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Kathryn V. Bulandr

Illinois Wesleyan University, kbulandr@iwu.edu

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Kathryn V. Bulandr

Illinois Wesleyan University

Abstract

The current study examined whether the combination of anxiety sensitivity (AS) and stress affected college students' urge and motive to drink alcohol. Participants (n= 95, 44.2% male, 55.8% female, M_{age}= 18.82 years) included undergraduate students from Illinois Wesleyan University. Participants were asked to fill out a series of questionnaires, in addition to a short anagram task, which was used to induce stress in half of the sample. A multivariate factorial analysis was used to examine two main effects (AS and stress levels) and one interaction effect. Our hypothesis was partially supported, in that there was only one significant main effect found and no significant interaction effect. More specifically, individuals with high levels of AS were more likely to report greater urges and higher coping motives to drink than individuals with low levels of AS. Levels of stress did not affect one's urge or motive to drink, nor was there an effect of AS on urge and motive to drink between differing stress conditions.

Keywords: anxiety sensitivity, stress, motivation

Anxiety Sensitivity, Stress, and Problematic Drinking Behaviors among College Students

Alcohol use among young adults is common, particularly in the college student population (Arterberry, Martens, Cadigan, & Smith, 2012). Excessive alcohol use among the young adult population can carry significant risk of negative social, psychological, and physical health consequences (Cooper, 1994). In order to successfully limit these adverse consequences of drinking, it is important to understand not only the patterns and prevalence of drinking, but also the reasons and motives behind drinking behavior, as well as risk factors for drinking. One potential risk factor, anxiety sensitivity, refers to the fear of anxiety symptoms, including bodily sensations, which results from beliefs about the harmful social, psychological, and physiological consequences of such symptoms (McLaughlin & Hatzenbuehler, 2009). Although not yet demonstrated experimentally, Stewart, Samoluk, and MacDonald (1999) proposed that anxiety sensitivity should predict higher levels of drinking due to alcohol's disinhibiting effects and its ability to reduce arousal sensations. Additionally, the experience of stress has been found to predict problematic drinking (Zvolensky, Kotov, Antipova, Leen-Feldner, & Schmidt 2004). Although stress and anxiety sensitivity have separately been identified as predictors of drinking, they have yet to be investigated together. This study aims to investigate whether stress and anxiety sensitivity affect reported urges and type of motivations to drink among young adults.

The following sections review literature in the patterns of alcohol use among college students, commonly examined correlates of alcohol use, potential risk factors of problematic drinking, including anxiety sensitivity and stress, and a theory of motivational use of alcohol (Cox & Klinger, 1988). This theory provides reasons for drinking that include two dimensions: individual/social and avoidance/enhancement. Also, a section on the urge to drink, as related to this theory, is included.

Alcohol Use Among College Students

Emerging adulthood is a unique developmental period in which many life changes occur, including individual growth and independence. It is during this time, however, that risky behaviors tend to peak (Park, Mulye, Adams, Brindis, & Irwin, 2006). In particular, changes in health risk behaviors, such as alcohol use, emerge during young adulthood (Velazquez et al., 2011). According to Foster and colleagues (2014), college students are more likely to drink heavily in comparison to their non-college peers. Heavy episodic drinking among college students has been associated with a range of serious primary and secondary consequences (i.e., memory loss, risky sexual behavior, addiction, academic impairment, car accidents, violence, and death; Hingson & Zha, 2009; Gonzalez & Hewell, 2012; Ragsdale et al., 2012). In 2008, 69% of U.S. college students reported using alcohol in the past month (Johnston, O'Malley, Bachman, & Schulenberg, 2009). Extreme binge drinking is becoming problematic among college students, with 11% of students consuming ten or more drinks and five percent consuming 15 or more drinks in a row (Johnston et al., 2009).

Given these findings, many intervention programs for drinking have been developed nationwide across college and university campuses, but evidence has indicated that these interventions only generate modest effects (Foster et al., 2014). Some prevention programs have focused on assessing the quantity of alcohol consumed as a way to identify students at risk for alcohol-related negative consequences and other high-risk behaviors (Pedrelli et al., 2010). However, this strategy relies on students' self-report, which may be unreliable because young adults may have difficulties recalling how many standard drinks were consumed. With the high co-occurrence of high-risk behaviors among college students, it is important to investigate

predictors of problematic drinking among college students in order to provide insight to further tailor drinking interventions (Foster et al., 2014).

Common Correlates of Alcohol Use

Much of the current literature regarding alcohol use among young adults focuses on three constructs of psychological distress—distress tolerance, discomfort intolerance, and self-esteem. Distress tolerance is defined as an individual's perceived capacity to withstand negative emotional states (Ozdel & Ekinci, 2014). Low distress tolerance has been specifically linked to alcohol use. Additionally, using alcohol to cope with negative affect is a strong predictor of problematic alcohol use (Simons & Gaher, 2005). Discomfort intolerance refers to an individual's capacity to withstand physical disturbances or uncomfortable bodily states (Schmidt, Richey, & Fitzpatrick, 2004). Elevated levels of discomfort intolerance increase the risk for substance use in order to mitigate the unpleasant arousal. Self-esteem refers to how an individual evaluates oneself (Zeigler-Hill, Stubbs, & Madson, 2013), which reflects a person's overall emotional evaluation of his or her own worth. Self-esteem can also be seen as a judgment of oneself as well as an attitude toward the self. Low self-esteem has been consistently associated with drinking among college students. Individuals with low self-esteem are more likely to consume alcohol for a variety of reasons, including the belief that drinking will make them more socially desirable and help them cope with negative emotional states (Zeigler-Hill et al., 2013).

