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Drinking to Cope: Effects of Anxiety on Generation of Self-Regulation Strategies

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Drinking to Cope: Effects of Anxiety on Generation of Self-Regulation Strategies

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy in Psychology

by

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Abstract

This study sought to utilize motivational and self-regulatory processes, specifically the principle of emotional transfer (PET), to elucidate mechanisms underlying the transition from casual alcohol use to dependence in young adults with elevated anxiety. Utilizing a script-driven imagery procedure, the proposed study examined the effects of manipulated state anxiety on 1) the amount, content, and commitment to freely generated anxiety reduction strategies, and 2) the level of craving for alcohol. Young adult college students ($N = 69$; ages 18-24; 76.8% women) were randomly assigned to either the high ($n = 35$) or low ($n = 34$) anxiety condition. After script presentation, participants responded to a script-related prompt eliciting generation of anxiety regulation strategies, rated their commitment to those strategies, and reported their current level of alcohol craving. Analyses revealed no significant difference between the conditions on the quantity of strategies generated, level of alcohol craving, or number of participants generating alcohol use as a strategy. However, participants in the high anxiety condition reported significantly greater commitment to the strategies generated than the low anxiety condition. While anxiety increased in both conditions in response to the script, it did not increase significantly more in the high anxiety condition. The two conditions were collapsed and hierarchical linear regressions were run to assess whether post-induction anxiety predicted the outcome variables, while controlling for covariates. Greater past-year alcohol use and problems – not anxiety – predicted generation of significantly fewer strategies and higher alcohol craving. Findings of this study suggest partial support for the PET and highlight the need for alternative approaches to inducing and assessing the potential effects of anxiety on self-regulatory processes, particularly for those most at risk for alcohol use problems.

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Introduction

While a high proportion of the U.S. population either consumes or has consumed alcohol on a regular basis at some point in their life, a much smaller portion ultimately transitions into alcohol dependence (Kalaydjian et al., 2009). Data from large national epidemiological and longitudinal studies have shown that the risk of developing an alcohol use disorder (AUD) is highest from ages 19-26 (Grant et al., 2015; Hasin et al., 2007), with the 12-month prevalence rate at 8.5% in adults (American Psychiatric Association, 2013). An AUD is characterized by a pattern of use over the course of at least one year, which causes significant impairment or distress; typical features include reduced control over use, impairment in social functioning, continued use despite increased risk, and signs of tolerance or withdrawal (American Psychiatric Association, 2013). Within the subset of individuals who transition to problematic alcohol use, a co-occurrence of anxiety disorders is commonly seen, with prevalence rates around 18% (Grant et al., 2004; 2015). While the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; American Psychiatric Association, 2013) identifies various anxiety-related disorders, they all share features of persistent or excessive fear or anxiety, typically lasting at least six months, with associated cognitive and behavioral responses (e.g., avoidance, vigilance, worry). While many researchers have explored why an individual would choose to drink when anxious, less is known about the fundamental process of generating a coping strategy repertoire from which alcohol is chosen. This study will serve as an important step toward understanding the effect of anxiety on the ability to generate coping strategies in current drinkers. How anxiety affects individuals' ability to generate and appraise coping strategies, including alcohol, is valuable information for understanding how and for whom casual alcohol use develops into dependence.

Alcohol Use to Regulate Emotions

Many theories used to explain the comorbidity between alcohol use and anxiety disorders assert that people utilize alcohol in order to cope with negative emotional states (e.g., self-medication, Khantzian, 1997; 2003; stress-response dampening model, Sher & Levenson, 1982; tension reduction theory, Conger, 1951). The motivational model (Cooper, 1994; Cox & Klinger, 1988) in particular posits that people use alcohol in order to achieve a desired effect, and reaching that goal reinforces the alcohol use behavior. Therefore, motives for alcohol use can be distinguished based on the valence of reinforcement (positive or negative) and source of reward (internal or external), resulting in four distinct motives: enhancement (internal, positive), coping (internal, negative), social (external, positive), and conformity (external, negative). In line with previous theories, coping motives (i.e., drinking to alleviate negative affect) would be expected to play a primary role for those with co-occurring anxiety-related psychopathology. To date, this hypothesis has been primarily tested through assessing people's self-reported drinking motives and whether alcohol consumption actually produces these desired changes in mood.

Research on self-reported drinking motives repeatedly finds associations between drinking to cope and heavy alcohol use (e.g., Cooper, Agocha, & Sheldon, 2000; Labouvie & Bates, 2002), alcohol-related problems (e.g., Cooper, Frone, Rusell, & Mudar, 1995; Kuntsche, Knibbe, Gmel, & Engels, 2005; McNally, Palfai, Levine, & Moore, 2003; Simons, Correia, & Carey, 2000), and symptoms of alcohol dependence (e.g., Carpenter & Hason, 1998a, 1998b, 1999). Coping drinking motives have also been linked to various types of anxiety and shown to mediate the relationship between anxiety and alcohol problems (DeMartini & Carey, 2011; Kuntsche, Knibbe, Gmel, & Engels, 2006; Lewis et al., 2008). Research has also explored whether alcohol has specific effects on people's mood, as the motivational model would suggest.

While laboratory-based studies exploring alcohol's direct impact on mood have been mixed (for review see, Curtin & Lang, 2007), recent work using ecological momentary assessment (Gorka, Hedeker, Piasecki, & Mermelstein, 2017) found that individuals high in anxiety see more robust decreases in negative mood and increases in positive mood after consuming alcohol when compared to those low in anxiety. Such research also aligns with neurobiological studies linking alcohol's influence on mood through neurotransmitter activation. Specifically, increases in gamma-aminobutyric acid (GABA) can lead to anxiolytic effects, whereas increases in dopamine and endogenous opioids can produce euphoric effects in early stages of alcohol consumption (Davies, 2003; Mitchell, O'Neil, Janabi, Marks, Jagust, & Fields, 2012; Tabakoff & Hoffman, 2013). Taken together, these findings support the notion that those with anxiety can hold coping drinking motives and see mood-related reinforcing effects from alcohol.

