ABSTRACT

Title of Thesis: PROFILES OF SOCIAL ANXIETY SYMPTOMS AND IMPULSIVITY AMONG COLLEGE STUDENTS

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Prior work points to a subtype of Social Anxiety (SA) characterized by disinhibition or high externalizing behaviors (e.g., substance use and Attention Deficit Hyperactivity Disorder (ADHD) symptoms). This study extended prior work by replicating subtypes of SA and impulsivity and examining differences among these subtypes in their expression of externalizing behavior. Three hundred seventy-five undergraduates completed an online study including measures of SA, substance use, ADHD symptoms and impulsivity. Latent class analyses revealed three classes of individuals who were: (a) low SA and low impulsivity, (b) high SA and low impulsivity, and (c) high SA and high impulsivity. Individuals high in both SA and impulsivity exhibited greater likelihoods of exhibiting externalizing behavior concerns, relative to the two other classes, with the largest differences on ADHD symptoms. These findings indicate that identifying differences among SA subtypes in externalizing behavior concerns depends on the externalizing domain.

PROFILES OF SOCIAL ANXIETY SYMPTOMS AND IMPULSIVITY

AMONG COLLEGE STUDENTS

by

Melanie Lipton

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Chapter 1: Introduction

Social Anxiety Disorder (SAD) is one of the most common psychiatric disorders in the United States. Epidemiological studies reveal that the median age of onset for SAD is during adolescence (i.e., 13 years; Kessler et al., 2005), and SAD has one of the highest lifetime prevalence rates of all psychiatric disorders with a lifetime prevalence rate of 13% and a 12-month prevalence rate of 7.4% (Kessler, Petukhova, Sampson, Zaslavsky, & Wittchen, 2012).

According to the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5), SAD is characterized by intense and long-standing fears of social situations where a person is exposed to people with whom they are unfamiliar (American Psychiatric Association, 2013). The fears also have a tendency to involve fear of performance situations and situations in which evaluation or scrutiny is possible (Bogels et al., 2010). These fears typically present themselves in a variety of different domains including work, school, and personal spheres (e.g., parties and other social events) and often lead to significant quality of life impairments (e.g., poor relationship quality, social skills deficits, and job dissatisfaction; Beidel, Rao, Scharfstein, Wong, & Alfano, 2010; Wong, Sarver, & Beidel, 2012). Individuals experiencing Social Anxiety (SA) symptoms also experience intense fears of anticipation of being placed in social situations, which often result in avoidance of these situations. Thus, properly evaluating the severity of SA symptoms involves assessing both fears of these situations and likelihood or frequency of avoidance.

Given that avoidance is a key component to the disorder, researchers tend to study and describe SAD and its associated features in the context of social inhibition and shy

behavioral tendencies (Bögels et al., 2010). In this "typical case of SAD," individuals are described as experiencing intense fears in social situations, inhibited behaviors in a variety of domains, and most important, avoidance of situations where they are forced to interact with others. Notably, numerous studies have shown that those experiencing heightened SA display deficits when placed in social situations (Beidel, Turner, & Morris, 1999; Beidel, Rao, Scharfstein, Wong, & Alfano, 2010). These deficits reflect a variety of factors, including severe social skill deficits, heightened levels of anxiety that impair performance, or use of behaviors meant to reduce distress within social situations, such as avoidance of eye contact (i.e., *safety behaviors*). Despite the uncertainty of the reasons for the deficits displayed, historically, individuals with SA are frequently unsuccessful in social situations and thus tend to avoid rather than engage in social situations (Voncken, Rinck, Deckers & Lange, 2012).

Additionally, prior work indicates that those who exhibit high levels of trait anxiety are less likely to engage in risk taking or impulsive behaviors (Butler & Mathews, 1987). Relative to both other clinical patients (e.g. those suffering from mood disorders) and non-anxious controls, those experiencing higher levels of anxiety tend to evidence greater risk aversion when making behavioral decisions (Barlow, 1988; Maner et al., 2007). Classical cognitive models of SAD support this aversion to risky behaviors. Cognitive models describe that individuals suffering from SAD engage in thoughts and behaviors that deflect attention away from themselves (Clark & Wells, 1995). That is, according to the evolutionary perspective of SAD, those experiencing SA concerns do not like being the center of attention, given that it increases the likelihood that individuals will see them as a social dominant threat (Gilbert, 2001; Weeks, Heimberg, Rodebaugh,

& Norton, 2008). Given that risk-taking behaviors tend to draw attention to individuals engaging in them, it follows that those experiencing relatively high levels of SA symptoms would be less likely to engage in risky behaviors, relative to those experiencing low levels of such symptoms.

Despite the evidence suggesting that SA symptoms tend to co-occur with behavioral inhibition, recent research suggests that SAD may not be as homogenous as previously thought. That is, recent work has shown that in a significant subset of individuals (i.e., 50% of diagnosable SAD cases in a sample of 82 individuals diagnosed with SAD), SAD may be related to risky, impulsive behaviors (Kashdan & Hoffman, 2008). Specifically, some individuals experiencing SAD react to the stress elicited within social situations by engaging not in the prototypical inhibited or avoidance behaviors, but rather in impulsive, externalizing behaviors such as drug and alcohol use (Kashdan & McKnight, 2010; Kashdan & Hoffman, 2008; Kashdan, Elhai, & Breen, 2008). Thus, two distinct subtypes of SAD may exist: those who respond to social anxiety with behaviorally inhibition, and those who respond by displaying risky, disinhibited behaviors.

Evidence of this distinction has been seen in both non-clinical and clinical SAD samples. In an examination of this risky subtype in a college student sample, researchers found three distinct groups of SA and approach vs. avoidant tendencies towards risky behaviors (i.e. risky sexual, aggressive, and substance use behavior; Kashdan, Elhai, & Breen, 2008). The first group, representing 28.2% of sample, exhibited low levels of SA symptoms and also low levels of approach and appraisal of risky behavior. The rest of the sample (nearly 70% of the total sample) exhibited moderate levels of SA, but displayed

markedly different patterns of approach versus avoidance to risky events. The first group exhibited moderate levels of SA symptoms and displayed an avoidance oriented appraisal style, most representative of the prototypical SA pattern of behavior. This group accounted for a little more than half of high-SA participants. The second group, which represented a little less than half of high-SA participants, exhibited an approach oriented appraisal style to risky behaviors. Thus, preliminary studies indicate that nearly 50% of those experiencing elevated SA symptoms may display heightened approach to risky behaviors.

In a study examining these subtypes in a clinical sample of individuals suffering from SAD, there was evidence that while the majority of the sample exhibited low novelty seeking behavior (i.e., activities characterized by impulsivity, unpredictability and hostility), 41% of the sample exhibited high novelty seeking behavior as evidenced by impulsivity (e.g., acting without thinking) and propensity for novel stimuli (e.g., trying new things just for fun or thrills; Kashdan & Hoffman, 2008). Importantly, these two groups did not differ in their severity of SA symptoms, nor did they differ significantly on levels of impairment with regard to their SA symptoms. Novelty seeking behavior was the only factor that distinguished these two patient groups. In addition, the individuals higher in novelty seeking behavior also showed an increased propensity for engaging in substance use (i.e. drug and alcohol use; Kashdan & Hoffman, 2008). This work provided preliminary evidence that within a clinical population of those experiencing SA, the atypical disinhibited SA subtype was evident, prevalent, and clearly distinguishable from the prototypical inhibited SA subtype.

Whereas behaviors such as drug and alcohol use are typically described as risky

and impulsive, these behaviors comprise a subset of a larger domain of *externalizing behaviors*. Specifically, two domains underlie much of psychopathology: internalizing and externalizing (Krueger, McGue, & Iacono, 2001; Krueger, Markon, Patrick, & Iacono, 2005; Krueger & South, 2009). Researchers typically conceptualize substance use and other risky behaviors (i.e. alcohol and drug use, impulsive behaviors) as externalizing behaviors due to their significant impairments and potential negative outcomes for society (Hall, Bernat, & Patrick, 2007; Wood, Read, Palfai, & Stevenson, 2001). Whereas substance abuse problems such as drug and alcohol use are some of the most commonly studied externalizing disorders, a number of other conditions fall into the externalizing domain and have high levels of co-morbidity with drug and alcohol use.