Anxiety Sensitivity

Anxiety sensitivity (AS) has been examined as a risk factor for problematic drinking patterns. AS arises from the belief that arousal-related sensations, such as sweating or increased heart rate, will lead to extreme adverse consequences, such as social rejection, insanity, or death (Howell, Leyro, Hogan, Buckner, & Zvolensky, 2010). More than 100 peer-reviewed journal

articles on AS have been published during the past 30 years (Stewart et al., 1999). The growing interest in AS spans three domains: theoretical, empirical, and clinical. Recent theories by Reiss (e.g. 1991) and Clark (1986) have suggested that AS and similar constructs play a central role in the etiology and maintenance of fear, anxiety, panic, and other related issues, which have prompted a great deal of empirical research in the field (Stewart et al., 1999). The findings of these studies have consistently shown support for the etiological importance of AS and its highly predictive significance over other related variables (e.g., trait anxiety). Lastly, clinical interventions designed to decrease AS have been shown to be highly effective treatments for panic and other related disorders (Stewart et al., 1999).

AS and Trait Anxiety. AS is a somewhat stable factor that is related, but unique from trait anxiety and serves as a risk factor for anxiety pathology (Schmidt et al., 2007). Trait anxiety, according to McNally (1996), involves the general tendency to experience anxiety symptoms across a wide variety of stressful situations (Comeau, Stewart, & Loba, 2001). AS, on the other hand, involves a specific fear of anxiety-related bodily sensations due to beliefs that such sensations will lead to catastrophic outcomes, such as physical illness, social embarrassment, or loss of mental control (Comeau et al., 2001). Also, a mentally stressful event can lead to these same feared bodily arousal symptoms, which in turn could trigger AS. AS can be seen as a specific trait that implies a general tendency to respond fearfully to one's own anxiety symptoms, whereas trait anxiety can be seen as a global trait that indicates a tendency to respond fearfully to non-specific stressors and/or anxiety-provoking stimuli (Lilienfeld, Turner, & Jacob, 1993; McNally, 1999). The general inclination to become anxious (trait anxiety) may be determined by tendencies to become anxious about specific type of stressors (Taylor, 1995). Thus, AS and other fundamental fears are believed to lead to trait anxiety.

AS, Panic, and Anticipatory Anxiety. The majority of the research on AS has been focused on panic attacks and panic disorder, which suggests a link between fear of bodily anxiety sensations and panic vulnerability (Schmidt, Buckner, & Keough, 2007). More specifically, AS and related concepts have been investigated regarding their role in panic attacks, panic disorders, pain disorders, and anxiety disorders. Clark (1986) proposed that panic attacks tend to arise from the catastrophic misconception of certain bodily sensations. Similarly, catastrophic thinking about arousal sensations in AS may suggest that there is a common intervening factor between anxiety responses to pain and other forms of stress (Conrod, 2006). In this particular experimental study, Conrod (2006) examined whether AS is related to anxiety in anticipation of and in response to different stressors, or if AS is specifically involved in the response to a physical (painful) stressor. Anticipatory anxiety concerning an upcoming event or procedure can be conceptualized as "indices of perceived aversiveness or threat" (Tsao et al., 2004). AS is directly related to anticipatory anxiety, regardless of the type of stressor (Conrod, 2006). In other words, the fear of anxiety-related bodily sensations influence one's reactions to both physical and social stress.

Functions of AS and Alcohol: Coping and Avoidance. In order to reduce both panic and anxiety surrounding panic, researchers have found that the sedative effects of alcohol have reinforced drinking behavior among those with panic disorders. This idea may contribute to the high comorbidity between alcohol-use disorders and panic disorder (Kushner et al., 1996). Substance use disorders, particularly alcohol use disorders, are closely related to anxiety sensitivity as well (Schmidt et al., 2007). AS has been postulated to motivate individuals to use substances in an effort to decrease feared anxiety sensations. Because AS functions as an "anxiety-amplifier" (Reiss, 1991), it could lead to the use and potential abuse of any

psychoactive drug that has the capability to reduce, control, or eliminate arousal or fear, including alcohol (Stewart et al., 1999). Therefore, this method of coping could potentially lead to increased risk of substance use disorders among those with elevated AS (Schmidt et al., 2007). AS is also considered to be a strong motivator for avoiding negative affect, which has sparked current research on the potential importance of AS in the development and maintenance of substance use disorders and addictions (DeMartini & Carey, 2011). In fact, the *DSM-III-R* characterized alcohol dependence by significantly higher than average Anxiety Sensitivity Index (ASI) scores when compared to nonclinical ASI norms, suggesting that high AS could represent a premorbid vulnerability factor related to the motivation to drink in excess (Stewart et al., 1999). Items on the ASI measure anxiety sensitivity by using questions such as, "It scares me when my heart beats rapidly" and "Unusual body sensations scare me" (Reiss, Peterson, Gursky, & McNally, 1986). High AS is correlated with higher levels of alcohol consumption when compared to low AS (DeMartini et al., 2011). This observed correlation has sparked an interest in the drinking motives that may help explain the relationship between AS and alcohol consumption.

Stress in Young Adulthood

Stress is another major factor influencing drinking behaviors on college campuses (Wemm et al., 2013). Stress arises when individuals perceive that they cannot adequately cope with the demands being made on them or with threats to their well-being (Lazarus, 1966). During these years of emerging adulthood, individuals are exposed to a wide variety of stress-inducing situations and are going through major life transitions, such as leaving home and starting an independent life (Larsen et al., 2013). This also tends to be a period in which many young adults engage in social drinking and regular alcohol consumption, especially on college

campuses (Paschall, 2003). The inability to cope with these life stressors has been linked to an

increased risk for alcohol consumption and potentially alcohol use disorders (Bobadilla &

Taylor, 2007). Various studies have demonstrated that alcohol consumption is a common way of

coping with stress in order to reduce tension (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004).

The tension-reduction hypothesis (Conger, 1956) proposes that states of tension (i.e., anxiety,

fear, conflict, or frustration) are aversive motivational states and drug compensation serves as a

rewarding activity because it reduces such states.