While this body of research helps to explain motivations to use alcohol in those with elevated anxiety, it lacks the specificity necessary to identify which individuals using for this reason will progress to an alcohol use disorder, and dependence symptoms in particular. Menary and colleagues (2011) found that people with anxiety disorders who reported self-medication with alcohol were at a greater risk for developing alcohol dependence, and that this relationship was partially mediated by quantity of alcohol consumed. Because alcohol use was a partial mediator, there are likely other unknown mechanisms that explain the transition to dependence for these individuals with anxiety. The self-regulation field may provide insight into these unknown mechanisms.

Self-Regulation and Motivation

Recently, Köpetz and colleagues (2013) issued a call for convergence between addiction and the study of self-regulation and motivation. The field of motivation has sought to explain

why people behave the way they do (Allport, 1937; Kruglanski & Köpetz, 2009), with self-regulation being the process by which people “translate motivation into action” (Köpetz et al., 2013, p. 7). More specifically, self-regulation involves setting a goal (i.e., a desirable end state), selecting appropriate means (i.e., behavioral plans perceived useful for goal attainment), and enacting those means (Carver & Sheier, 2011). From a social-cognitive perspective, goals are mental representations and thus governed by general cognitive principles (e.g., accessibility, interconnectedness; for a review see Kruglanski & Köpetz, 2009). This suggests goals are activated by internal or external cues, hold motivational value (i.e., desirability) that influences goal commitment (i.e., determination to pursue goal), and produce emotional reactions upon goal attainment (Fishbach et al., 2004; Köpetz et al., 2013). Furthermore, from this perspective goal constructs also retain associations with behaviors (i.e., means) needed to attain the goal, facilitating effective and repetitive choices for goal attainment (Huang & Bargh, 2014; Köpetz et al., 2015). Thus, when goals are repeatedly achieved a *transfer of affect* occurs from the goal (i.e., its motivational value/desirability) to the mean (Fishbach et al., 2004), which can result in previously neutral or aversive behaviors becoming desirable. This process has been labeled the principle of emotional transfer (PET). The PET suggests that “behaviors (or means) acquire affect (or value) in direct proportion to (a) the importance of the goal that they serve and (b) the strength of the association between the behavior and the goal” (Köpetz et al., 2013, p. 10). A study assessing the generation of work-related goals and means found support for this principle (Kruglanski et al., 2011). They found that as the number of means increased, the less commitment people had to those individual means, and that the relationship between number of means and goal commitment (i.e., effort intended to invest in goal pursuit) was mediated by goal importance and likelihood of goal attainment.

The self-regulation and motivation theories described thus far are not inconsistent with existing behavioral learning theories. At first, when a goal is activated, working towards that goal can require intentional, conscious choices on the means to be used. As means are enacted, instrumental conditioning occurs, reinforcing those that successfully facilitate goal attainment. Instrumental conditioning is the process by which the probability of a behavior occurring in the future is either increased or decreased based on its consequences (Skinner, 1953). Thus, means that enable goal attainment will be more likely to be utilized again in the future. Once this initial learning happens, the process of goal pursuit through these means becomes more automatic over time, particularly under similar situational conditions (Aarts & Dijksterhuis, 2000; Bargh & Chartrand, 1999; Bargh, Lee-Chai, Barndollar, Gollwitzer, & Trotschel, 2001).

The PET suggests that the motivational and affective properties experienced upon repeated goal attainment transfer to the means, allowing them to gain, or change, their value. On the surface this process appears to be evaluative conditioning, which is when the liking of a conditioned stimulus (CS) is changed based on whether the unconditioned stimulus (US) to which it is paired is liked or disliked (De Houwer, 2007). However, proponents of the PET suggest that the value gained by the affective properties transferred are not specific to subjective “liking,” but rather characterized by the possible positive consequences of enacting the mean (Köpetz et al., 2013). Evaluative conditioning has also been described, perhaps more broadly, as learning the motivational and affective properties of a stimulus (US, and by association, the CS; Balleine, 2011), which can then facilitate a secondary learning – incentive learning. Incentive learning is how we come to “assign value to the consequences or goals of goal-directed action” through direct experience (Balleine, 2011; Dickinson & Balleine, 1994). These processes appear more in line with the transfer of affect described in PET. It may also help to understand the

decision-making processes behind choosing a goal-directed action when we have learned that multiple actions could lead to successful goal attainment.

This proposed two-part instrumental learning process begins when an action is paired with an outcome. The outcome (and its features) is then paired with a physiologically based motivational system. This system mediates an affective feedback that then occurs and becomes paired with the outcome upon further presentations, ultimately changing the incentive value of the instrumental action. This process was described by Balleine (2011) within the context of taste aversion, such that lever pressing (action) led to a sugar solution (outcome/CS), which was then followed by an injection (US) that produced illness (UR). It is proposed that the sugar solution became paired with the rats' motivational system sensitive to illness, which then triggered the negative affective feedback loop (disgust response) upon future presentations of the sugar solution resulting in decreased lever pressing. While this model is framed within biologically relevant events, its inclusion of an organism's underlying motivational system opening an affective feedback loop to modulate goal-directed action appears more aligned with the proposed processes of the PET than evaluative conditioning alone, which draws primarily in human research on subjective "liking" (De Houwer, Thomas, Baeyens, 2001).

Therefore, what has been claimed to be unique about the PET – its specification of the mechanism (i.e., transfer of motivational value/*means valuation*) by which means gain incentive value (Kopetz et al., 2013) – does not appear to be completely novel. What could be argued as additive from the PET is the concept that means valuation can lead to the mean gaining its own motivational pull over time, ultimately becoming its own goal to be pursued outside of the original goal-directed motivated action in which it was established. The PET, and its situation within a broader social-cognitive framework, also acknowledges that the quantity and quality of

means valuation is influenced by the number of competing means and goals, the importance of the goal, and how the goal is perceived (Fishbach et al., 2004). These cognitive and affective processes (reviewed in Fishbach et al., 2004; Köpetz et al., 2013), though facilitated by classical and instrumental learning, appear to be more complex and unique to the human experience.