One additional externalizing condition that shares a great deal of conceptual overlap with substance use and has high rates of comorbidity with substance use disorders is Attention Deficit/Hyperactivity Disorder (ADHD) (Kessler et al., 2005a). Researchers tend to focus their attention on expressions of ADHD concerns among children and adolescents (Kessler et al., 2005a). Although researchers have long noted that ADHD can persist into adulthood, ADHD in adults has only been the focus of clinical attention within the last 15 years (Kessler et al., 2005a; Pary et al., 2002; Wilens, Faraone, & Biederman, 2004). With the recent increase in clinical attention, it has been noted that prevalence rates for adult ADHD are as high as 4.4% in the general population and tend to be comorbid with many additional psychiatric disorders (Kessler et al., 2005b). Although comorbid with a number of internalizing and externalizing disorders, adult ADHD tends to co-occur with substance abuse diagnoses such as alcohol and drug abuse (Kessler et al., 2005b; Wilens & Morrison, 2012).

The child and adolescent literature has long supported the relation between ADHD and internalizing disorders such as anxiety, with an average comorbidity rate of approximately 25% among patients meeting criteria for an anxiety disorder (Jarrett & Ollendick, 2008). With the recent increase in clinical interest of adult ADHD, estimates in adulthood have provided evidence that ADHD and anxiety disorders are highly comorbid as well. In a study examining an adult population of individuals suffering from anxiety disorders, the prevalence rate of ADHD was approximately 28% (Van Ameringen, Mancini, Simpson, & Patterson, 2011). Specifically, SAD was the second highest most comorbid disorder following major depressive disorder, with a comorbidity rate of 38.5%.

Despite the existing evidence on how the proposed risky-impulsive SA subtype relates to drug and alcohol use, the potential role of ADHD symptoms has not been examined in this population. Given this, it is possible that this subtype differs from the typical socially inhibited subtype of SA on a range of behaviors on the externalizing spectrum, including alcohol use, drug use, and ADHD symptoms. Thus, an important next step in examining this proposed subtype is to examine the relations between the subtype and various externalizing behaviors including ones not focused on in previous studies examining these proposed subtypes.

The purpose of this study was to extend prior work on the potential risky-impulsive subtype of SA by replicating distinct profiles of SA symptoms and impulsivity seen in prior work. Furthermore, I sought to examine differences among these profiles when externalizing behaviors (i.e. alcohol use, drug use, and ADHD symptoms) are taken into consideration. I administered self-report measures of SA, impulsivity and various

externalizing behaviors to examine these profiles further. I expected to find distinct

profiles of SA symptoms and impulsivity to emerge, replicating the work by Kashdan and

colleagues. Specifically, I expected to find one distinct profile representing individuals

experiencing relatively high levels of SA symptoms, but low in risk taking behaviors. I

expected to find a second profile representing individuals high in SA symptoms and high

in risk taking behaviors. Given that the study was conducted using an unselected sample

of undergraduate students, I also expected to find a profile representing individuals who

presented as low in both SA and risk taking behaviors. Furthermore, I expected that there

would be significant differences in the profiles relations to substance use (i.e. alcohol and

drug use) and ADHD symptoms.

Chapter 2: Method

Participants

Participants were 375 undergraduate college students at a large Mid-Atlantic University. Participants were recruited through the SONA system, an online research recruitment system run by the University. Initially, 420 participants were recruited for the study, however participants were only included in the current study if they had complete data, represented by at least 90% completion of all measures in the study. Thus, the final sample of participants with complete data consisted of 375 undergraduates. The young adults in the sample had a mean age of 19.63 years (SD=2.81) and included 86 male and 289 female participants. Participants identified their race/ethnicity as Black or African American (12.8%), White, Caucasian, American, or European (65.1%), Asian American (16.3%) or American Indian (0.5%). In addition, 8% of participants identified as Hispanic and/or Latina/o.

Study Measures

Social anxiety. I assessed SA using three subjective self-report scales. The first two scales were the Social Phobia Scale (SPS; Mattick & Clark, 1998) and the Social Interaction Anxiety Scale (SIAS; Mattick & Clark, 1998). Both the SPS and SIAS are self-report scales designed to measure SA and related symptoms in an adult population. The SPS is a 20-item measure designed to measure fears of being scrutinized by others while performing various tasks such as eating, writing, or drinking in public places. The 20-item SIAS evaluates anxiety related to both initiating and maintaining interactions with others across a wide range of social situations. Both scales utilize a 5-point response scale ranging from 0 (not at all characteristics of me) to 4 (extremely characteristics of

me). In previous validation studies, both scales evidenced strong internal consistency as well as convergent validity, as reflected by significant correlations with other measures of SA (Mattick & Clark, 1997). In my sample, both measures displayed high levels of internal consistency, α=.92 and α=.93 respectively for the SPS and SIAS.

In addition, I measured fear and avoidance associated with SA using the Leibowitz Social Anxiety Scale – Self Report (LSAS-SR; Cox et al., 1998; Fresco et al., 2001). The LSAS-SR is a 48-item self-report measure designed to assess levels of fear and avoidance in the general population. The LSAS-SR assesses anxiety and avoidance in 24 situations; 12 social interaction based situations (e.g. making eye contact with people you are unfamiliar with) and 12 performance-based situations (e.g. giving a speech in front of others). Scores from the LSAS-SR correlate quite highly in magnitude with the clinician-administered version on which the self-report measure is based (i.e., $r =$ .94; Fresco et al., 2001). In addition, the LSAS-SR has shown to be internally consistent and showed strong convergent validity with other measures of SA (Fresco et al., 2001). My sample showed acceptable levels of internal consistency for the LSAS-SR (α=.95).

Impulsivity. I assessed impulsivity using an adapted version of the UPPS-P Impulsive Behavior Scale (UPPS-P- Short Version; Lynam et al., 2007; Billieux et al., 2012). The UPPS-P short version is a 20-item self-report measure that assesses impulsivity across five core domains; negative urgency, positive urgency, (lack of) premeditation, (lack of) perseverance, and sensation seeking. The items on the UPPS-P short version represent the four items from each domain that loaded most strongly on each factor in the original UPPS-P scale (Billieux et al., 2012), with items rated on a four-point scale ranging from 1 (agree strongly) to 4 (disagree strongly). In various

adaptations of the measure, including a French translated version of the measure, the

UPPS-P short version demonstrated excellent internal consistency as well as significant

positive correlations with other domains of psychopathology previously shown to be

associated with impulsivity (i.e. gambling behaviors, risky sexual behavior and drinking

behavior; Billuex et al., 2012; Cyders & Smith, 2007; Smith et al., 2007). The current

study uses three subscales; Negative Urgency, Premeditation, and Sensation Seeking. In

my sample, the subscales of the UPPS-P short version exhibited acceptable levels of

internal consistency (a=.68, .79, and .70 respectively.).

Alcohol use. Alcohol use was measured using the Michigan Alcoholism

Screening Test (MAST; Selzer, 1975). The MAST is a 24-item self-report measure

designed to assess alcohol related problems in the general population. The MAST

assesses use and abuse using a yes/no response format and provides a total score ranging

from 0-53, with higher scores indicating greater difficulties with alcohol use.

Furthermore, the MAST uses a weighted point system, with certain questions

representing higher diagnostic utility and thus holding more weight in the total score. The

MAST possesses adequate internal consistency and strong convergent validity with

DSM-IV diagnoses for alcohol abuse problems (Selzer, 1975; Conley, 2001). In my

sample, the MAST exhibited adequate internal consistency (α=.58; Note: Internal

consistency estimates in SPSS represent the same value for both likert-type and

dichotomously scaled items)

Drug use. Drug use was measured using the Drug Use Disorders Identification

Test (DUDIT; Berman, Bergman, Palmstierna, & Schlyter 2005a). The DUDIT is an 11-

item self-report measure designed to assess frequency and severity of drug use in the

general population. Specifically, it aims to identify individuals who may be at risk of developing drug-use disorders. In one study, researchers found the DUDIT to possess adequate internal consistency as well as show significant positive correlations with DSM-IV drug abuse diagnoses both clinical and non-clinical samples, suggesting its utility in identifying those in the general population who may possess drug-use problems (Berman, Bergman, Palmstierna, & Schlyter, 2005b). In my sample, the DUDIT exhibited good levels of internal consistency (α=.81).