Furthermore, stressed individuals, particularly college students, are more easily

influenced by other people's drinking. In a recent study, researchers predicted that after exposure

to a stressor, people would be more likely to imitate the drinking behaviors of others because of

the increase in levels of arousal (Larsen et al., 2013). Additionally, it may be that stressful

situations trigger individuals to seek out positive responses in interactions with others to relieve

tension. If no positive feedback is given, however, these individuals may cope by attempting to

connect with others, perhaps by mimicking their drinking behaviors (Larsen et al., 2013).

Physiological factors further enhance the behavioral and psychological effects of stress.

Wemm and colleagues (2013) assessed college students' vulnerability for alcohol-related

consequences by measuring their physiological and behavioral stress responses during a

challenging task. The task consisted of three anagrams of increasing difficulty, the last of which

was impossible to solve. Excessive alcohol use was related to an impaired physiological response

to stress during the impossible task (Wemm et al., 2013). Thus, when individuals are exposed to

a stressful situation or event, coping with stress—both psychological and physiological—tends to

be the most common motive for drinking (Wemm et al., 2013). College students who reportedly

drank to cope with stress consequently had significantly higher levels of cortisol—a steroid

hormone released in response to stress—meaning their motive to drink resulted in inadequate physiological coping.

Taken all together, these results suggest a dangerous positive feedback loop in the relationship between dysfunctional coping strategies (i.e., drinking) and coping with stress. One of the major systems involved in the stress response and its regulation (the hypothalamic-pituitary-adrenal axis) is activated as a result of drinking. This ultimately increases overall stress and potentially motivates college students to drink even more in the future (Dai, Thavundayil, Santella, & Gianoulakis, 2007; De Kloet, 2004; McEwen, 1998). The lack of alternative, more effective skills for coping with stress is one important moderator in the relationship between stress and drinking outcomes (Corbin, Farmer, & Nolen-Hoekesma, 2013).

Theory: A Motivational Model of Alcohol Use

The motivational theory of drinking by Cox and Klinger (1988) suggests that the primary factor that influences drinking is motivation. According to this theory, various factors (e.g., past experiences with drinking, current life situations) help form people's expectations of affective change from drinking. In other words, the overall motivation to drink is closely related to people's incentives in other life areas and to the affective changes that they derive from their incentives. Incentive motivation is the first fundamental premise of the model, meaning that people drink in order to gain a certain valued outcome. The second fundamental premise is affective change, which is a change in emotional response from its current state (Cox & Klinger, 1988). This motivational model of alcohol use suggests that there are many variables that can influence a person's decision to drink, and these variables help form expectations about affective changes that will occur if a person drinks as compared to affective changes produced by nondrinking behaviors (Cox & Klinger, 1988).

Cox and Klinger (1988) proposed a framework that categorizes motives based on the concepts mentioned above. Accordingly, drinking motives can be characterized between two dimensions that reflect the quality (positive or negative) and source (internal or external) of the outcomes an individual hopes to achieve by drinking alcohol (Cooper, 1994). Therefore, individuals may drink to gain a positive outcome (positive reinforcement) or to avoid a negative one (negative reinforcement). Additionally, drinking may be a response to internal rewards (e.g., one's own internal emotional state) or external rewards (e.g., social acceptance; Cooper, 1994). This model yields four drinking motives: (1) Enhancement motives are characterized by internal, positive reinforcement, (2) social motives are characterized by external, positive reinforcement, (3) coping motives are characterized by internal, negative reinforcement, and (4) conformity motives are characterized by external, negative reinforcements (DeMartini et al., 2011; Cooper, 1994; Cox & Klinger, 1988; see Figure 1).

Empirical research on drinking motives has mainly focused on two of the four motives previously mentioned: social and coping motives. These two motives for alcohol use have been strongly supported in both adult and adolescent samples. Social motives are more common than coping motives, and individuals reporting this motive tend to engage in light, infrequent drinking in social settings. Coping motives, however, tend to be associated with heavier, more problematic drinking (Cooper, 1994). Although fewer studies have examined enhancement motives, existing evidence suggests that individuals who uphold this enhancement motive to drink show a unique pattern of drinking behaviors. Specifically, enhancement motives have been positively correlated with heavy drinking patterns in situations conducive to heavy drinking, such as drinking with same-sex friends (Cooper, 1994). Lastly, conformity motives were identified to be generally unrelated to heavy or frequent alcohol use. However, there was some

indication that younger adolescents were more likely to endorse conformity motives (Brown & Finn, 1982; Johnston & O'Malley, 1986) and that drinking to conform may be more predictive of alcohol use among younger adolescents (Gliksman, 1983).

The model predicts people decide to drink or not to drink on the basis of whether the positive (enhancement) consequences they expect to acquire from drinking outweigh those they expect to acquire from not drinking (Cox & Klinger, 1988). Since rational decision-making generally involves values, which are emotional based, the decision to drink is a combination of both emotional and rational processes (Cox & Klinger, 1988). However, individuals are not necessarily aware of having made a decision to drink, or not to drink, or the factors that affected that decision. Two additional factors have been found to have an impact on one's decision to drink: (1) the situation in which an individual is located at any point in time and (2) his or her current positive and negative incentives that serve as sources of the positive and negative affect that he or she experiences (Cox & Klinger, 1988). Prior research indicates that those who decide to drink report choosing alcohol to obtain particular emotional effects they are unable to obtain through "nonchemical" incentives—for example, to feel less anxious and depressed (Langenbucher & Nathan, 1983).

Urge to drink. The urge to drink, also referred to as a craving, is an emotional state in which a person is motivated to seek and use alcohol (Rohsenow & Monti, 1999). This motivation can be associated with either positive or negative emotions (e.g., anticipation of alcohol's positive effects or frustration over problems at work) and is thought to be predictive of drinking outcomes (Rohsenow et al., 1999). Urges are inherently a self-reported phenomenon—that is, an individual must describe his or her desire to drink. In human models, however, there is often a discrepancy between the urge to drink and that of actual alcohol consumption.