The PET has been discussed as a way to understand why some individuals utilize self-defeating behaviors (e.g., substance use) as a mean toward “successful” self-regulation (Köpetz & Orehek, 2015); more specifically, it may explain how people transition from casual alcohol use to dependence (Köpetz et al., 2013). From this perspective, if someone suffering from anxiety thinks that it is important to reduce their anxiety (the goal), and they believe alcohol (the mean) is their only way of achieving this, they will be more likely to develop an alcohol use disorder. This is because the association between alcohol use and anxiety reduction will be strong, allowing the affective properties of the goal to be transferred upon successful goal attainment. From the PET perspective, the value being acquired references the incentive value of alcohol use based on its perceived positive consequences. This is conceptualized as a separate, but parallel process to the incentive processes occurring neurobiologically from alcohol use (Köpetz et al., 2013). The increased valuation of alcohol can ultimately lead to alcohol use becoming its own motivational force (i.e., engaging in alcohol use outside of times when needing to reduce anxiety), which could progress to an alcohol use disorder. In contrast, if the person is able to identify multiple methods of reducing their anxiety, they will be less likely to become alcohol dependent because the affective value of the goal will be dispersed among the means. In other words, it will be less likely that any one of the means will become highly valued and utilized over the others.

Effects of Anxiety on Self-Regulatory Resources

In considering the PET, the question remains of why some people would be able to generate more means than others. It could be that this ability is tied to their self-regulatory resources. The availability of self-regulatory resources fluctuates based on current states (e.g., stress level, amount of other regulation attempts; Baumeister & Heatherton, 1996; Gailliot et al., 2007), so it would follow that an individual's mean generation capacity would fluctuate along with them. This connection could help explain why there is such variability in whether someone chooses to seek out or abstain from alcohol use in varying contexts.

Such consideration of context has recently been applied to understanding self-regulation's role as a mechanism of change in addiction treatment. Roos and Witkiewitz's (2017) proposed model incorporates both the broad (e.g., person-level characteristics, environment) and immediate situational contexts (e.g., internal states, fluctuating environmental features), which shape whether or not certain self-regulation skills are implemented and effective in preventing addictive behavior. They specifically suggest that, "cognitive functioning or psychiatric symptoms may influence or interfere with one's ability to competently and appropriately execute self-regulation skills" (p. 121). Therefore, it stands to reason that these same contextual factors would impact self-regulation abilities during the *development* of a substance use disorder, especially for those with co-occurring psychopathology.

For individuals with elevated anxiety, their momentary fluctuations in mood may limit their immediate cognitive abilities, thus hindering their generation, selection, and execution of anxiety reduction strategies. Studies of trait and experimentally induced anxiety find that anxiety does in fact impact neuropsychological functions, including a narrowing of attention and impairment in cognitive flexibility (Airaksinen et al., 2005; Diaper et al., 2012; Najmi et al.,

2012; Toren, et al., 2000; Vytal et al., 2012). If these individuals also become triggered to drink alcohol from internal cues of anxiety (e.g., experience an increase in craving; are motivated to drink to cope with negative affect), they might have an even more restricted coping repertoire. For some, alcohol may become the only strategy they think of when needing to achieve an anxiety down-regulation goal.

Effects of Alcohol on Self-Regulatory Resources

Alcohol use has also been connected to self-regulatory resources, such as executive functioning (e.g., Noel, Bechara, Dan, Hanah, & Verbanck, 2007; Noel et al., 2005) and working memory (Bechara & Martin, 2004; Goudriann, Oosterlaan, de Beurs, & van den Brink, 2005). For example, Houben, Wiers, and Jansen (2011) used a working-memory training program to enhance the cognitive resources of heavy drinkers and found that it decreased their alcohol consumption. Therefore, high levels of anxiety could be taxing on cognitive resources, restricting the ability to generate multiple options for anxiety reduction. For people who drink alcohol, this could lead to impairment in searching for other methods of anxiety reduction. Ultimately, it would be these individuals who (a) more strongly value alcohol as a mean to reduce anxiety, and (b) are at greater risk for developing problematic alcohol use. Once set, this problematic pattern is likely maintained because as their alcohol use increases, the ability to self-regulate may be hindered by state anxiety, any predisposing self-regulatory deficits (e.g., response inhibition, memory; Finn & Hall, 2004; Nigg et al, 2006), as well as the neurobiological impairments from chronic heavy alcohol use.

Another factor affecting alcohol users' ability to search for alternative means could be their automatic drive toward alcohol in response to stress. Interestingly, the same neural pathways have been implicated in both the regulation of emotions and craving (Kober, et al.,

2010). Laboratory studies further support this connection, such that negative affect inductions increase participants' self-reported craving of alcohol (Fox et al., 2007; Schlauch et al., 2013). On a more implicit level, experimental manipulations of mood also increase alcohol approach tendencies, and attentional bias to alcohol cues for those with drinking-to-cope motives (Cooney et al., 1997; Field & Powell, 2007). These findings suggest that individuals who use alcohol may experience increased craving or alcohol approach tendencies when anxious, which could influence the coping strategies they choose.

Present Study

Taken together, the literature suggests that the PET might be a valuable lens through which to examine why certain individuals with anxiety move from casual alcohol use to dependence. More specifically, the contextual influence of state anxiety may have a large impact on an individual's ability to generate self-regulatory means, as well as what kind of means they select (e.g., alcohol use). Over time, a coping-motivated pattern of drinking would be strengthened until, barring intervention, drinking becomes its own self-regulation goal (i.e., alcohol dependence). Thus far, research has examined mean generation abilities and means commitment for personal goals (e.g., school/work performance, keeping fit; Fishbach et al., 2004; Kruglanski et al., 2011). However, no study has explicitly measured the ability to generate means to regulate anxiety. The effect of state anxiety on the generation, content, and appraisal of anxiety reduction strategies is also yet to be explored.

