 0.025) but not AS-social concerns ($B = 0.01$, $SE = 0.01$, 95% CI = -0.003, 0.028).

CHAPTER 4: DISCUSSION

4.1 General Discussion

This study was the first to investigate IU's role in cannabis use and related impairment. Further, this was the first known study to examine the indirect effects of social anxiety on cannabis problems through AS subfacets and IU. Consistent with prediction, social anxiety was unrelated to cannabis use frequency, yet positively related to cannabis-related problems. Social anxiety was related to all AS subfacets and IU, which is consistent with prior work (Allan et al., 2014; Belcher & Peters, 2009; Boelen & Reijntjes, 2009; Carleton et al., 2010; Grant et al., 2007; Noel et al., 2013; Norr et al., 2013; Wheaton et al., 2012; Whiting et al., 2014). Consistent with previous findings (Bonn-Miller, Zvolensky, Marshall, et al., 2007), AS subfacets were unrelated to cannabis use frequency. Only one known study (Buckner, Zvolensky, et al., 2011) has examined the associations of AS subfacets with cannabis-related problems and that study found AS-cognitive concerns to be the only AS subfacet related to cannabis problems. Yet, all AS subfacets were related to cannabis problems in this sample, with the strongest relationship found between the AS-social concerns subfacet and cannabis-related problems. AS-social concerns being the subfacet most related to cannabis problems fits in with prior work given that this subfacet is most strongly associated with social anxiety (e.g., Allan et al., 2014), which has been found to be associated with cannabis problems in prior work (for review see Buckner, Heimberg, et al., 2013). These disparate findings may be accounted for by differences in sample sizes between the two studies. Correlations between AS subfacets and cannabis-related problems represented small effect sizes in both studies but our sample consisted of four times as many participants as that of Buckner and colleagues (2011). Thus, their sample might have been

underpowered to detect significant correlations between all AS subfacets and cannabis problems, although effect sizes were similar.

As predicted, IU was not related to cannabis use frequency but was related to cannabis-related problems. This finding suggests that individuals who are unable to tolerate uncertainty are not necessarily using cannabis more frequently, but something about their use may be placing them at risk for experiencing more problems related to their use. It may be that these individuals rely on cannabis to help manage negative affect associated with IU and therefore continue to use cannabis despite having problems associated with their use. Further, given that greater IU is associated with a multitude of anxiety disorder symptoms (Carleton et al., 2010; Carleton et al., 2014; Carleton et al., 2012), individuals with high IU may be using cannabis to manage the uncertainty associated with anxiety-provoking situations (e.g., panic attacks, social interactions, future catastrophic events).

Social anxiety was indirectly related to cannabis problems through AS-social concerns and IU. However, when these variables were tested simultaneously, social anxiety remained indirectly related to cannabis problems through IU only. These findings suggest that socially anxious individuals may be more at risk to develop cannabis-related problems if they perceive that they are unable to tolerate uncertain situations. These individuals may avoid ambiguous social situations and engage in more solitary cannabis use, which is associated with more cannabis-related problems (Creswell, Chung, Clark, & Martin, 2015). These findings point to the potential utility of these malleable anxiety-related vulnerability factors in intervention efforts aimed at reducing cannabis-related impairment, especially among socially anxious individuals who are experiencing problems relate to their use.

4.2 Limitations and Future Directions

The current study should be interpreted in light of some limitations. First, due to the cross-sectional nature of this study, causal inferences cannot be made. Prospective and experimental work examining the role of anxiety-related cognitive vulnerability factors in the social anxiety-cannabis problems relationship will be an important next step. Second, self-report measures were used and future work will benefit from utilizing multi-method designs (i.e., biological verification of cannabis use, clinical interview to assess social anxiety disorder symptoms, behavioral measures of AS and IU). Third, the sample consisted of undergraduate cannabis users who were primarily Caucasian females. Although an undergraduate sample was warranted given that they seem to be at risk for cannabis-related problems (Caldeira, Arria, O'Grady, Vincent, & Wish, 2008), future work is needed in more diverse populations. Fourth, given the small correlations found between anxiety-related vulnerability factors and cannabis problems, results should be replicated to ensure that these relationships were not spurious.

4.3 Conclusions

Results of the current study suggest that anxiety-related cognitive vulnerability factors may play a role in cannabis-related impairment, although not necessarily in the frequency of cannabis use. IU may be particularly important in the relationship between social anxiety and cannabis-related problems. Thus, given that IU is malleable (Boswell et al., 2013; Dugas & Ladouceur, 2000; Ladouceur et al., 2000; Mahoney & McEvoy, 2012) it may be ideal to target in transdiagnostic treatments aimed at treating cannabis use disorders and anxiety disorders simultaneously (Buckner, Zvolensky, Schmidt, et al., 2014).