Compulsive Drinking. Compulsive drinking can be considered a dimension of craving, and has been distinctly characterized from simple reward seeking and alcohol use (Anton, Moak, & Latham, 1995; Anton, 1999). Among college students in particular, compulsive drinking is associated with a higher number of drinks per drinking day and with worse alcohol-related negative consequences (McEvoy, Stritzke, French, Lang, & Ketterman, 2004; Rosenberg & Mazzola, 2007). The association between compulsive drinking and heightened risky behaviors may be explained by the pharmacological effect of consuming alcohol, which may lead to a decreased ability to inhibit impulses and urges (Källmén & Gustafson, 1998). Many of the current strategies that assess compulsive drinking among college students hinges on students' self-reports, which may yield an underestimation of true compulsive drinking behaviors. A better understanding and more reliable assessment of craving would be beneficial in tailoring treatments for interventions.

The Current Study

The present study investigated whether anxiety sensitivity (AS) and stress influence reported urges to drink and the motivations to drink among college students. Other commonly indentified correlates of drinking behaviors were also examined, including distress tolerance, discomfort intolerance, and self-esteem. After each participant's AS level was determined, participants were quasi-randomly assigned to either a stressed condition or a non-stressed condition in which a short task was performed. It was predicted that students with high AS and high state stress levels (i.e., students in the stressed condition) would report greater urges to drink as well as higher coping motives to drink. Higher coping motives, according to Cooper (1994), are indicative of heavier and more frequent problematic drinking.

Method

Participants

Participants included male and female undergraduate students from Illinois Wesleyan University (n= 95, 44.2% male, 55.8% female, M_{age}= 18.82 years, SD_{age}= 2.16 years, age rage 18-24 years). See Table 1 for racial demographic information, international status, annual household income, and social drinking involvement.

Participants were comprised of both General Psychology students and non-General Psychology students. General Psychology students were recruited through the Illinois Wesleyan subject pool. Non-General Psychology students were recruited through flyers posted across the IWU campus; also, class announcements were made to various Psychology classes. General Psychology students who agreed to participate in this study received one Research Experience Program (REP) credit. If recruited through flyers, non-General Psychology students were entered into a raffle to win a gift card; if recruited through class announcements, non-General Psychology students received extra credit in their respective class. Participation was voluntary. The exclusionary criteria were if students were younger than 18 years old and if they participated in the fall under the stressed condition. These individuals were eliminated from data analyses because the procedure for the stressed condition during the fall semester was slightly modified for the spring session. In total, seven participants were excluded from the current study. Five participants participated in the fall under the stressed condition and two participants were 17 years old.

Measures

Anxiety sensitivity. The Anxiety Sensitivity Index (ASI; Reiss et al., 1986) is a 16-item measure in which participants indicate the degree to which they are concerned about possible

negative consequences of anxiety symptoms (Howell et al., 2010). This survey uses a 5-point

Likert scale ranging from "very little" (0) to "very much" (4). An example dimension would be,

"It scares me when I feel shaky." This measure demonstrated good internal consistency

(Cronbach's α = .84).

Demographics. A demographic questionnaire assesses age, race, gender, socioeconomic

status, and involvement in social drinking activities.

Discomfort intolerance. The Discomfort Intolerance Scale (DIS; Simons, Richey, &

Fitzpatrick, 2006) is a 7-item measure in which respondents indicate the degree of agreement

toward statements that relate to their tolerance of discomfort (Howell et al., 2010). Participants

rate the questions on a 7-point Likert scale ranging from "not like me at all" (0) to "extremely

like me" (6) (Simons et al., 2006). Example questions include, "I can tolerate a great deal of

physical discomfort," and, "I have a high pain threshold." Items one and two were reversed

scored. The intolerance subscale demonstrated good internal consistency (Cronbach's α = .82).

The avoidance subscale demonstrated poor internal consistency (Cronbach's α = .44) and was

not analyzed further.

Distress tolerance. The Distress Tolerance Scale (DTS; Simons & Gaher, 2005) is 16-

item self-report measure in which participants indicate the extent to which they can experience

and withstand distressing psychological states (Howell et al., 2010). This self-report survey uses

a 5-point Likert scale ranging from "strongly agree" (1) to "strongly disagree" (5). Example

dimensions include, "I'll do anything to avoid feeling distressed or upset," "My feelings of

distress or being upset scare me," and, "I can't handle feeling distressed or upset" (Simons et al.,

2005). This measure included four subscales, two of which demonstrated good internal

consistency (Cronbach's α = .78 for the appraisal subscale, .74 for the regulation subscale), and

two that demonstrated adequate internal consistency (Cronbach's α = .69 for the tolerance

subscale, .65 for the absorption subscale).

Self-esteem. The Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965) is a 10-item

measure that assesses global self-worth by measuring both positive and negative feelings about

the self. The RSES uses a 4-point Likert scale ranging from "strongly agree" (1) to "strongly

disagree" (4). One example dimension is, "I take a positive attitude toward myself." This scale

demonstrated good internal consistency (Cronbach's α = .87).

Drinking history. The Alcohol Use Disorders Identification Test—Consumption

(AUDIT-C) consists of the first 3 questions of the World Health Organization's 10-item AUDIT

(Berger, Williams, Bryson, Rubinsky, & Bradley, 2013). This questionnaire assesses the

frequency of typical drinking, the number of drinks consumed on a typical drinking day, and the

frequency of drinking 6 or more drinks on one occasion. The AUDIT-C is scored from 1 to 12—

each question accounting for up to 4 points (Berger et al., 2013). This measure demonstrated

good internal consistency (Cronbach's α = .87).

Psychological distress. The Depression Anxiety and Stress Scale (DASS; Lovibond &

Lovibond, 1995) assesses an individual's level of stress, anxiety symptoms, and depressive

symptoms during the past week. This measure is a 42-item survey that includes three self-report

scales consisting of 14-items each. The DASS uses a 4-point Likert scale ranging from "did not

apply to me at all" (0) to "applied to me very much, or most of the time" (3). An example

dimension includes, "I tended to over-react to situations" (Lovibond et al., 1995). Each subscale

demonstrated high internal consistency (Cronbach's α = .95 for the depression subscale, .88 for

the anxiety subscale, and .94 for the stress subscale).