Therefore, the current study sought to test the emotional transfer principle's applicability to explain drinking (i.e., mean) to cope with anxiety (i.e., self-regulation goal). The specific aims were to: 1) determine the effects of an anxiety induction on the amount, content, and commitment to means (i.e., anxiety reduction strategies) generated, 2) determine the effects of an

anxiety induction on the level of craving for alcohol, and 3) assess how an individual's coping drinking motives influence this process. It was hypothesized that those in the high anxiety condition (vs. low anxiety condition) would generate fewer means to reduce anxiety (H1), list alcohol as a mean more frequently (H2), and have greater commitment to the means generated (H3). Furthermore, the number of means generated was hypothesized to mediate the relationship between anxiety condition and means commitment, such that those in the high anxiety condition would generate fewer means, and the decreased number of means would lead to an increased commitment to the alcohol use mean (H4). Participants in the high anxiety condition were also hypothesized to report higher levels of alcohol craving (H5) compared to the low anxiety condition. Finally, drinking motives were hypothesized to moderate the relationship between anxiety and alcohol mean generation. Specifically, participants in the high anxiety condition with greater drinking to cope scores would generate an alcohol mean more often (H6) compared to those in the low anxiety condition, while conditions would not differ for those with lower drinking to cope scores.

Method

Design Overview

This experiment utilized a between-subjects design in which participants underwent a script-based mood induction procedure (high anxiety vs. low anxiety). Stratified random assignment by gender determined participants' experimental condition. Both procedures consisted of participants rating their pre-induction subjective experience (e.g., anxiety, fear, tension, happiness), followed by listening to a script designed to produce anxiety (high or low). They then rated their post-induction anxiety, responded to a prompt eliciting anxiety reduction coping strategies for the script, and reported their commitment to using those strategies. Finally,

participants listened to a follow-up script to ensure persistence of induced anxiety and rated their current level of alcohol craving. After the experimental manipulation, the researcher conducted a brief follow-up interview to obtain additional information about the participant's responses to the prompt. Prior to the experimental manipulation, participants also completed a self-report measure of drinking motives to assess possible moderating effects.

Participants

Participants were 76 young adults (76.3% women) aged 18-24 years ($M = 19.24$, $SD = 1.22$) recruited from the University of Arkansas Psychology Subject Pool ($n = 66$) and larger University of Arkansas student population ($n = 10$). To maximize likelihood of response to the mood-induction script, participants were recruited based on responses to the anxiety facet of the neuroticism subscale as assessed by the Big Five Inventory (BFI; John & Srivastava, 1999). For inclusion in the study, participants had to score greater than or equal to average anxiety facet scores (adjusted for gender differences), or positively endorse at least one of the anxiety facet items. Because an aim of the study was to assess factors predicting generation of alcohol use as a mean to reduce anxiety, participants had to be current drinkers. Inclusion criteria for the study was the use of alcohol at least once in the past 30 days, based on the response to the question, "*how many days have you had alcohol in the past 30 days?*" These criteria were assessed via a phone screening with 417 interested subjects; 261 were excluded at this stage.

To further screen for participant eligibility, the Alcohol Use Disorders Identification Test (AUDIT, Babor et al., 2001) and select modules of the Mini International Neuropsychiatric Interview (MINI, Sheehan et al., 1998) were utilized once participants arrived to the lab. Subjects were excluded from the study based on evidence of: 1) alcohol or illicit substance use prior to the study session, 2) inability to complete study session without access to nicotine, 3)

score >20 on the AUDIT; 4) suicidality; 5) meeting diagnostic criteria for bipolar disorder, schizophrenia, or psychotic disorder; and 6) limited mental competency, as evidenced by an inability to give informed, voluntary, written consent to participate. Responses that indicate uncertainty on any of the interviews (e.g., “I don’t know,” “I can’t remember,”) were treated conservatively as a positive endorsement, and those subjects were excluded. Participants below the legal drinking age were not excluded, as this study seeks to explain processes underlying the transition from casual to problematic alcohol use, which has been shown to develop most frequently from late teens to early twenties (Grant et al., 2015; Hasin et al., 2007). Of the 118 participants brought to the lab, 42 were deemed ineligible based on these criteria.

Finally, data from seven participants in the high anxiety condition were excluded from primary data analyses due to non-response to the anxiety manipulation (i.e., VAS-A score decreased or remained the same from pre- to post-manipulation). Thus, the final sample was 69 participants (76.8% women) ranging in age from 18-24 years ($M_{age} = 19.26$, $SD = 1.26$). The sample was primarily non-Hispanic White (85.5%). For a complete summary of participant flow through the study, see Figure 1.

Materials and Stimuli

Background and Demographic Characteristics.

Participants self-reported age (must have been 18-25 years old), gender, race/ethnicity, and educational attainment. To further describe the psychopathology of the sample, participants completed a 21-item measure with a subscale assessing current depression symptoms (Depression, Anxiety, and Stress Scales-21; Lovibond & Lovibond, 1995), as anxiety and depression often co-occur. For a demographic summary of the sample, see Tables 1 and 2.

Screening Measures for Eligibility.

Trait Anxiety. The BFI (John & Srivastava, 1999) is a 44-item self-report questionnaire assessing an individual's personality across the Big Five dimensions on a 1 (*disagree strongly*) to 5 (*agree strongly*) scale. The BFI has five domains (i.e., openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism), each comprised of two facets (Soto & John, 2009). At the beginning of recruitment for this study, participants needed a neuroticism average score of 3.27 or greater, based on data examining mean neuroticism scores across young adulthood (Srivastava, John, Gosling, & Potter, 2003). However, due to a high rate of subjects screening out it was decided that the inclusion criteria would be widened. Specifically, instead of using the neuroticism domain score, which includes anxiety and depression facets, only the anxiety facet score was used. The 10 BFI facet scores have been shown to demonstrate good reliability and construct and discriminant validity (Soto & John, 2009). Participants' anxiety facet scores were obtained by summing their responses to the 4 facet items from the neuroticism subscale (e.g., "*worries a lot*," "*gets nervous easily*"). Inclusion criteria varied by gender due to research suggesting that women tend to score higher than men (e.g., Lehmann, Denissen, Allemand, & Penke, 2013; Schmitt, Realo, Voracek, & Allik, 2008). Based on average anxiety facet scores found by Feldt, Lee, and Dew (2014), as well as data from gender comparison studies, women needed a sum score at or above 12 and men needed a sum score at or above 10. Participants were also included if they positively endorsed (i.e., score of 4 or 5, accounting for reversed scored items) at least one of the anxiety facet items. Previously screened out subjects who now met the criteria were contacted and offered inclusion in the study.