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APPENDIX: IRB APPROVAL FORM

ACTION ON PROTOCOL APPROVAL REQUEST

LSU

Institutional Review Board
Dr. Robert Mathews, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu | lsu.edu/irb

TO: Julia Buckner
Psychology

FROM: Robert C. Mathews
Chair, Institutional Review Board

DATE: October 16, 2013
RE: **IRB#** 3422

TITLE: College substance use

New Protocol/Modification/Continuation: New Protocol

Review type: Full _X_ Expedited ___ **Review date:** 10/11/2013

Risk Factor: Minimal ___X___ Uncertain _____ Greater Than Minimal_____

**Approved*_____X_____ Disapproved _____

Approval Date: 10/11/2013 **Approval Expiration Date:** 10/10/2014

Re-review frequency: (annual unless otherwise stated)

Number of subjects approved: _1000_

Protocol Matches Scope of Work in Grant proposal: (if applicable) _____

*Approval Note: Your study is not to begin until your Certificate of Confidentiality is approved and on file with the LSU-BR Institutional Review Board

By: Robert C. Mathews, Chairman _____

PRINCIPAL INVESTIGATOR: PLEASE READ THE FOLLOWING –
Continuing approval is CONDITIONAL on:

1. Adherence to the approved protocol, familiarity with, and adherence to the ethical standards of the Belmont Report, and LSU's Assurance of Compliance with DHHS regulations for the protection of human subjects*
2. Prior approval of a change in protocol, including revision of the consent documents or an increase in the number of subjects over that approved.
3. Obtaining renewed approval (or submittal of a termination report), prior to the approval expiration date, upon request by the IRB office (irrespective of when the project actually begins); notification of project termination.
4. Retention of documentation of informed consent and study records for at least 3 years after the study ends.
5. Continuing attention to the physical and psychological well-being and informed consent of the individual participants including notification of new information that might affect consent.
6. A prompt report to the IRB of any adverse event affecting a participant potentially arising from the study.
7. Notification of the IRB of a serious compliance failure.
8. SPECIAL NOTE:
*All investigators and support staff have access to copies of the Belmont Report, LSU's Assurance with DHHS, DHHS (45 CFR 46) and FDA regulations governing use of human subjects, and other relevant documents in print in this office or on our World Wide Web site at http://www.fas.lsu.edu/osp/irb

Application for Approval of Projects Which Use Human Subjects

This application is used for projects/studies that cannot be reviewed through the exemption process.

– Applicant, Please fill out the application in its entirety and include two copies of the competed application as well as parts A-E, listed below. Once the application is completed, please submit to the IRB Office for review and please allow ample time for the application to be reviewed. Expedited reviews usually takes 2 weeks. Carefully completed applications should be submitted 3 weeks before a meeting to ensure a prompt decision.

LSU

Institutional Review Board
Dr. Robert Mathews, Chair
130 David Boyd Hall
Baton Rouge, LA 70803
P: 225.578.8692
F: 225.578.5983
irb@lsu.edu | lsu.edu/irb

– A Complete Application Includes All of the Following:
  (A) Two copies of this completed form and two copies of part B thru F.
  (B) A brief project description (adequate to evaluate risks to subjects and to explain your responses to Parts 1&2)
  (C) Copies of all instruments to be used.
      *If this proposal is part of a grant proposal, include a copy of the proposal and all recruitment material.
  (D) The consent form that you will use in the study (see part 3 for more information.)
  (E) Certificate of Completion of Human Subjects Protection Training for all personnel involved in the project, including students who are involved with testing or handling data, unless already on file with the IRB. Training link: (http://phrp.nihtraining.com/users/login.php)
  (F) IRB Security of Data Agreement: (https://sites01.lsu.edu/wp/ored/files/2013/07/Security-of-Data-Agreement.pdf)

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1) Principal Investigator*: Julia D. Buckner, PhD   **Rank** Assistant Professor

*PI **must be** an LSU Faculty Member

Dept: Psychology   **Ph:** 8-4096   **E-mail:** jbuckner@lsu.edu

2) Co Investigator(s): please include department, rank, phone and e-mail for each

IRB# **3422** LSU Proposal #

☑ Full   ○ Expedited

☑ Complete Application

☑ Human Subjects Training

☑ IRB Security of Data Agreement

3) Project Title: College substance use

4) Proposal Start Date: 11/1/13   **5) Proposed Duration Months:** 24

6) Number of Subjects Requested: 1000   **7) LSU Proposal #:** NA

8) Funding Sought From: NA

STUDY APPROVED BY:
Dr. Robert C. Mathews, Chairman
Institutional Review Board
Louisiana State University
130 David Boyd Hall
225-578-8692 / www.lsu.edu/irb

Approval Expires: 10/10/2014

ASSURANCE OF PRINCIPAL INVESTIGATOR named above

I accept personal responsibility for the conduct of this study (including ensuring compliance of co-investigators/co-workers) in accordance with the documents submitted herewith and the following guidelines for human subject protection: The Belmont Report, LSU's Assurance (FWA00003892) with OHRP and 45 CFR 46 (available from http://www.lsu.edu/irb). I also understand that copies of all consent forms **must be maintained at LSU for three years after the completion of the project**. If I leave LSU before that time, the consent forms should be preserved in the Departmental Office.

Signature of PI _[signature]_   Date 9/19/13

ASSURANCE OF STUDENT/PROJECT COORDINATOR named above. If multiple Co-Investigators, please create a "signature page" for all Co-Investigators to sign. Attach the "signature page" to the application.