Stress. The Stress Appraisal Measure (SAM; Peacock & Wong, 1990) assesses one's thoughts about various aspects of a current situation (right now), including perceived threat, challenge, centrality, control (self and others), and stressfulness. This measure is a 28-item survey that uses a 5-point Likert scale ranging from "not at all" (1) to "extremely" (5). Some example questions include, "Does this situation create tension in me?", "Is this going to have a positive impact on me?", and, "Will I be able to overcome the problem?" (Peacock et al., 1990). There are seven subscales within this measure. The centrality, control-self, control-others, and stressfulness subscales all demonstrated high internal consistency (Cronbach's α= .86, .86, .91, and .81, respectively). The threat, challenge, and uncontrollable subscales all demonstrate adequate internal consistency (Cronbach's α = .62, .69, and .61, respectively).

Urge to drink. The Alcohol Craving Questionnaire- Short Form- Revised (ACQ-SF-R; Singleton, 1997) contains 12 items from the 47-item Alcohol Craving Questionnaire (ACQ-NOW). This measure assesses craving for alcohol among alcohol users in the current context (right now). Each item has seven compartments that are checked-off and scored on a scale of 1 (strongly disagree) to 7 (strongly agree). The 12 items are strongly correlated with 4 subscales— compulsivity, expectancy, purposefulness, and emotionality (Tiffany, Carter, & Singleton, 2000). Four subscales are used within this measure. The compulsivity and purposefulness subscale were not analyzed due to their poor internal consistency (Cronbach's α = .25 and .48, respectively). The expectancy and emotionality were the only two subscales that were analyzed because of their good internal consistency (Cronbach's α = .77 and .75, respectively).

Motive to drink. The Drinking Motives Questionnaire- Revised Short Form (DMQ-R SF) is based on the Motivational Model of Alcohol Use (Cox & Klinger, 1988). The DMQ-R-SF is a 12-item measure that assesses the four drinking motive dimensions: enhancement, coping,

conformity, and social motives. Relative frequency of drinking for each of the 12 reasons is rated

on a 5-point Likert scale ranging from "almost never/never" (1) to "almost always/always" (5)

(Cooper, 1994). An example dimension includes, "In the last 12 months, how often did you drink

because it makes social gatherings more fun?" (Kuntsche & Kuntsche, 2009). This measure

contains four subscales, all of which demonstrated high internal consistency (Cronbach's α = .83

for the enhancement subscale, .94 for the social subscale, .85 for the conformity subscale, and

.84 for the coping subscale).

Procedure

Eligible participants were given a copy of informed consent and the opportunity to ask

questions regarding any concerns they had about the study. Participants were then given the

Anxiety Sensitivity Index (ASI). Once completed, it was immediately scored and each

participant was quasi-randomly assigned to either the control (non-stressed) group or the

experimental (stressed) group to ensure a relatively even number of participants in each

condition. While the research assistant completed scoring, participants were asked to fill out the

demographics questionnaire, which included questions regarding gender, age, race and ethnicity,

and social drinking involvement. The Discomfort Intolerance Scale (DIS), the Distress Tolerance

Scale (DTS), the Rosenberg Self-Esteem Scale (RSES), the AUDIT-C, and the Depression

Anxiety and Stress Scale (DASS) were also included in the first packet.

Stress was induced in half of the participants in order to assess the possible effects of

state stress on subsequent urges and motives to drink. Students in the stressed condition received

additional instructions. The research assistant interrupted the participant while he or she was

filling out the first packet of questionnaires and said the following:

> "Oh, I forgot to tell you something really important. In a few minutes you are going to be
> asked to complete a task. This task will require you to solve word puzzles that are known

as anagrams. This task is very important because it has been correlated with many other variables, including general well-being, achievement, and overall success in students. It is very important that you take this task seriously and do your best. Do you have any questions?"

This statement was given to the stressed condition only in order to induce anticipatory anxiety, which is anxiety due to anticipation of and in response to a stressor (Conrod, 2006). After completion of the first packet of questionnaires, the stressed condition received four anagrams—three of which were solvable (e.g., "obko," "ngera," and "talme") and one of which was unsolvable (e.g., "rdeerm"). They were given a strict time limit (four minutes) to try and complete these anagrams. The time was uniformly monitored using a stopwatch. The control group was also given four anagrams—all of which were solvable ("obko," "ngera," "talme," and "mtsor"). They were given no time constraints. All anagrams were drawn from Paivio, Yuille, and Madigan (1968) norms so that all were highly concrete and meaningful.

After completion of the stressed and non-stressed anagram tasks, participants were given the second packet of questionnaires. The first questionnaire was the Stress Appraisal Measure (SAM), which assessed the participants perceived levels of stress in that exact moment in time; it was predicted that the experimental group would display higher state stress levels due to their stressful situation. Participants were also given the Drinking Motives Questionnaire- Revised Short Form (DMQ-R SF) and Alcohol Craving Questionnaire- Short Form (ACQ-SF-R) following the stressed and non-stressed conditions to assess their urge and type of motivation to drink. At the end of the study, participants were given a copy of the debriefing statement and the opportunity to ask further questions. The debriefing statement indicated—for those in the stress condition—that the last anagram was actually unsolvable and that the anagram task was not directly correlated with overall student success (refer to anticipatory anxiety instructions above).

After data collection was complete, the low AS and high AS groups were established. In order to determine placement of the high and low anxiety sensitivity groups, the mean score among participants on the ASI was used. The mean score was 22.12; therefore, individuals with a score of 21 or lower were identified as "low anxiety sensitivity," whereas those with a score of 22 or higher were indentified as "high anxiety sensitivity." The means and standard deviations among our two groups (low levels and high levels) were 14.93 (4.55) and 29.41 (6.53), respectively. Further, it is interesting to note that this samples' mean score is at the high end of the range reported by the authors of the measure (14.2 to 22.5; Stewart et al., 1999).