Attention Deficit/Hyperactivity Disorder symptoms. Adult Attention Deficit/Hyperactivity Disorder symptoms were assessed using the Adult ADHD Self-Report Scale (ASRS; Kessler et al., 2005b). The ASRS is an 18-item self-report measure developed to assess the prevalence of ADHD symptoms in the general adult population. The ASRS uses a frequency report scale ranging from "Never" to "Very Often." The ASRS contains nine questions pertaining to inattention symptoms and nine questions designed to assess for hyperactivity and impulsivity. The ASRS has shown excellent sensitivity and specificity in indentifying clinical levels of ADHD when used in both clinical and normative samples (Kessler et al., 2005b). The ASRS exhibited good levels of internal consistency in the current sample (α=.85).

Depressive symptoms. I measured depressive symptoms using a modified version of the self-report Beck Depression Inventory –II (BDI-II; Dozois, Dobson, & Ahnberg, 1998). This is a 21-item measure that assesses depressive symptoms in adult populations. In order to address confidentiality precautions, I did not administer item 9, which inquires about suicidal thoughts. Thus, my total score was calculated based on 20 items. The BDI-II has shown to exhibit good internal consistency and validity with other measures of

depressive mood (Dozois, Dobson, &Ahnberg, 1988). I observed an adequate level of

reliability in the current sample (a=.92)

  Anxiety sensitivity. I assessed anxiety sensitivity using the Anxiety Sensitivity

Index (ASI: Taylor et al., 2007). The ASI is an 18-item self-report measure which assess

the three most common and well-studied factors of anxiety sensitivity; physical,

cognitive, and social concerns. The ASI yields subscale totals for each of these three

constructs as well as a total score. The ASI asks respondents to rate how characteristic of

them each statement is ranging from "1= Very Little" to "5=Very Much." The ASI has

been shown to possess good psychometric properties including high internal consistency

and high validity with individuals meeting criteria for a range of anxiety disorders (i.e.

Generalized Anxiety Disorder and Panic Disorder) displaying significantly higher scores

on the ASI-III compared to normal controls (Taylor et al., 2007). The current sample

yielded adequate levels of internal consistency for the ASI-III (α=.91).

  Emotion reactivity. I assessed emotion reactivity using the Emotion Reactivity

Scale (ERS; Nock, Wedig, Holmberg, & Hooley, 2008). The ERS is a 21-item self-report

measure designed to measure the sensitivity, intensity and persistence of emotions and

originally created for use with adolescents and young adults. Items on the ERS are rated

on a 4-point scale ranging from "0= not at all like me" to "4=completely like me" with

possible total scores ranging from 0-84. In the original validation of the ERS, the measure

was shown to have excellent internally consistency (α=.94) as well as strong convergent

and discriminant validity. Specifically, the ERS showed significant positive correlations

with measures of behavioral inhibition but was unrelated to measures affiliation and

urgency (Nock et al., 2008). In my sample, I observed an acceptable level of internal consistency (α= .94)

Fear of negative evaluation. Fear of negative evaluation was measured using the Brief Fear of Negative Evaluation Scale (BFNE; Leary, 1983). The BFNE is a 12-item likert scale designed to measure fear of negative evaluation in the normative adult population. The BFNE exhibits significant, positive relations with measures of social avoidance and distress, suggesting its utility in relating to core features of SA and thus it's utility in assessing patients experiencing SA (Weeks et al., 2005). In a validation study with a clinical population, the BFNE reliably distinguished those experiencing SA from non-anxious controls as well as sensitivity to treatment among patients, showing an improvement over the initial FNES (Weeks et al., 2005). In my sample, I observed an acceptable level of internal consistency (α= .93).

Demographics. Participants completed a demographics form that inquired about age, gender, ethnicity and year in school.

Procedure

All procedures were conducted following approval by the Institutional Review Board at the University. In order to participate, individuals had to be currently enrolled undergraduate students at the university where the study was conducted and had to be at least 18-years of age or older. All participants were recruited using the SONA system as described previously. Participants registered for a study slot using the SONA system and were then directed to a Qualtrics database (Qualtrics, Provo, UT). Qualtrics is an online data-collection website designed to allow for easy and confidential data collection. Upon following the link to the database, participants were directed to an online consent form

explaining all procedures, risks and benefits. Following the online consent form, all measures were completed online via Qualtrics in a single time period. Data collection took place on participants' own time and thus they could complete the measures at the location of their choice. Following completion of all measures, participants were granted extra credit for the class of their choice through the SONA system.

Data-Analytic Plan

In order to examine distinct profiles of SA and impulsivity, I used exploratory latent class analysis (LCA; McCutcheon, 1987). LCA is a person-centered approach that uses ordinal or categorical variables to produce different classes within which there is a local independence of indicators (i.e., variables that are independent within each level of the latent classes found in the analysis). In addition, LCA produces tests of the relative and absolute fit of models, allowing one to test how many categorical classes yield the "best fit" to the data. Consistent with recent LCA work (De Los Reyes, Henry, Tolan, & Wakschlag, 2009; De Los Reyes et al., 2013), I dichotomized SA and impulsivity scores by recoding participants into groups using a nominal variable for each group (i.e., 1 = top 25%, 0 = below top 25%, or 1 = above clinical cut-off, 0 = below clinical cut-off). Specifically, for one SA measure with available clinical cutoffs (i.e., LSAS-SR; score of 60 or above; Rytwinski et al., 2009), I dichotomized the measure based on this cutoff. For the remaining measures of SA and impulsivity without clinical cutoffs, I dichotomized each measure based on whether participants scored above versus below the top 25%. For the dependent variable (externalizing behaviors), I created median splits of all scores (i.e., ADHD symptoms, drug and alcohol use) and used these scores in subsequent analyses.

I entered dichotomized SA and impulsivity variables into an LCA model. Specifically, I used the Latent GOLD® (Statistical Innovations Inc, 2005) software to further examine whether patterns of SA and impulsivity scores could be used to identify latent class subgroups of participants in my sample. LCA yields estimates of the absolute and relative fit of the models using statistics such as the chi-square for each model tested. Consistent with prior work (e.g., De Los Reyes et al., 2009; De Los Reyes et al., 2013), I examined model fit by tracking the statistical significance of the chi-square statistic, or the instance in which chi-square shifted from indicating statistical significance for one model and then non-significance for the next model. Specifically, I began with assessing fit for a one-cluster model, and then moved to examining fit of two-cluster and then three-cluster models and so forth, until I identified the first class where the model fit statistic was non-significant (i.e., the class chosen as best fitting the data). As an additional check of model fit, I assessed the mean probability of latent class assignment for each class. Specifically, each participant in the sample received an estimate of probability of membership in each of the latent classes in a model solution ranging from 0 to 1, with greater scores indicating greater probability of membership in a given latent class. I used the mean threshold of .70 as an indicator of whether the classes selected as best fitting the data resulted in participants that, on average, evidenced a high probability of assignment to their particular class (see Nagin, 2006).

Following modeling via LCA, I conducted a Generalized Estimating Equation (GEE) to examine relations between the classes and externalizing domains (i.e. alcohol use, drug use, and ADHD symptoms). Given that the ratings were non-independent observations (i.e., different externalizing behaviors tend to be correlated with one

another), the data violated key assumptions underlying general linear modeling (GLM).

Given this, I examined my main hypothesis using GEE; an extension of the GLM that

allows for correlated data structures (Hanley, Negassa, & Forester, 2003).

For my GEE model, I used a binomial distribution with a logit link function and

an unstructured correlation matrix. Specifically, I modeled my dependent variable

(Externalizing behavior) as a function of three factors in a repeated measures design. I

entered as an independent variable one within-subjects factor ("Domain") to account for

the type of externalizing domain (ADHD symptoms, drug use and alcohol use). Next, I

entered as a second independent variable the between-subjects factor ("Profile") to

account for the social anxiety-impulsivity profile for each subject. Lastly, I entered in the

interaction between "Domain" and "Profile" to account for the interaction between the

two.

Design Considerations

The first design consideration is the use an undergraduate normative sample.