Past-Month Alcohol Use. To assess participants' current alcohol use and related problems they responded to the question, "*how many days have you had alcohol in the past 30*

days?” and completed the AUDIT (Babor et al., 2001). The AUDIT is a 10-item self-report questionnaire assessing past year alcohol use and problems; a total score for alcohol problem severity is found by summing the items, with higher scores indicating greater severity.

Individuals who reported no alcohol use in the past month, or scored higher than 20 were excluded from the study.

Severe Psychopathology. To assess exclusionary psychopathology, select modules of the MINI (version 7; Sheehan et al., 1998) were administered. The MINI is a structured diagnostic interview in which participants are asked diagnosis-specific questions to which they answer “yes” or “no.” If participants endorsed the specified number of questions on the following modules so as to indicate meeting diagnostic criteria, they were excluded from participation: suicidality, bipolar disorders, and psychotic disorders.

Coping Drinking Motives.

Coping drinking motives were measured with the coping subscale of the 20-item Drinking Motives Questionnaire–Revised (DMQ-R; Cooper, 1994). The DMQ-R assesses four types of motivations for using alcohol: social ($\alpha=.92$; *it helps you enjoy a party*), coping ($\alpha=.91$; *to forget your worries*), enhancement ($\alpha=.95$; *it’s exciting*), and conformity ($\alpha=.91$; *so you won’t feel left out*; Ham, Zamboanga, Bacon, & Garcia, 2009). Participants self-report how frequently their alcohol use is motivated by each reason, ranging from 1 (*almost never/never*) to 5 (*almost always/always*). Each subscale is comprised of five items, which are summed to determine subscale scores. Reliability and validity of the DMQ-R is well-established (e.g., Cooper, 1994; Martens, Rocha, Martin, & Serrao, 2008).

Anxiety-Induction Scripts.

Script-driven imagery has been shown to reliably induce specific emotional states with both personalized scripts (e.g., Garrison, Coyle, Baggott, Mendelson, & Galloway, 2010; Rauch et al., 1996) and standardized scripts (e.g., Buff et al., 2018, Raghunathan & Pham, 1999). Standardized scripts were utilized to control for variability of imagined anxiety-provoking situations across participants, which could impact types of coping means generated. The scripts were constructed based on McTeague and Lang's (2012) bioinformational theory of emotional imagery. Therefore, the high and low anxiety scripts (see Appendix A and B) described the same basic event but varied based on specific anxiety-related stimulus (i.e., context cues), meaning (i.e., semantic context cues), and response (i.e., behavioral, physiological) representations.

The scripts were written in second person and present tense to increase the ease with which participants could imagine themselves in the situation. Both scripts lasted approximately two minutes, were read by a gender-neutral voice, and presented via headphones. Participants listened to the scripts in a private setting with the researcher in an adjacent room. They were instructed to close their eyes, imagine themselves in the scene, and focus on the sensory details described. Next, participants were asked to imagine it's Friday and they go to campus to take an important exam. Upon arriving home that night, they receive a phone call from the academic integrity monitor stating that allegations of academic dishonesty have been made against them and they will need to report to a meeting on Monday.

Multiple considerations went into determining the type of anxiety-provoking event utilized in the scripts. One goal was to use a transdiagnostic anxiety stimulus, in comparison to a manipulation drawing on a particular form of anxiety (e.g., social anxiety, performance anxiety). It was also important to choose an event that would be relevant for the entire sample of

participants, which were university students. Considering these factors, it was determined that a school-related event would be used (i.e., taking an important exam followed by an accusation of cheating) and the reactions described would draw from common symptoms across anxiety disorders (e.g., physiological responses, worry, fear of negative evaluation). There was also a need for the event described to leave open the possibility for a variety of possible coping strategies, including alcohol use. Therefore, the accusation of cheating was said to occur on a Friday evening, while the student was at home, and that the next step for the student would be to attend a meeting about this on Monday. It was hoped that by having this event occur at the start of a weekend – a time they may have less options to directly address the problem (e.g., professors/school officials less accessible) – that participants might be more varied in the types of strategies they would consider and more likely to imagine coping with alcohol use.

To ensure persistence of induced mood when completing outcome measures, participants also listened to a follow-up script (see Appendix C and D). It was presented after state anxiety ratings, means generation, and commitment ratings and prior to providing their current alcohol craving. The follow-up script lasted thirty seconds and instructed the participant to again imagine the meaning and response representations from the original script (e.g., “*Your chest feels tight and your whole body is shaking. You’re thinking that will get kicked out of school.*”).

Scripts utilized in this study underwent three rounds of piloting to small samples of undergraduate research assistants working within the Department of Psychological Science. The research assistants participated on a volunteer basis and did not undergo the full study procedures. They were asked to complete pre-script mood ratings (see Subjective State Anxiety section below for a description of ratings scales), were then presented with the imagery instructions, listened to one of the two scripts (either the high or low anxiety version), and then

completed post-script mood ratings. This procedure lasted approximately five minutes and was completed through an online survey. The first round of data revealed that both scripts raised anxiety by approximately 8 points on a 0-100 scale, with both conditions' average anxiety post-script in the 30s. The scripts underwent multiple changes to their anxiety-related stimulus, meaning, and response representations in attempts to further exaggerate the differences between the high and low anxiety conditions (e.g., high anxiety changed from “chest feels so tight” to “like an elephant is sitting on your chest;” low anxiety changed “chest is heavy” to “heaviness in your chest lightens”). After the third round of piloting, responses indicated that the high anxiety script increased anxiety, on average, 34 points (vs. 20 points for low anxiety), with an average anxiety rating post-script of 61 (vs. 43). Statistical tests of differences were not conducted due to limited power from the small sample sizes. This third version of the scripts were used in this study (see Appendix A and B).

Subjective State Anxiety.