I agree to adhere to the terms of this document and am familiar with the documents referenced above.

Signature of Co-PI (s) _____   Date _____

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Consent Form

Study Title:	College substance use
Performance Site:	Data will be collected using a secure online data collection program. Management of this study will occur in the Department of Psychology (Audubon Hall Room 110) of Louisiana State University.
Investigators:	Julia D. Buckner, Ph.D., the principal investigator, can be reached at 225-578-4096 Monday-Friday between 9:00PM and 5:00PM or at jbuckner@lsu.edu.
Purpose of the Study:	Investigate factors related to substance use and beliefs about substance use among undergraduates.
Participants Inclusion Criteria:	Participants must be at least 18 years of age and undergraduate students at Louisiana State University (LSU).
Exclusion Criteria:	Participants will be excluded if they are not at least 18 years of age and/or are not undergraduate students at LSU.
Number of Subjects:	We plan to enroll up to 1000 participants.
Study Procedures:	This study consists of an online survey that asks questions about your thoughts, feelings, and behaviors, including your use of alcohol, illicit (illegal) drugs, and nicotine/tobacco products.
Benefits:	You may derive benefit from participating in the self-assessment, as participation may increase your awareness of your thoughts, feelings, and behaviors. You will also receive referrals to clinical services located on campus upon completion of the survey. You may also gain a better understanding of research methodology. In addition, you will be providing researchers with valuable insight that may be used to help others in the future.
Risks/Discomforts:	This study is not known to cause any risk. Some participants may be uncomfortable reporting about their personal thoughts, feelings, and substance use behaviors. Confidentiality is protected through the use of a secure online service, which is password-protected so that only laboratory personnel can access responses.
Right to Refuse:	Participation in this study is completely voluntary, and you may withdraw from the study at any time without prejudicing your future relations with LSU.

Privacy:	The LSU Institutional Review Board (which oversees university research with human subjects) may inspect and/or copy the study records. However, your name or other identifying information will not appear on these records. We will not ask you to include your name in the survey.

Results of the study may be published, but no names or identifying information will be included in this publication. All personal information obtained in this study will be kept confidential unless legally compelled. Your responses will be labeled only with a study identification number. |
Financial Information:	There will be no financial compensation for the completion of the study. You will earn research credit points for your LSU psychology classes for completion of this study.
Withdrawal:	All participants have the opportunity to withdraw at any point throughout the study.
Removal:	Participants may be removed from the study without consent if they are believed to be a danger to themselves or others. Removal may also occur if it would be in the best clinical interest of the participants.
Alternatives:	If you do not wish to participate in the present study but wish to seek psychological treatment for emotional or psychological problems, we will provide a list of referrals of treatment programs offered at Louisiana State University, but we cannot attest to their efficacy.
Unforeseeable Risks:	As with any study, confidentiality is a concern; however, confidentiality risk is unlikely given the steps we have taken to ensure that participant identifying information is kept confidential. Confidentiality is protected through use of a secure online service and password-protected access for study personnel. We have also applied for a Certificate of Confidentiality from the National Institute of Health. Be sure to close your browser when you finish the survey so no one can see your answers.
Certificate of Confidentially:	To help us protect your privacy, we have applied for a Certificate of Confidentiality (COC) from the National Institutes of Health. The COC is issued to protect the investigators on this study from being forced to tell people that are not connected with this study about your participation in this study, even under a subpoena. The protection offered by the COC does not stop us from voluntarily reporting information about suspected or known sexual, physical, or other abuse of a child or older person, or a subject's threats of violence to self or others. If any member of the research team is given such information, he or she will make a report to the appropriate authorities. Even when a

COC is in place, you and your family members must still continue to actively protect your own privacy. If you voluntarily give your written consent for an insurer, employer, or lawyer to receive information about your participation in the research, then we may not use the COC to withhold this information.

Study-related illness or injury: Participants are encouraged to seek any necessary medical care from their primary physician as well as contact the Principle Investigator, Dr. Julia Buckner (225-578-4096) if there is a medical illness or injury related to the study.

New Findings: Any new and relevant findings in regards to this study that may influence your willingness to continue this study will be made known to you.

Signatures: *"The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigators. If I have questions about subjects' rights or other concerns, I can contact Robert C. Mathews, Institutional Review Board, (225) 578-8692, irb@lsu.edu. I agree to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of the consent form."*

STUDY APPROVED BY:
Dr. Robert C. Mathews, Chairman
Institutional Review Board
Louisiana State University
130 David Boyd Hall
225-578-8692 / www.lsu.edu/irb
Approval Expires: 10/10/2014

VITA

Emily Robin Jeffries is a third year student in the clinical psychology training program at Louisiana State University, where she is pursuing a Doctoral Degree in clinical psychology under the supervision of Dr. Julia Buckner. Ms. Jeffries received her bachelor's of Arts degree from the University of Cincinnati in 2012. Ms. Jeffries' research interests include examining transdiagnostic risk factors for comorbid anxiety and substance use disorders. She is also interested in the role of health-related behaviors, such as exercise, in the treatment of anxiety disorders.