There are a number of reasons this specific population was chosen for this study. First,

numerous epidemiological studies have shown that rates of alcohol and drug use are

higher for individuals in college than both their same age, non-university peers as well as

individuals in other age cohorts (i.e. teenagers and adults; Ham & Hope, 2003; O'Malley

& Jonhston, 2002). Based on a synthesis of multiple epidemiological studies conducted

over a nearly decade long period, researchers estimate that nearly 70% of full-time

college students consume alcoholic drinks within a 30-day time span (O'Malley &

Johnston, 2002). It is clear that although a large number of college students drink, not all

college students drink, thus I expect to find great variation in this variable in the sample.

This will allow me to view risk-taking behaviors such as alcohol and drug use over a wide range. Second, prior research has shown that both social anxiety and risk taking behaviors (i.e., substance use, alcohol use, and unprotected sexual activity) tend to emerge in adolescents and remained heightened throughout the emerging adulthood period (Kessler et al., 2012, Jonhston, O'Malley, & Bachman, 2003). Thus, undergraduate college students are an ideal population to examine these constructs in.

Another important design consideration is the choice of an impulsivity measure, namely the UPPS-P, as a personality factor linked to risk taking and externalizing behavior. The main reason for this decision was that I wanted a way to measure risky, externalizing behavior in a way that didn't make an aspect of the independent variable redundant with the dependent variable. That is, given that an aspect of externalizing behaviors was needed to categorize the profiles (i.e., the independent variable), I wanted to ensure this would not involve introducing significant shared method variance between measures to construct the latent classes and the dependent measures (i.e., externalizing behaviors, namely alcohol use, drug use, and ADHD symptoms). Broadly, impulsivity has been defined as an inability to ask questions without thinking, a lack of sensitivity to understanding the consequences of one's actions, and an inability to inhibit certain behaviors that may be seen as inappropriate such as substance use and law breaking (Reynolds, Ortengren, Richards, & de Wit, 2006). Given that impulsivity represents a personality style for which high levels pose risk for engagement in inappropriate and potentially risky behavior, it seemed an appropriate construct to distinguish individuals experiencing social anxiety in terms of those who tend to engage in inhibited social behavior (i.e., relatively low levels of impulsivity) from those who tend to engage in

disinhibited behavior (i.e., relatively high levels of impulsivity).

In addition, I specifically chose the UPPS-P due to its strong relations with measures of real-world externalizing behaviors, specifically alcohol use. In an undergraduate sample examining a version of the UPPS that did not include the positive urgency subscale (i.e., only the negative urgency, premeditation, sensation seeking, and perseverance subscales), all four subscales evidenced significant relations with alcohol use and problems associated with that use (Magrid & Colder, 2007). In addition, the UPPS-P, which includes a subscale specifically developed to assess the concept of positive urgency, significantly relates to both self-reports of drinking and other risk taking behavior as well as risk taking on a real-world based manipulation of risk taking (i.e. the Balloon Analog Risk Task; BART; Cyders et al., 2012). Thus, the UPPS-P appears to be an ecologically valid way of measuring impulsivity as it related to the outcomes used in the present study.

A third design consideration is the decision to dichotomize the scores from the self-report measures used to examine fit in the LCA models. This decision is consistent with prior work that has used LCA to examine underlying latent constructs in order to form groups (De Los Reyes, Henry, Tolan, & Wakschlag, 2009; De Los Reyes et al., 2013; Althoff, Rettew, Faraone, Boosma, & Hudziak, 2006). Notably, researchers have argued that if the underlying variable you use to classify the groups (i.e., social anxiety scores) were examined continuously, the classes formed may merely reflect differences in severity of symptoms rather than underlying differences in the latent structure of the construct (Althoff et al., 2006). In addition, when you use continuous variables to categorize your classes in LCA, the cut-points for the classes are empirically determined

and thus may be sample-specific, similar to the positioning of variables in a stepwise

multiple regression model (see Cohen, Cohen, Aiken, & West, 2003). Thus, use of

continuous variables poses increased risk of findings not generalizing to other

populations or samples examined. However, by using clearly defined, dichotomized cut

offs, you are able to increase likelihood that the classes yielded can be generalized to

other populations.

Chapter 3: Results

Preliminary Analyses

Preliminary analyses revealed that all SA and impulsivity measures met the statistical assumptions for the proposed analyses (i.e., acceptable ranges of skewness [≈ +/−1.0]). However, I observed significant skewness for participants' BDI-II reports (skewness = 1.96). Given this, I applied a square root transformation to these scores, and observed a reduction in skewness for these transformed scores (skewness = .42). Thus, these transformed scores were used in tests of my main hypotheses. Table 1 displays summary statistics for all study measures.

Identifying Profiles of Social Anxiety and Impulsivity

To examine the hypothesis that I would identify three distinct classes of SA and impulsivity, I tested LCA models using the data-analytic plan described previously. I began with a one-cluster model and continued conducting LCA models evaluating the fit and interpretability of each. As predicted, the three-class solution fit the data best, χ^2 (43) = 41.64, *ns*, L^2 = 47.30, *ns.* Figure 1 shows the fit statistics and reports a graphical representation of the three-class solution. Table 2 reports the frequencies, percentages, and probabilities of latent class assignment for each of the three identified classes. Consistent with my hypothesis, the three classes represented individuals who were: (1) low on SA and low on impulsivity (LowSA-LowImp, N = 281), (2) high on SA and low on impulsivity (HighSA-LowImp, N = 67), and (3) high on SA and high on impulsivity (HighSA-HighImp, N = 27). The mean assignment probabilities of all three classes were each above 0.90 and thus well above the recommended threshold of 0.70 (Nagin, 2006).

Next, I examined the two profiles of individuals high in SA (i.e. HighSA-LowImp and HighSA-HighSA) to determine if the groups differed on levels of SA and other internalizing concerns (i.e., emotional reactivity, depression, and anxiety sensitivity). Pair-wise comparisons revealed that the two groups high in SA did not differ significantly on measures of internalizing concerns (p-values ranging from .15 to .68). As an additional metric, I computed the effect sizes of the mean differences between the two groups and found small effect sizes for all measures examined (i.e., Cohen's *d* values ranging from -.16 to .32; see Cohen, 1988). In fact, the effect sizes were not only small but were inconsistent in that they pointed in different directions of effects, with some non-significant effects indicating greater scores for one group relative to the other and vice versa. Thus, consistent with prior work (Kashdan & Hoffman, 2008), tests were inconclusive as to whether the two SA groups differed on levels of SA or other internalizing concerns.

Relations Between Social Anxiety – Impulsivity Classes and Externalizing Concerns

To examine the relations between latent classes of SA and impulsivity and externalizing concerns (i.e., alcohol use, drug use, and ADHD symptoms), I conducted GEE using the data-analytic plan described previously. Analysis revealed a significant main effect of both latent class and externalizing domain (See Table 4). Overall, the HighSA-HighImp class exhibited greater likelihoods of exhibiting externalizing behavior, relative to the two other classes. However, these effects were qualified by a significant domain X class interaction. Post-hoc univariate analyses of these effects revealed small and non-significant differences between the HighSA-HighImp class and both the LowSA-LowImp (95% Wald Confidence Interval [CI]: [-.03,1.57]; *p*=.06) and HighSA-

LowImp (95% Wald CI: [-.62,1.19]; p=.53) classes when the domain was alcohol use.

Further, I observed marginally significant differences between the HighSA-HighImp

class and the LowSA-LowImp (95% Wald CI: [-.04, 1.56]; p=.06) and HighSA-LowImp

(95% Wald CI: [-.02,1.80]; p=.05) classes when the domain was drug use. Importantly, I

observed statistically significant differences between the HighSA-HighImp class and the

LowSA-LowImp (95% Wald CI: [.97, 3.14]; p<.001) and HighSA-LowImp (95% Wald

CI: [.25,2.58]; p<.05) classes when the domain was ADHD.