Visual analogue scales (VAS), measures well-established in mood induction studies (e.g., Garrison et al., 2010; Montorio, Nuevo, Cabrera, Marquez & Izal, 2015), were administered to check that the experimental manipulation increased subjective experiences of anxiety. Participants selected the point on a horizontal line that best reflected the level of anxiety, and related experiences (i.e., tension, nervousness, fear, anger, relaxation, and happiness), felt at the current moment from 0 (*not at all*) to 100 (*the most ever*). Participants' anxiety was assessed by averaging scores on three items (i.e., anxiety, tension, nervousness; further denoted as VAS-A); these were completed pre- and post-script (i.e., initial and follow-up) presentation. Reliability analyses revealed excellent internal consistency for pre-VAS-A ($\alpha = .917$) and post-VAS-A ($\alpha = .944$) variables. Prior to a follow-up interview, participants provided retrospective ratings of their

peak level fear, anger, relaxation, and happiness during the anxiety induction. These VAS scores served as an additional manipulation check. Finally, to evaluate the necessity for relaxation techniques prior to completion of the study, participants again completed the anxiety VAS to ensure a reduction in state anxiety had occurred.

Means Generation and Commitment.

Participants responded on a computer to a prompt designed to tap into the goal of anxiety reduction where alcohol use could be a mean. The prompt was presented at the end of the anxiety-induction script and read, “*You’ve just hung up the phone with the academic integrity monitor. What can you do to manage your feelings after this call?*” Preliminary data for this project found that young adults ($N = 300$) generated from 1-7 ($M = 3.02$, $SD = 1.29$) strategies when asked how they could reduce anxiety with an open-response format (“*You’re at home on a Friday evening and start feeling anxious. What can you do to reduce your anxiety?*”).

Participants’ responses to the prompt were counted in order to obtain the number of means.

Responses to the prompt also underwent a coding procedure to classify whether the participant did (coded as 1) or did not (coded as 0) list alcohol use as a mean. In line with previous research by Kruglanski et al. (2011), participants’ commitment to the means generated were evaluated by having them rate on a scale ranging from 1 (*not at all annoying/irritating*) to 7 (*very annoying/irritating*), how irritated or upset they would feel if they were not able to attain their goal (i.e., anxiety reduction) by the individual means. Commitment ratings were obtained for each mean the participant generated.

Alcohol Craving.

Participants’ craving for alcohol in response to the anxiety induction was assessed on a 100-point Craving VAS (adapted from Fox et al., 2007); they indicated their current desire to

drink from 0 (*not at all*) to 100 (*extremely high*). Participants completed these ratings after they generated and rated their anxiety reduction means, so as to not influence what means they generated.

Vividness of Script-Driven Imagery.

To measure the extent to which participants were able to imagine themselves in the script, they completed a vividness VAS. Participants rated the vividness of their script-driven imagery from 0 (*not at all*) to 100 (*extremely high*). Participants indicating a score of zero on vividness were to be excluded from analyses; however, no participants rated vividness as zero.

Follow-up Interview.

Participants completed a brief interview following the anxiety induction procedure and ratings. To ensure they paid adequate attention to the directions, the experimenter asked participants what they remembered about the prompt. To assist in the coding of generated mean responses, participants were asked to elaborate on unclear responses (e.g., those in which the strategy, such as “go out with friends,” may or may not be alcohol use related; typographical errors). First, an open-ended prompt (“Tell me about what you meant when you listed ‘go out with friends’?”) was asked, followed by a brief set of questions to probe further as needed (e.g., “What would you do while ‘out with friends’?”). Trained raters independently coded interview responses to determine whether strategies did or did not involve alcohol use. Inter-rater reliability was 98.75%. When raters did not agree, a third rater determined the final coding.

Procedures

A multi-media recruitment strategy was employed, utilizing flyers on campus and in the community, advertisement via email to potentially eligible college students identified via the departmental psychology subject pool prescreener, and online advertisements. Interested

participants contacted the lab for a brief telephone screening, at which time initial exclusionary criteria were assessed by asking their age, gender, past month alcohol frequency, ability to refrain from nicotine use throughout the study session, and administering the neuroticism subscale of the BFI. Potentially eligible participants were then invited to attend the laboratory-based session. All laboratory sessions were conducted at 2:00 pm or later for two reasons: 1) to increase the probability of participants generating an alcohol use coping strategy and 2) because stress-related hormone levels vary throughout the day (Lovallo, Farag, & Vincent, 2010; Vedhara et al., 2003).

Upon arrival to the laboratory, informed consent was reviewed and obtained. Participants then completed a formal assessment for eligibility, including alcohol use behavior (i.e., past 30 day use, AUDIT) and a brief structured diagnostic interview (i.e., select modules from the MINI). If found to be ineligible, participants were compensated for the time spent in the lab and provided mental health resources.

Eligible participants were sat at a table in front of a computer and then completed self-report measures, including demographics, drinking motives (DMQ-R), and initial affective VAS scores (i.e., anxiety, tension, nervousness, fear, anger, relaxation, and happiness). Next, the researcher provided them with headphones and gave instructions for completing the script-driven imagery and subsequent self-report measures on the computer. All participants were provided the opportunity to have any questions addressed and informed they could discontinue the procedure at any time without penalty. Participants were randomly assigned (stratified by gender) and blind to experimental condition.

The researcher then left the experimental area and the script recording began. The researcher was able to view the participant's progress on a connected desktop computer in a

private adjoining space in the experimental room. The script-driven imagery lasted two minutes, followed by the post-induction VAS-A (i.e., anxiety, tension, nervousness) ratings. Participants then responded to the mean generation prompt and rated their commitment to the means they generated. Next, they listened to the follow-up script, provided VAS-A ratings, and reported their current desire to drink alcohol. Participants then provided retrospective peak affect ratings during the script-driven imagery presentation. Upon completion of the experimental phase, the experimenter re-entered the experimental area and informed participants that the computerized tasks were complete.

The researcher then conducted the follow-up interview. Participants were asked what they remembered about the prompt and had a chance to elaborate on any means they generated that were unclear to the researcher (e.g., clarifying if “go out with friends” includes the use of alcohol). Upon completion of the follow-up interview, participants provided a final anxiety VAS rating to ensure their state anxiety had returned to baseline. If participants’ anxiety remained elevated, they were guided through a breathing retraining-based relaxation task. Participants were fully debriefed on the purpose and procedures of the study and compensated for their time. Participants from the subject pool were compensated with course credit (i.e., 0.5 credits per 30 minutes); participants recruited outside the subject pool received \$5 per 30 minutes. All study procedures were approved by the University of Arkansas Institutional Review Board (see Appendix E).