Design

The data were analyzed using multivariate analysis that examined main effects of anxiety sensitivity and stress condition, as well as any significant interaction effect. The two main independent variables under investigation were anxiety sensitivity (AS) and state stress levels, each of which had two levels. The dependent variables were the urge to drink and the type of motivation to drink, which were assessed using the ACQ and the DMQ. Distress tolerance, discomfort intolerance, and self-esteem were also examined as covariates.

Each main effect (anxiety sensitivity and stress condition) as well as the interaction effect were examined. It was hypothesized that individuals with both high AS levels and high state stress levels (i.e., participants in the stress condition) would show greater urges to drink and higher coping motives to drink, which have been commonly related to heavier, more frequent, and problematic drinking.

Results

The variables were analyzed for outliers, which yielded ten cases among four variables. These values were winsorized (i.e., their scores were replaced with the next closest score that

was not considered an outlier). Correlational analyses were conducted to examine the

relationship between dependent variables and covariates. These results are reported in Tables 2

and 3, respectively.

In order to verify that individuals in the stress condition experienced more stress than

those in the control (or, non-stress) condition, we analyzed results of the Stress Appraisal

Measure (SAM). Independent t-tests were conducted and yielded statistically significant

differences, in the expected direction, among three of the subscales. These were control-self,

uncontrollable, and challenge. Regarding the control-self subscale, individuals in the stress

condition reported lower levels of perceived problem solving abilities as compared to those in

the control condition (M = 14.91, SD = 3.02 and M = 16.56, SD = 3.63, respectively), $t(86)$ =

2.32, p = .023. For the uncontrollable subscale, individuals in the stressed condition (M = 7.00,

SD = 2.72) reported significantly higher levels of hopelessness than individuals in the non-

stressed condition (M = 5.41, SD = 2.1), $t(86)$ = 3.03, p = .003. Lastly, for the challenge subscale,

individuals in the stressed condition (M = 8.74, SD = 2.87) reported lower levels of eagerness

than individuals in the non-stressed condition (M = 9.98, SD = 2.95), $t(86)$ = 1.98, p = .051. The

remaining subscales of the SAM were not statistically significantly different. Despite the fact

that the stressfulness subscale as a whole was not significantly different between our groups, we

examined the responses to one item of this measure, which used a 5-point Likert scale ranging

from "not at all" (1) to "extremely" (5). The item was, "To what extent to I perceive this

situation as stressful?" This analysis revealed a significant difference, such that individuals in the

stress condition reported higher agreement with this statement than those in the control group (M

= 2.13, SD = .96, M = 1.69, SD = 1.12, respectively, $t(93)$ = -2.07, p = .041).

Our main analysis was conducted using multivariate factorial analyses of anxiety sensitivity and stress condition effects on the urge and motivation to drink. The urge to drink was measured using the emotionality subscale and the expectancy subscale of the Alcohol Craving Questionnaire (ACQ). The motivation to drink was measured using the Drinking Motives Questionnaire (DMQ). A main effect of anxiety sensitivity (AS) levels was found for participants' emotional urge to drink, $F (1, 84) = 5.671, p = .02, d = .52$, such that individuals with high AS levels were more likely to report higher urges to drink in anticipation of relief from withdrawal or negative affect compared to individuals with low AS levels; anxiety sensitivity levels did not predict one's expectancy to drink alcohol, $F (1, 84) = 1.404, p = .239$. AS levels were also highly associated with one's motive to drink as a coping mechanism, $F (1, 84) = 4.01$, $p = .033, d = .49$, such that individuals with high AS levels were more likely to drink alcohol in order to reduce or regulate negative emotions compared to individuals with low AS levels. AS levels did not predict one's drinking to enhance a positive mood, $F (1, 84) = .514, p = .475$, one's drinking to obtain positive social rewards, $F (1, 84) = 1.25, p = .267$, or one's drinking to avoid social rejection, $F(1, 84) = .347, p = .251$. Some participants identified themselves as non-drinkers on the AUDIT-C; therefore, we analyzed data only on the subgroup that identified themselves drinkers. Non-drinkers were identified by a score of "0" on the AUDIT-C questionnaire. When this population was excluded from the data set, the previously significant results remained significant. The main effect for AS levels was found for participants' emotional urge to drink, $F (1, 84) = 7.45, p = .008, d = .67$.

We examined whether there was a main effect regarding the stress condition. The stressed and non-stressed conditions did not yield any significant results regarding their effect of one's urge and motivation to drink. Therefore, an individual in a stressful situation did not report

greater urges to drink or higher coping motives to drink compared to an individual in a non-stressful situation (see Table 4). Finally, the interaction effect was examined between AS levels and condition of stress on urge and motivation to drink (see Table 5). There was no interaction effect between AS levels and condition of stress levels, meaning the effects of anxiety sensitivity on one's urge and motivation to drink did not differ depending on the situational stress condition.

Two post-hoc analyses were conducted with demographic variables as covariates: international student status and gender of the participant. Although we did not plan to analyze these initially, because our sample included international students whose first language was not English (16%), it is possible their experience of the word-based stress condition may differ from native-English speakers. Therefore, we ran the multivariate analysis of variance with international status as a covariate and found very similar results to our main analysis. The only significant effects were main effects for anxiety sensitivity on the dependent variables of ACQ emotionality and DMQ coping subscales (F (1, 83) = 5.61, p = .020 and F (1, 83) = 4.76, p = .032, respectively). There were no other significant main effects or interaction effects. Lastly, although it was not part of our main hypothesis, the gender of the participant is often associated with drinking behaviors (Pedrilli et al., 2010; Wemm et al., 2013). Therefore, we ran an analysis using gender of the participant as a covariate, which yielded the following results for ACQ emotionality and DMQ coping subscales: F (1, 83) = 8.00, p = .006 and F (1, 83) = 5.83, p = .018, respectively. There were no other significant main effects or interaction effects. Thus, although the results varied somewhat depending on which covariate was included, in both cases, the main findings remain unchanged.