Chapter 4: Discussion

Main Findings

The purpose of this study was to examine subtypes of SA, as well as associated features of these SA subtypes. There were four main findings. First, I replicated prior work in identifying SA subtypes in a sample of undergraduate college students, with LCA revealing a 3-class solution for participants' levels of SA and impulsivity. Specifically, I found one class of individuals evidencing low SA and low impulsivity, one class with individuals high on SA and low on impulsivity, and a third class with individuals high on SA and high on impulsivity. Second, I found that the two latent classes representing individuals who evidenced relatively high SA did not statistically differ on measures of SA and other internalizing concerns (i.e., depression, anxiety sensitivity, and emotion reactivity). That is, these classes did not appear to be distinguishable on levels of internalizing concerns.

Third, I found that the SA subtypes significantly differed in their levels of externalizing behavior. Specifically, those participants evidencing high levels of both SA and impulsivity exhibited a greater likelihood of exhibiting externalizing behaviors (i.e., alcohol use, drug use, and ADHD symptoms) relative to the participants evidencing high levels of SA and low levels of impulsivity. Fourth, I found that the significant difference between SA subtypes on externalizing behaviors depended on the externalizing domain examined, such that the only statistically significant difference I observed between SA subtypes was on level of ADHD symptoms.

Significance of Main Findings

This study expands the literature by replicating prior work by Kashdan and colleagues on SA subtypes in an unselected sample of undergraduates. Specifically, there appears to be a distinct group of individuals who evidence high levels of both SA and impulsivity that can be distinguished on levels of externalizing behavior from individuals who evidence high levels of SA and low levels of impulsivity. In addition, to my knowledge, this is the first investigation to examine relations between these SA subtypes and externalizing behaviors beyond aggressive behavior and substance use, namely ADHD symptoms. In fact, among externalizing behaviors, the SA subtypes appear to evidence the strongest differences on levels of ADHD symptoms. Given that this is a factor that has not been considered in research thus far, future research should examine this relation in more depth and focus on understanding mechanisms by which ADHD symptoms may play a role in the differences between SA subtypes.

There are a number of reasons why the results of this study may have shown a significant difference in the SA subtypes with regard to ADHD symptoms, but not alcohol and drug use. Firstly, alcohol and drug use represent a common occurrence among college students in the United States. Specifically, a meta-analysis conducted over a nearly 10-year period revealed that approximately 70% of full-time college students in the United States consume alcoholic drinks within a 30-day time period (O'Malley & Johnston, 2002). In addition, 30% of college students report using marijuana in their lifetime, and 17% report use within a 30-day span (Mohler-Luo, 2003). In addition, SA symptoms appear to confer specific risk for engagement in drug and alcohol use in general (Bruckner, 2004). Thus, alcohol and drug use appear to be something that a large proportion of undergraduate college students engage in, regardless of SA status. That is,

undergraduate college students who exhibit any concerns with anxiety or other

psychosocial concerns may be more likely to engage in substance use behaviors in

general and this may account for the lack of significant differences observed between the

SA subtypes on alcohol and drug use measures.

Second, in addition to the high rates of drug and alcohol use among undergraduate

college students, recent research has suggested that SA and ADHD may exhibit

significant co-morbidity. Findings in the child and adolescent literature have suggested

that there is significant overlap between ADHD and internalizing disorders and that

comorbidity rates may be as high as 25% (Jarrett & Ollendick, 2008). Thus, it may be

that ADHD symptoms are more likely to occur in those suffering from anxiety disorders

such as SAD relative to individuals lower in SA symptoms. At the same time, our

understanding of the development and maintenance of adulthood ADHD is

underdeveloped relative to knowledge of this condition among children and adolescents

(Kessler et al., 2005a; Pary et al., 2002; Wilens, Faraone, & Biederman, 2004).). Thus,

future research should seek to further examine the relations between SA subtypes and

levels of ADHD concerns.

Limitations

Three limitations to the current study should be noted. First, I used a normative

sample of undergraduate college students to examine SA subtypes. While I did find a

substantial portion of individuals elevated in SA symptoms with varying levels of

impulsivity, the majority of the sample evidenced low levels of both SA and impulsivity.

Thus, I am limited in my ability to generalize these LCA classes and associated

differences in externalizing behaviors to clinical samples of SAD. At the same time, prior

work supports the existence of these SA subtypes in clinical samples of adult SAD patients, although this support is based on findings primarily from a single research team (e.g., Kashdan & Hoffman, 2008). Thus, future research from additional research teams should replicate identification of these SA subtypes in clinical samples, and examine differences among these subtypes in externalizing behaviors.

Second, I relied solely on self-report measures to classify the SA subtypes. The self-report method provides useful information on how individuals characterize their own thoughts and behaviors. Yet, experts have emphasized that in order to properly evaluate anxiety and anxiety related concerns, researchers ought to use a variety of techniques including behavioral and performance-based measures (Silverman & Ollendick, 2005; Barlow, 2005; Hunsely & Mash, 2005, Antony & Rowa, 2005). Future research should employ a range of evidence based assessments that measure a variety of associated behaviors of SA including factors that precipitate the onset of anxiety symptoms (e.g., maladaptive thought patterns), patterns of behavioral avoidance, physical symptoms (e.g., sweating, heart palpitations), and social skill deficits.

Lastly, I chose to dichotomize the key dependent variables in my LCA modeling. In doing so, it is possible that I reduced my statistical power to detect differences between SA subtypes, as discrete data often evidence lower levels of reliability and validity relative to dimensional data (for a review, see Markon, Chmielewski, & Miller, 2011). However, this decision was in line with previous research suggesting continuous variables pose their own difficulties in LCA modeling. Specifically, researchers have noted that using continuous variables may lead to classes formed that reflect differences in symptom severity and not underlying differences in construct latent structure (Althoff

et al., 2006). In addition, after examining the latent profile assignment values for the three LCA classes of SA and impulsivity, I noted the mean profile assignment probability across the classes was .96, indicating extremely high likelihood that individuals were classified into the profile that best fits their SA and impulsivity symptoms.

Research and Clinical Implications

My findings have important research and practical implications. First, to my knowledge, all work to date examining SA subtypes has been conducted by one work-group (Kashdan & McKnight, 2010; Kashdan & Hoffman, 2008; Kashdan, Elhai, & Breen, 2008). Thus, my findings represent the first successful replication of findings from a group independent from group who initially identified the subtypes. This successful replication further supports the idea that people may exhibit individual differences in how they respond to SA concerns. Additionally, this finding suggests that there may be utility in identifying psychopathology domains such as ADHD symptoms that appear to co-occur among individuals high in both SA and impulsivity. That is, identifying these characteristics in individuals may allow researchers and clinicians to predict who may show increased tendencies towards impulsivity and risk taking behaviors.

This identification could have important implications for the diagnosis and treatment of SAD. Given that nearly all work to date has focused on the shy, behaviorally inhibited form of SAD, all current treatment methods focus on that subtype as well (Bogels et al., 2010). Given this, an important next step is to examine whether SA subtypes may differ in their response to current treatments for SAD and associated symptoms. For example, individuals belonging to the new subtype identified in this sample (i.e. HighSA-HighImp) may not respond as well to current behavioral treatments for SAD. The majority of

current treatments for SAD use social skills training and exposure techniques, which focus on behavioral inhibition and avoidance (Biedel and Turner, 2007). However, this new SA subtype does not appear to express concerns with inhibition or avoidance and instead display difficulties with disinhibition and engagement in risky behaviors. Thus, it remains unclear how this subtype may respond to current treatments given that they do not target the main difficulties individuals in this group express. Future research should seek to examine individual differences between the prototypically inhibited and impulsive SA subtypes in response to current behavioral treatment modalities.

Concluding Comments

In sum, my findings suggest the presence of SA subtypes in a college student sample. I was able to replicate SA subtypes previously seen in work with college students and clinical samples. In addition, my work provides evidence that these subtypes differ on their expression of externalizing behaviors, namely alcohol use, drug use, and ADHD symptoms. The findings suggest that the profiles showed the largest differences when ADHD symptoms were considered. These findings have important implications for the assessment of correlates of SA. Thus, I encourage future work in both clinical and research settings to further examine the SA subtypes further, especially the associated features of the newly identified profile high in SA and impulsivity.