Data Analytic Plan

Preliminary Analyses

Data were analyzed for missing values, outliers, and normality. Craving VAS ranged from 0 to 70 ($M = 10.06$, $SD = 15.40$) and was non-normally distributed with skewness of 1.86

($SE = .29$) and kurtosis of 3.47 ($SE = .58$); a square root transformation was conducted. Means and standard deviations presented are the original, untransformed values. Analysis of histograms and skewness and kurtosis suggested all other outcome variables were normally distributed, with no significant outliers. Missing data, when present, was in $< 5\%$ of cases so pairwise exclusion was utilized for analyses.

Descriptive statistics for all study variables were obtained (see Tables 1 and 2).

Independent-samples t -tests and Pearson's Chi-Square tests were used to compare conditions on demographics and background variables. Finally, pre-post difference scores on the VAS-A were compared by condition using independent-samples t -tests as a manipulation check on the script's ability to increase anxiety more so in the high anxiety condition.

Primary Aims

To examine whether predicted effects of anxiety condition occurred, a series of one-tailed independent-samples t -tests were conducted for the following dependent variables: number of means generated (H1), average commitment to the means (H3), and craving (H5). One-tailed t -tests were chosen based on power analyses using effect sizes found by Kruglanski et al. (2011) while examining relationships between mean set size and commitment for work-related goals. To test H2, a two-sided Fisher's exact test was conducted to assess whether there was a significant difference in proportion of participants listing alcohol as a mean (yes/no) for the high and low anxiety groups. The Fisher's exact test was chosen over a chi-square test due to small cell sizes.

A mediation analysis using Hayes' (2012) PROCESS macro (embedded in SPSS v. 23) model 4 with bias-corrected bootstrapping (with 5000 replicates) was planned to examine the mediating effect of number of means (M) on the relationship between anxiety (X) and alcohol mean commitment (Y) (H4). However, only 6 participants (5 in low anxiety and 1 in high

anxiety condition) generated alcohol use as a mean and, therefore, had alcohol mean commitment ratings. Due to this low frequency, H4 could not be tested.

Secondary Aim

To determine the extent to which the relationship between anxiety condition and listing alcohol as a mean (H6) differ based on coping drinking motives, a moderation analysis using Hayes' (2012) PROCESS macro was planned. As with H4, due to the low frequency of the outcome variable of interest H6 could not be tested.

Results

High and low anxiety conditions did not significantly differ on the following variables: age, gender, race/ethnicity, educational attainment, BFI anxiety facet score, depression, number of drinking days in the past month, AUDIT score, and drinking motives (see Tables 1 and 2). Despite random assignment, there was a significant association between the recruitment source and what experimental condition they were assigned ($p = .045$, OR = 5.06, two-sided Fisher's exact test). Those recruited from the larger student population ($n = 8$ out of 10; 80%) were 5.06 times more likely to be assigned to the low anxiety condition than the participants from the Psychology Subject Pool ($n = 26$ out of 59; 44.1%). These results suggest partial effectiveness of stratified random assignment. When assessing the entire data analytic sample ($n = 69$), participants reported on average 3.30 means ($SD = 1.57$), with a range from zero (i.e., one participant reported they would be nervous, but did not list coping strategies in initial open-response format to prompt) to 8 means generated. Descriptive statistics of outcome variables by anxiety condition for hypotheses 1, 3, and 5 (i.e., number of means generated, average commitment to means, alcohol craving) are presented in Table 3. For a complete summary on types of means generated by participants, see Table 4. Overall, participants' most common

strategies included contacting family and friends for support or guidance, problem solving/preparation, and taking deep breaths.

Anxiety Manipulation Check

An independent-samples t-test was conducted to assess for effectiveness of the mood induction to increase anxiety significantly more in the high anxiety condition. Contrary to predictions, participants' VAS-A difference scores did not significantly differ between the high ($M = 29.59, SD = 24.86$) and low ($M = 25.23, SD = 22.03$) anxiety conditions, $t(67) = -.77, p = .444, d = 0.19$. To assess whether state anxiety increased from the mood induction procedure, paired-samples t-tests examining pre and post VAS-A ratings were run for each condition. For the low anxiety condition, VAS-A scores were significantly higher post-manipulation ($M = 38.72, SD = 23.65$) than pre-manipulation ($M = 13.49, SD = 15.32$), $t(33) = -6.68, p < .001, d = 1.164$. Similarly for the high anxiety condition, VAS-A scores were significantly higher post-manipulation ($M = 44.90, SD = 26.01$) than pre-manipulation ($M = 15.31, SD = 16.71$), $t(34) = -7.03, p < .001, d = 1.189$. Taken together, the script-driven imagery procedure significantly increased participants' anxiety; however, there was no significant difference in the amount anxiety increased between the high and low anxiety conditions.

VAS ratings for fear, anger, relaxation, and happiness were examined to further describe the script-driven imagery's impact on participants' mood. Paired samples t-tests examining pre and peak VAS-A ratings were run for each condition. In both high and low anxiety conditions, participants' anger and fear significantly increased and their level of relaxation and happiness significantly decreased (see Table 5). Independent-samples t-tests assessing VAS difference scores for each of these emotions found no significant differences between the high and low anxiety conditions. For full summary of these VAS difference score analyses, see Table 6. These

findings suggest that the high and low anxiety scripts affected participants' mood similarly and in expected directions: anxiety, fear, and anger increased, whereas relaxation and happiness decreased.

Primary Analyses

H1 (Number of Means Generated).

A one-tailed independent-samples *t*-test showed that the number of means generated did not significantly differ between the high ($M = 3.37$, $SD = 1.44$) and low anxiety conditions ($M = 3.24$, $SD = 1.72$), $t(67) = -0.36$, $p = .361$, $d = 0.08$. Therefore, the hypothesis that the high anxiety condition would generate fewer means was not supported.

H2 (Generating Alcohol Use as a Mean).