In our final multivariate analysis, we entered all previously indentified covariates into the model. These included distress tolerance, discomfort intolerance, and self-esteem. This model

resulted in a non-significant main effect for anxiety sensitivity. The condition of stress and interaction effects remained non-significant, similar to the previous results (see Tables 6, 7, and 8 for F and p values).

Discussion

This study investigated the effects of both anxiety sensitivity (AS) and stress on one's urge and motivation to drink alcohol. The results suggest that our hypothesis was partially supported. One main effect that was found to be statistically significant was level of AS, suggesting that individuals with high levels of AS were more likely to report greater urges to drink and higher coping motives to drink compared to individuals with low levels of AS. More specifically, high levels of AS were indicative of drinking in anticipation of the relief from negative emotions (Singleton, 1997). High levels of AS were also associated with higher coping motives to drink, which can be linked to heavier and more problematic drinking (Cox & Klinger, 1988; Cooper, 1994), compared to low levels of AS. Contrary to our hypothesis, stress levels did not influence one's urge and/or motivate to drink. Results of this study showed that individuals in a stressful situation were not more likely to report greater urges or higher coping motives to drink compared to individuals in a non-stressful situation. Lastly, there was no interaction effect, which would suggest that an individual with high AS levels in a stressful situation will not report greater urges or higher coping motives to drink alcohol when compared to another individual with high AS levels in a non-stressful situation. In other words, an individual's anxiety sensitivity level would not influence one's urge and motive to drink if they are presented with a stressful situation.

AS levels were a strong predictor of one's urge to drink in order to relieve feelings of withdrawal and/or negative affect, otherwise known as emotionality. The three items of the ACQ

emotionality subscale are: "If I used alcohol, I would feel less tense," "I would feel less restless if I drank alcohol," and "If I were using alcohol, I would feel less nervous." All three statements include feelings of negative reactivity, similar to what individuals with high AS may experience. By definition, anxiety sensitivity is the fear of arousal-related sensations, arising from the belief that the sensations have adverse consequences (Howell et al., 2010). Thus, AS levels significantly predicted participants' urge to drink due to the experience negative affect. Differing AS levels were also indicative of differing motives to drink, specifically coping motives to drink. Cox and Klinger's Motivational Model of Alcohol Use (1988) characterizes drinking motives across two dimensions: source and quality. Coping motives, in particular, are characterized by internal, negative reinforcements. According this model, an individual who is motivated to drink in order to reduce internal, negative emotions will most likely engage in heavier and problematic drinking patterns.

Following our main analysis testing our hypothesis, we also examined the covariates (i.e., self-esteem, distress tolerance, and discomfort intolerance). In this model, none of the effects (main or interaction) were significant. This may have resulted due to relationships among the independent variables and covariates and/or the lack of statistical power due to the increased number of variables being analyzed.

The current study has expanded upon past literature due to the combination of examining both stress and levels of anxiety sensitivity on the urge and motive to drink. Although our hypothesis was not fully supported, the results showed that levels of anxiety sensitivity play a major role in college students' urge and motivation to drink. Because of these results, prevention programs and/or seminars for incoming freshman may be helpful, particularly programs that emphasize strategies on how to cope with elevated levels of anxiety. According to the Anxiety

and Depression Association of American, anxiety disorders are the most common mental illness in the U.S, affecting 40 millions adults 18 years and older (Greenberg et al., 1999). It is important to not only recognize this current trend, but also to understand how to prevent an increase in anxiety's prevalence, particularly among the younger cohort.

Strengths and Limitations

This study examined the effects of anxiety sensitivity (AS) and stress on college students' urge and motivation to drink. Due to college students' increased risk for problematic drinking behaviors (Foster et al., 2014), this was an appropriate demographic to target. AS and stress are two of the major risk factors for excessive alcohol consumption; however, most of the past literature had not investigated these constructs together. In regards to the experimental procedure, we were successful in inducing stress in the stressed condition participants. This was an important aspect of the study, mainly because it was our way of differentiating levels of stress in our participants.

A larger sample could improve statistical power and could yield different results regarding stress condition status. Another limitation was the age ($M = 18.82$ years) of the participants. A young cohort may lack experience with risky behaviors, such as excessive alcohol consumption. Previous studies investigating the link between stress and drinking among college students have typically used an older sample, ranging from 20-22 years old (Larsen et al., 2013; Wemm et al., 2013). Thus, this young cohort may not be a reliable source to qualitatively measure their urges and/or motives to drink. Additionally, external validity is a potential problem with the current study. According to Stewart and colleagues (1999), the normative sample mean scores on the Anxiety Sensitivity Index (ASI) are 14-22. The Illinois Wesleyan student population scored on the higher end of this range ($M = 22.12$). Thus, it would be difficult to

generalize these results to a larger population due to the generally high anxiety levels of students on this campus. Another issue that may have affected certain aspects of this study was the anagram task. The anagram task was biased towards native-English speakers; however, there was a significant amount of individuals that did not speak English as their first language ($n = 19$). This may have affected the International participants' reaction to the word-based task because solving the anagrams would theoretically prove to be more difficult than for those Native-English participants.

Although the anagram task proved to be stress inducing in several aspects of the Stress Appraisal Measure (SAM), there are multiple other scenarios in which we could have measured and implemented stress. For example, non-situational stress levels could have been analyzed using the Perceived Stress Scale, which measures perceived stress levels over the past month (Corbin et al., 2013). Another measure, such as the Life Events Scale (LES), could be used to assess stressful life events across the lifespan (McLaughlin & Hatzenbuehler, 2009). In this regard, our study would have measured chronic stress instead of acute/situational stress. Physiological measures could have been also implemented. Several studies have used saliva samples to measure cortisol levels prior to and after the induction of stress, as well as basal cardiovascular tests that measures systolic blood pressure, diastolic blood pressure, and heart rate (Wemm et al., 2013). If the resources were available, some studies were able to recreate a scenario in which participants were given the opportunity to drink alcohol at a bar (alongside confederates), therefore measuring their social desire to engage in drinking behavior (Larsen et al., 2013).