Table 1 **:** *Means (M) and Standard Deviations (SD) Estimates of Survey*

Measures of Social Anxiety, Impulsivity and Correlates

Variable	M	SD
SIAS	26.08	14.37
SPS	20.79	14.15
LSAS	47.22	24.26
MAST	43.00	3.41
DUDIT	2.11	3.76
ASRS	29.44	9.28
UPPS Negative Urgency Subscale	2.30	.72
UPPS Premeditation Subscale	1.72	.54
UPPS Sensation Seeking Subscale	2.56	.69
BFNE	21.33	7.88
ASI	34.23	11.80
ERS	28.59	17.14
BDI-II	9.18	8.66

Note. SIAS = Social Interaction Anxiety Scale, SPS = Social Phobia Scale, LSAS = Leibowitz Social Anxiety Scale, MAST = Michigan Alcohol Screening Test, DUDIT = Drug Use Disorders Identification Test, ASRS = Adult ADHD Self-Report Scale, BFNE = Brief Fear of Negative Evaluation Scale; ASI = Anxiety Sensitivity Index, ERS = Emotion Regulation Scale, BDI-II = Beck Depression Inventory-II.

Table 2: *Latent Class Solution of Classes of SA and Impulivity (N=375)*

Latent Class	N	%	Mean Assignment Probability
LowSA – LowImp	281	74.5%	.98
HighSA - LowImp	67	17.0%	.94
HighSA – HighImp	27	8.5%	.97
Total	375	100%	.96

Conditional Probabilities for Measured Variables

| Measured Variable	Latent Classes		
	LowSA-LowImp	**HighSA-LowImp**	**HighSA-HighImp**
Leibowtiz Social Anxiety Scale (LSAS) Total Score	Below Clinical Cut Off. 0.95 At or Above Clinical Cut Off. 0.23	Below Clinical Cut Off. 0.01 At or Above Clinical Cut Off. 0.58	Below Clinical Cut Off. 0.04 At or Above Clinical Cut Off. 0.19
Social Interaction Anxiety Scale (SIAS) Total Score	Below 25th Percentile. 0.92 At or Above 25th Percentile. 0.24	Below 25th Percentile. 0.07 At or Above 25th Percentile. 0.44	Below 25th Percentile. 0.01 At or Above 25th Percentile. 0.32
Social Phobia Scale (SPS) Total Score	Below 25th Percentile. 0.94 At or Above 25th Percentile. 0.19	Below 25th Percentile. 0.04 At or Above 25th Percentile. 0.55	Below 25th Percentile. 0.02 At or Above 25th Percentile. 0.26
UPPS Impulsivity Scale – Negative Urgency Score	Below 25th Percentile. 0.81 At or Above 25th Percentile. 0.55	Below 25th Percentile. 0.14 At or Above 25th Percentile. 0.25	Below 25th Percentile. 0.05 At or Above 25th Percentile. 0.20
UPPS Impulsivity Scale -Sensation Seeking Score	Below 25th Percentile. 0.72 At or Above 25th Percentile. 0.84	Below 25th Percentile. 0.19 At or Above 25th Percentile. 0.08	Below 25th Percentile. 0.09 At or Above 25th Percentile. 0.08
UPPS Impulsivity Scale – Premeditation Score	Below 25th Percentile. 0.75 At or Above 25th Percentile. 0.72	Below 25th Percentile. 0.21 At or Above 25th Percentile. 0.01	Below 25th Percentile. 0.04 At or Above 25th Percentile. 0.27

Table 3: *Means (M) and Standard Deviations (SD), and Effect Size (Cohen's D) Estimates of*

Social Anxiety Correlates in Cluster 2 (HighSA-LowImp) and Cluster 3 (HighSA-HighSA)

Variable	*Cluster 2* *M(SD)*	*Cluster 3* *M(SD)*	*Cohen's D Effect* *Size*	*p*
BFNE	28.95(6.96)	26.65(7.17)	.32	.15
ASI	43.50(10.31)	44.54(10.70)	-.10	.66
ERS	40.76(15.80)	43.43(16.42)	-.16	.47
BDI-II	3.63 (1.23)	3.78(1.30)	-.12	.61

Note. BFNE = Brief Fear of Negative Evaluation Scale; ASI = Anxiety Sensitivity Index,

ERS = Emotion Regulation Scale, BDI-II = Beck Depression Inventory-II.

Table 4: *Generalized Estimating Equations Displaying Differences in Externalizing Domains by Latent Class Membership*

Factor	Wald X^2	Pseudo-R^2	*P*
Latent Class	15.28	0.39	.000
Externalizing Domain	12.24	0.32	.002
Class * Domain	11.33	0.29	.023

Figure 1: *Fit Statistic of Latent Analysis Classes of SA and Impulsivity*

Group 1: LowSA-LowImp
Group 2: HighSA-LowImp
Group 3: HighSA-HighImp
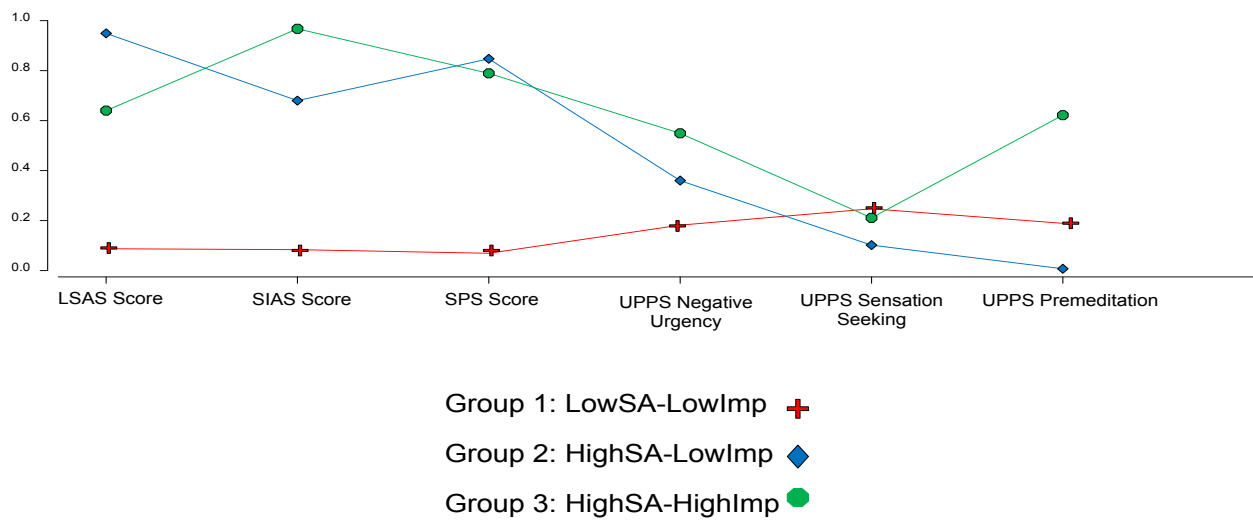
References

Althoff, R. R., Rettew, D. C., Faraone, S. V., Boomsma, D. I., & Hudziak, J. J. (2006). Latent

    class analysis shows strong heritability of the child behavior checklist–juvenile bipolar

    phenotype. *Biological psychiatry*, *60*, 903-911. doi: 10.1016/j.biopsych.2006.02.025

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders*

    (5th ed.). Arlington, VA: American Psychiatric Publishing.

Antony, M. M., & Rowa, K. (2005). Evidence-Based Assessment of Anxiety Disorders in

    Adults. *Psychological Assessment*, *17*, 256-266. doi: 10.1037/1040-3590.17.3.256

Barlow, D. H. (1988). Anxiety and its disorders: The nature and treatment of anxiety and panic.

    NY: Guilford Press.

Barlow, D. H. (2005). What's New About Evidence-Based Assessment?. *Psychological*

    Assessment, *17*, 308-311. doi: 0.1037/1040-3590.17.3.308

Beidel, D. C., Turner, S. M., & Morris, T. L. (1999). Psychopathology of childhood social

    phobia. *Journal of the American Academy of Child & Adolescent Psychiatry*, *38*, 643-

    650. doi: 0.1097/00004583-199906000-00010

Beidel, D. C., & Turner, S. M. (2007). Shy children, phobic adults: Nature and treatment of

    social anxiety disorder. Washington, DC: American Psychological Association.