Future Directions

Excessive alcohol use, particularly among the college population, has many negative consequences, both in the short-term and the long-term. Heavy drinking among college students has been highly associated with a wide range of serious consequences, including memory loss, accidental injuries, violence, and addiction (Hingson & Zha, 2009; Gonzalez & Hewell, 2012; Ragsdale et al., 2012). With our results, prevention and intervention programs for excessive drinking may be developed and implemented in colleges and universities across the country. In particular, prevention programs targeting individuals with high levels of anxiety sensitivity would be beneficial due to anxiety's significant influence on both urge and motivation to drink. Ideally, these programs would teach at-risk individuals how to handle anxiety-inducing situations and how to regulate arousal sensations without turning to alcohol.

One particular covariate that was not examined in the current study was gender. Future studies could look at gender, in addition to anxiety sensitivity and stress, as a possible predictor of one's urge and motive to drink alcohol. Additional aspects of a participant's life could also be examined, such as his or her social involvement in Greek life or other social clubs/organizations. It would be interesting to see if there is a relationship between high social involvement and urge and/or motivation to drink, particularly social and conformity motives because they are characterized by external outcomes (e.g., drinking to obtain social awards; drinking to avoid social rejection). Finally, as mentioned above, it would be useful to include a stress-inducing task that was not partial to native-English speakers. Perhaps, instead of a word-based task, a mathematical task could be implemented.

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	Internal	**External**
Positive	Enhancement motive	Social motive
Negative	Coping motive	Conformity motive

Figure 1. Drinking motives according to the Motivational Model of Alcohol Use (Cox & Klinger, 1988). Enhancement motives are associated with heavy drinking when with same sex friends; social motives are associated with light, infrequent drinking during social situations; coping motives are associated with heavier, problematic drinking; conformity motives are associated with light, infrequent drinking (usually amongst younger adolescents).

Table 1

Demographic information and social drinking involvement

	n	*%*
Race		
African American/ Black	6	6.3
Asian American	6	6.3
Caucasian American/ White	58	61.1
Latino/a American/ Hispanic	8	8.4
Other	16	16.8
International Student?		
Yes	15	15.8
No	80	84.2
Annual Household Income		
$80,000 or below	41	43.2
$80,001-150,000	43	45.2
$150,001 and above	11	11.6
Social Drinking Involvement		
Always drink with other	42	44.2
Sometimes drink with other	26	27.4
Never drink alcohol	27	28.4

Note. $n = 95$.

Table 2

Dependent variables correlation coefficients

Variable	ACQ^1	ACQ^2	DMQ^1	DMQ^2	DMQ^3
ACQ^2	.626**				
DMQ^1	.498**	.659**			
DMQ^2	.548**	.625**	.80**		
DMQ^3	.415**	.268*	.343**	.541**	
DMQ^4	.546**	.55**	.44**	.464**	.447**

Note. $*p < .05$; $*p < .01$; ACQ = Alcohol Craving Questionnaire; ACQ^1 = emotionality subscale; ACQ^2 = expectancy subscale; DMQ = Drinking Motives Questionnaire; DMQ^1 = enhancement subscale; DMQ^2 = social subscale; DMQ^3 = conformity subscale; DMQ^4 = coping subscale.

Table 3

Covariate correlation coefficients

Variable	RSES	DTS
DTS	-.534*	
DIS	.131	-.178

Note. *p = .01; RSES = Rosenberg Self-Esteem Scale; DTS = Distress Tolerance Scale; DIS = Discomfort Intolerance Scale.

Table 4

Main effects by stress condition on urge and motive to drink

Variable	df	F	p-value
ACQ			
Emotionality	1, 84	1.05	.308
Expectancy	1, 84	.946	.333
DMQ			
Enhancement	1, 84	.218	.642
Social	1, 84	.000	.99
Conformity	1, 84	.698	.406
Coping	1, 84	.345	.558

Note. ACQ = Alcohol Craving Questionnaire; DMQ = Drinking Motives
Questionnaire.

Table 5

Interaction effect by stress condition and AS on urge and motive to drink

Variable	df	F	p-value
ACQ			
Emotionality	1, 84	.865	.355
Expectancy	1, 84	.296	.588
DMQ			
Enhancement	1, 84	.907	.344
Social	1, 84	.287	.594
Conformity	1, 84	.141	.709
Coping	1, 84	.997	.321

Note. ACQ = Alcohol Craving Questionnaire; DMQ = Drinking Motives
Questionnaire.

Table 6

All covariates: Anxiety sensitivity effects on urge and motive to drink

Variable	df	F	p-value
ACQ			
Emotionality	1, 81	2.17	.145
Expectancy	1, 81	.186	.668
DMQ			
Enhancement	1, 81	.177	.675
Social	1, 81	.824	.367
Conformity	1, 81	.362	.549
Coping	1, 81	2.81	.098

Note. ACQ = Alcohol Craving Questionnaire; DMQ = Drinking Motives
Questionnaire.

Table 7

All covariates: Stress condition effects on urge and motive to drink

Variable	*df*	*F*	*p-value*
ACQ			
Emotionality	1, 81	.592	.444
Expectancy	1, 81	.632	.429
DMQ			
Enhancement	1, 81	.243	.623
Social	1, 81	.000	1.00
Conformity	1, 81	.628	.43
Coping	1, 81	.031	.86

Note. ACQ = Alcohol Craving Questionnaire; DMQ = Drinking Motives
Questionnaire.

Table 8

All covariates: Interaction effects on urge and motive to drink

Variable	df	F	p-value
ACQ			
Emotionality	1, 81	.383	.538
Expectancy	1, 81	.011	.915
DMQ			
Enhancement	1, 81	.365	.548
Social	1, 81	.129	.721
Conformity	1, 81	.751	.389
Coping	1, 81	.581	.448

Note. ACQ = Alcohol Craving Questionnaire; DMQ = Drinking Motives Questionnaire.