Beidel, D. C., Rao, P. A., Scharfstein, L., Wong, N., & Alfano, C. A. (2010). Social skills and

    social phobia: an investigation of DSM-IV subtypes. *Behaviour Research and Therapy*,

    48, 992-1001. doi: 10.1016/j.brat.2010.06.005

Berman, A. H., Bergman, H., Palmstierna, T., & Schlyter, F. (2005a). DUDIT manual the drug

    use disorders identification test. *London: Karolinska Institutet Department of Clinical*

    Neuroscience.

Berman, A. H., Bergman, H., Palmstierna, T., & Schlyter, F. (2005b). Evaluation of the Drug Use Disorders Identification Test (DUDIT) in criminal justice and detoxification settings and in a Swedish population sample. *European Addiction Research*, *11*, 22-31. doi: 10.1159/000081413

Billieux, J., Rochat, L., Ceschi, G., Carré, A., Offerlin-Meyer, I., Defeldre, A. C., Khazaal, T., Besche-Richard, C., & Van der Linden, M. (2012). Validation of a short French version of the UPPS-P impulsive behavior scale. *Comprehensive Psychiatry*, *53*, 609-615. doi: 10.1016/j.comppsych.2011.09.001

Bögels, S. M., Alden, L., Beidel, D. C., Clark, L. A., Pine, D. S., Stein, M. B., & Voncken, M. (2010). Social anxiety disorder: questions and answers for the DSM-V. *Depression and Anxiety*, *27*, 168-189. doi:10.1002/da.20670

Buckner, J. D., Schmidt, N. B., Lang, A. R., Small, J. W., Schlauch, R. C., & Lewinsohn, P. M. (2008). Specificity of social anxiety disorder as a risk factor for alcohol and cannabis dependence. *Journal of Psychiatric Research*, *42*, 230-239. doi: 10.1016/j.jpsychires.2007.01.002

Butler, G., & Mathews, A. (1987). Anticipatory anxiety and risk perception. *Cognitive Therapy and Research*, *11*, 551-565. doi: 10.1007/BF01183858

Clark, D. M., &Wells, A. (1995). A cognitive model of social phobia. In: R. G. Heimberg, M. R. Liebowitz, D. A. Hope, &F. R. Schneier (Eds.), Social phobia: diagnosis, assessment, and treatment (pp.69–93). New York: Guilford Press.

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences (2nd ed.)*. Mahwah, New Jersey: Erlbaum, 1988.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2013). Applied multiple regression/correlation

analysis for the behavioral sciences. Routledge.

Conley, T. B. (2001). Construct validity of the MAST and AUDIT with multiple offender drunk drivers. *Journal of Substance Abuse Treatment*, *20*, 287-295. doi: 10.1016/S0740-5472(01)00159-3

Cox, B. J., Ross, L., Swinson, R. P., & Direnfeld, D. M. (1998). A comparison of social phobia outcome measures in cognitive-behavioral group therapy. *Behavior Modification*, *22*, 285-297. doi: 10.1177/01454455980223004

Cyders MA, Smith GT, Spillane NS, Fischer S, Annus AM, Peterson C. (2007). Integration of impulsivity and positive mood to predict risky behavior: development and validation of a measure of positive urgency. *Psychological Assessment*, 19, 107-18. doi: 10.1037/1040-3590.19.1.107

Cuming, S., Rapee, R. M., Kemp, N., Abbott, M. J., Peters, L., & Gaston, J. E. (2009). A self-report measure of subtle avoidance and safety behaviors relevant to social anxiety: Development and psychometric properties. *Journal of Anxiety Disorders*, *23*, 879-883. doi: 10.1016/j.janxdis.2009.05.002

Cyders MA, Smith GT. (2008) Emotion-based dispositions to rash action: positive and negative urgency. *Psychological Bulliten,*134, 807-28. doi: 10.1037/a0013341

Cyders, M. A., & Coskunpinar, A. (2012). The relationship between self-report and lab task conceptualizations of impulsivity. *Journal of Research in Personality*, *46*, 121-124. doi: 10.1016/j.jrp.2011.11.005

De Los Reyes, A., Henry, D. B., Tolan, P. H., & Wakschlag, L. S. (2009). Linking informant discrepancies to observed variations in young children's disruptive behavior. *Journal of Abnormal Child Psychology*, *37*, 637-652. doi: 10.1007/s10802-009-9307-3

De Los Reyes, A., Ehrlich, K. B., Swan, A. J., Luo, T. J., Van Wie, M., & Pabón, S. C. (2013). An experimental test of whether informants can report about child and family behavior based on settings of behavioral expression. *Journal of Child and Family Studies*, *22*, 177-191. doi: 10.1007/s10826-012-9567-3

Dozois, D. J., Dobson, K. S., & Ahnberg, J. L. (1998). A psychometric evaluation of the Beck Depression Inventory–II. *Psychological Assessment*, *10*, 83-89. doi:10.1037/1040-3590.10.2.83

Gilbert, P. (2001). Evolution and social anxiety: The role of attraction, social competition, and social hierarchies. *Psychiatric Clinics of North America*, *24*, 723-751. doi: 10.1016/S0193-953X(05)70260-4

Fresco, D. M., Coles, M. E., & Heimberg, R. G. (2001). The Liebowitz Social Anxiety Scale: a comparison of the psychometric properties of self-report and clinician-administered formats. *Psychological Medicine*, *31*, 1025-1035. doi: 10.1017/S0033291701004056

Hall, J. R., Bernat, E. M., & Patrick, C. J. (2007). Externalizing psychopathology and the error-related negativity. *Psychological Science*, *18*, 326-333. doi: 10.1111/j.1467-9280.2007.01899.x

Ham, L. S., & Hope, D. A. (2003). College students and problematic drinking: A review of the literature. *Clinical Psychology Review*, *23*, 719-759. doi: 10.1016/S0272-7358(03)00071-0

Ham, L. S., & Hope, D. A. (2006). Incorporating Social Anxiety Into a Model of College Problem Drinking: Replication and Extension. *Psychology of Addictive Behaviors*, *20*, 348-355. doi: 10.1037/0893-164X.20.3.348

Hanley, J. A., Negassa, A., & Forrester, J. E. (2003). Statistical analysis of correlated data using generalized estimating equations: an orientation. *American Journal of Epidemiology*, *157*, 364-375. doi: 10.1093/aje/kwf215

Mash, E. J., & Hunsley, J. (2005). Evidence-based assessment of child and adolescent disorders: Issues and challenges. *Journal of Clinical Child and Adolescent Psychology*, *34*, 362-379. doi: 10.1207/s15374424jccp3403_1

Jarrett, M. A., & Ollendick, T. H. (2008). A conceptual review of the comorbidity of attention-deficit/hyperactivity disorder and anxiety: Implications for future research and practice. *Clinical Psychology Review*, *28*, 1266-1280. doi:10.2217/npy.12.39

Johnston, L. D., O'Malley, P. M., & Bachman, J. G. (2003). Monitoring the Future: National results on adolescent drug use: Overview of key findings. *FOCUS: The Journal of Lifelong Learning in Psychiatry*, *1*, 213-234.

Kashdan, T. B., & Hofmann, S. G. (2008). The high-novelty–seeking, impulsive subtype of generalized social anxiety disorder. *Depression and Anxiety*, *25*, 535-541. doi: 10.1002/da.20382

Kashdan, T. B., Elhai, J. D., & Breen, W. E. (2008). Social anxiety and disinhibition: An analysis of curiosity and social rank appraisals, approach–avoidance conflicts, and disruptive risk-taking behavior. *Journal of Anxiety Disorders*, *22*, 925-939. doi: 10.1016/j.janxdis.2007.09.009

Kashdan, T. B., & McKnight, P. E. (2010). The Darker Side of Social Anxiety When Aggressive Impulsivity Prevails Over Shy Inhibition. *Current Directions in Psychological Science*, *19*, 47-50. doi: 10.1177/0963721409359280

Kessler, R. C., Berglund, P., Demler, O., Jin, R., Merikangas, K. R., & Walters, E. E. (2005a).

   Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National

   Comorbidity Survey Replication. *Archives of General Psychiatry*, *62*, 593-602.

   doi:10.1001/archpsyc.62.6.593

Kessler, R. C., Adler, L., Ames, M., Demler, O., Faraone, S., Hiripi, E., Howes, M.J., Jin, R.,

   Secnik, K., Spencer, T., Ustun, T.B., & Walters, E. E. (2005b). The World Health

   Organization Adult ADHD Self-Report Scale (ASRS): a short screening scale for use in

   the general population. *Psychological Medicine*, *35*, 245-256. doi:

   10.1017/S0033291704002892

Kessler, R. C., Petukhova, M., Sampson, N. A., Zaslavsky, A. M., & Wittchen, H. U. (2012).

   Twelve-month and lifetime prevalence and lifetime morbid risk of anxiety and mood

   disorders in the United States. *International Journal of Methods in Psychiatric Research*,

   21, 169-184. doi: 10.1002/mpr.1359

Kessler, R., Adler, L., Barkley, R., Biederman, J., Conners, C., Demler, O., Faraone, S.V.,

   Greenhill, L.L., Howes, M.J., Secnik, K., Spencer, T., Ustun, T.B., Waltern, EE. &

   Zaslavsky, A.M. (2006). The prevalence and correlates of adult ADHD in the United

   States: results from the National Comorbidity Survey Replication. *American Journal of

   Psychiatry*, *163*, 716-723. doi: 10.1176/appi.ajp.163.4.716

Krueger, R. F., McGue, M., & Iacono, W. G. (2001). The higher-order structure of common

   DSM mental disorders: Internalization, externalization, and their connections to

   personality. *Personality and Individual Differences*, *30*, 1245-1259. doi: 10.1016/S0191-

   8869(00)00106-9

Krueger, R. F., Markon, K. E., Patrick, C. J., & Iacono, W. G. (2005). Externalizing

Psychopathology in Adulthood: A Dimensional-Spectrum Conceptualization and Its

Implications for DSM–V. *Journal of Abnormal Psychology*, *114*, 537-550. doi:

10.1037/0021-843X.114.4.537

Krueger, R. F., & South, S. C. (2009). Externalizing disorders: cluster 5 of the proposed meta-

structure for DSM-V and ICD-11. *Psychological Medicine*, *39*, 2061-2070. doi:

10.1017/S0033291709990328

Leary, M. R. (1983). A brief version of the Fear of Negative Evaluation Scale. *Personality and

Social Psychology Bulletin*, *9*, 371-375. doi: 10.1177/0146167283093007

Lynam DR, Smith GT, Whiteside SP, Cyders MA. The UPPS-P: Assessing five personality

pathways to impulsive behavior. Technical report. West Lafayette, IN: Purdue

University; 2006.

Magid, V., & Colder, C. R. (2007). The UPPS Impulsive Behavior Scale: Factor structure and

associations with college drinking. *Personality and Individual Differences*, *43*, 1927-

1937.

Maner, J. K., Richey, J. A., Cromer, K., Mallott, M., Lejuez, C. W., Joiner, T. E., & Schmidt, N.

B. (2007). Dispositional anxiety and risk-avoidant decision-making. *Personality and

Individual Differences*, *42*(4), 665-675. doi: 10.1016/j.paid.2006.08.016

Markon, K. E., Chmielewski, M., & Miller, C. J. (2011). The reliability and validity of discrete

and continuous measures of psychopathology: a quantitative review. *Psychological

Bulletin*, *137*, 856-879. doi: 10.1037/a0023678

Mattick, R.P., & Clark, C.J. (1998). Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behaviour Research and Therapy,* 36, 455-470. doi: 10.1016/S0005-7967(97)10031-6

McCutcheon AL (1987), Latent Class Analysis. Newbury Park, CA: Sage

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

Nagin, D.S. (2006). Group-based modeling of development. Cambridge: Harvard University Press.

O'Malley, P. M., & Johnston, L. D. (2002). Epidemiology of alcohol and other drug use among American college students. *Journal of Studies on Alcohol Supplement*, 14, 23-39.

Pary, R., Lewis, S., Matuschka, P. R., Rudzinskiy, P., Safi, M., & Lippmann, S. (2002). Attention deficit disorder in adults. *Annals of Clinical Psychiatry*, *14*, 105-111. doi: 10.1023/A:1016807021779

Reynolds, B., Ortengren, A., Richards, J. B., & de Wit, H. (2006). Dimensions of impulsive behavior: Personality and behavioral measures. *Personality and Individual Differences*, *40*, 305-315.

Rytwinski, N. K., Fresco, D. M., Heimberg, R. G., Coles, M. E., Liebowitz, M. R., Cissell, S., Stein, M.B., & Hofmann, S. G. (2009). Screening for social anxiety disorder with the self-report version of the Liebowitz Social Anxiety Scale. *Depression and Anxiety*, *26*, 34-38.

Selzer M.L. (1975). The Michigan Alcoholism Screening test (MAST): the quest for a new

diagnostic instrument. *American Journal of Psychiatry*, 3,176-181. doi:

10.1016/j.paid.2005.03.024

Silverman, W. K., & Ollendick, T. H. (2005). Evidence-based assessment of anxiety and its

disorders in children and adolescents. *Journal of Clinical Child and Adolescent

Psychology*, *34*, 380-411. doi: 10.1207/s15374424jccp3403_2

Taylor, S., Zvolensky, M. J., Cox, B. J., Deacon, B., Heimberg, R. G., Ledley, D. R.,

Abromowtiz, A.S. & Cardenas, S. J. (2007). Robust dimensions of anxiety sensitivity:

development and initial validation of the Anxiety Sensitivity Index-3. *Psychological

assessment*, *19*, 176-188. doi: 10.1037/1040-3590.19.2.176; 10.1037/1040-

3590.19.2.176.supp

Van Ameringen, M., Mancini, C., Simpson, W., & Patterson, B. (2011). Adult attention deficit

hyperactivity disorder in an anxiety disorders population. *CNS Neuroscience &

Therapeutics*, *17*, 221-226. doi: 10.1111/j.1755-5949.2010.00148.x

Vermunt, J.K., & Magidson, J. (2005) Latent GOLD 4.0 User's Guide. Belmont, Massachusetts:

Statistical Innovations Inc

Voncken, M. J., Rinck, M., Deckers, A., & Lange, W. G. (2012). Anticipation of social

interaction changes implicit approach-avoidance behavior of socially anxious individuals.

Cognitive Therapy and Research, *36*, 740-749. doi: 10.1007/s10608-011-9408-5

Wallace, J. M., Bachman, J. G., O'Malley, P. M., Schulenberg, J. E., Cooper, S. M., & Johnston,

L. D. (2003). Gender and ethnic differences in smoking, drinking and illicit drug use

among American 8th, 10th and 12th grade students, 1976–2000. *Addiction*, *98*, 225-234.

doi: 10.1046/j.1360-0443.2003.00282.x

Weeks, J. W., Heimberg, R. G., Fresco, D. M., Hart, T. A., Turk, C. L., Schneier, F. R., & Liebowitz, M. R. (2005). Empirical Validation and Psychometric Evaluation of the Brief Fear of Negative Evaluation Scale in Patients With Social Anxiety Disorder. *Psychological Assessment*, *17*, 179-190. doi: 10.1037/1040-3590.17.2.179

Weeks, J. W., Heimberg, R. G., Rodebaugh, T. L., & Norton, P. J. (2008). Exploring the relationship between fear of positive evaluation and social anxiety. *Journal of Anxiety Disorders*, *22*, 386-400. doi: 10.1016/j.janxdis.2007.04.009

Wilens, T. E., Faraone, S. V., & Biederman, J. (2004). Attention-deficit/hyperactivity disorder in adults. *Journal of the American Medical Association*, *292*, 619-623. doi: 10.1001/jama.292.18.2214

Wilens, T. E., & Morrison, N. R. (2012). Substance-use disorders in adolescents and adults with ADHD: focus on treatment. *Neuropsychiatry*, *2*, 301-312. doi:10.2217/npy.12.39

Wong, N., Sarver, D. E., & Beidel, D. C. (2012). Quality of life impairments among adults with social phobia: The impact of subtype. *Journal of Anxiety Disorders*, *26*, 50-57. doi: 10.1016/j.janxdis.2011.08.012

Wood, M. D., Read, J. P., Palfai, T. P., & Stevenson, J. F. (2001). Social influence processes and college student drinking: The mediational role of alcohol outcome expectancies. *Journal of Studies on Alcohol and Drugs*, *62*, 32-43.