Analyses found no significant difference between the proportion of participants in the high ($n = 1$ out of 35; 2.9%) and low ($n = 5$ out of 34; 14.7%) anxiety conditions that generated alcohol use as a mean ($p = .106$, Cramer's $V = .210$; two-sided Fisher's exact test). This is contrary to H2, which posed that more participants in the high anxiety condition would list alcohol as a mean than the low anxiety condition.

H3 (Commitment to Means).

Results of a one-tailed independent-samples *t*-test showed that participants in the high anxiety condition reported significantly greater commitment to the means generated ($M = 5.18$, $SD = 1.33$) compared to those in the low anxiety condition ($M = 4.35$, $SD = 1.58$), $t(67) = -2.36$, $p = .011$, $d = 0.57$. These findings are consistent with H3.

H5 (Alcohol Craving).

A one-tailed independent-samples *t*-test showed that alcohol craving did not significantly differ between the high ($M = 8.76$, $SD = 15.26$) and low anxiety conditions ($M = 11.36$, $SD =$

15.66), $t(64) = .77, p = .221, d = -0.17$. This does not support the hypothesis that those in the high anxiety condition would report higher levels of alcohol craving after the script-driven imagery procedure.

Supplemental Analyses

As the high anxiety condition did not increase participants' anxiety significantly more than the low anxiety condition, the two conditions were collapsed for additional analyses. Similar to original hypotheses, higher anxiety levels were hypothesized to predict generation of fewer means, higher commitment to those means, and greater alcohol craving. Hierarchical linear regressions were conducted examining whether post-induction anxiety predicted the number of means generated, commitment to means, and alcohol craving, while controlling for pre-induction anxiety.

Bivariate correlations were obtained for study variables and the following demographic characteristics: age, BFI anxiety facet score, depression, number of drinking days in the past month, AUDIT score, and coping drinking motives (see Table 7). Pre-induction anxiety was found to be significantly positively associated with post-induction anxiety, BFI anxiety facet scores, depression scores, and drinking to cope motives. Post-induction anxiety was not significantly related to the examined variables. When examining dependent variables, number of means generated was found to have a significant positive relationship with age and a negative relationship with AUDIT scores. No significant correlations were found with the means commitment outcome variable. Alcohol craving ratings after the anxiety manipulation were positively related to AUDIT scores, number of drinking days in the past month, and drinking to cope scores. Based on these findings, age and AUDIT scores were added as additional control variables for the regression examining means quantity; AUDIT and drinking to cope scores were

added to the regression examining alcohol craving. Though number of drinking days also had a significant relationship to craving, it was not included as a control variable. This decision was made to reduce redundancy in predictor variables, as the AUDIT includes an item assessing drinking frequency.

To conduct the hierarchical linear regressions, pre-induction anxiety (VAS-A) and other specified control variables were entered at the first step, with post-induction anxiety (VAS-A) entered on the second step. The criterion variables were number of means generated, average commitment to means, and VAS craving scores. Assumptions of univariate and multivariate normality, linearity, and normally distributed errors were checked and met.

Number of Means Generated

When pre-induction VAS-A, age, and AUDIT scores were entered, they significantly predicted the number of means generated, $F(3, 68) = 2.93, p = .040, R^2 = .119$. Therefore, 11.9% of the variance in means quantity could be explained by knowing these factors. Specifically, AUDIT scores were a significant predictor of number of means generated, $\beta = -.246, t(65) = -2.11, p = .038$, such that greater AUDIT scores predicted fewer means generated in response to the anxiety induction. Age and pre-induction VAS-A scores were not significant predictors (see Table 8). When post-induction anxiety ratings were added to the model, it did not significantly improve prediction, $\Delta R^2 = .000, \Delta F(1, 64) = .01, p = .928$. All variables together did not significantly predict number of means generated, $F(4, 68) = 2.16, p = .083, R^2 = .119$.

Commitment to Means.

Contrary to hypotheses, post-induction anxiety did not significantly predict means commitment, controlling for pre-induction anxiety. Results are presented in Table 8.

Alcohol Craving.

When pre-induction VAS-A, AUDIT scores, and drinking to cope motives were entered, they significantly predicted alcohol craving, $F(3, 65) = 6.83, p < .001, R^2 = .248$. Therefore, 24.8% of the variance in alcohol craving could be explained by knowing these factors. AUDIT scores were a significant predictor of alcohol craving at this step, $\beta = .363, t(62) = 2.71, p = .009$. Coping drinking motives and pre-induction anxiety were not significant predictors of alcohol craving (see Table 8). When post-induction anxiety ratings were added to the model, it did not significantly improve prediction, $\Delta R^2 = .002, \Delta F(1, 61) = 0.15, p = .702$. All variables together significantly predicted alcohol craving, $F(4, 65) = 5.09, p = .001, R^2 = .250$. AUDIT scores remained a significant predictor of alcohol craving, $\beta = .370, t(61) = 2.71, p = .009$, such that greater AUDIT scores predicted greater alcohol craving after the anxiety induction. Coping drinking motives, pre-induction anxiety, and post-induction anxiety were not significant predictors of alcohol craving.

Discussion

This study aimed to examine the principle of emotional transfer's applicability to explain drinking to cope with anxiety. Participants underwent an anxiety induction to assess the effect of state anxiety on the amount, content, and commitment to means (i.e., anxiety reduction strategies) generated, as well as level of craving for alcohol. Script-driven imagery was utilized for the anxiety induction procedure, with participants asked to imagine that they received a call from an academic integrity monitor stating that they needed to attend a meeting on Monday due to an accusation of cheating on an exam. This phone call was said to occur on a Friday evening. High and low anxiety scripts differed in the intensity of anxiety symptoms described and severity of the possible outcome (i.e., kicked out of school vs. student found not guilty). When examining

the effectiveness of the manipulation, it was found that anxiety increased in both the low and high conditions. However, the manipulation failed to have the expected effect, as the high anxiety condition did not increase anxiety more so than the low anxiety condition. Therefore, the conclusions drawn from the planned hypothesized analyses should be interpreted with caution.

Number of Means Generated

The first hypothesis was that participants in the high anxiety condition would generate fewer means. This hypothesis was not supported; high and low anxiety conditions did not significantly differ on the number of means generated. It was thought that this result might be explained by the non-significant difference in anxiety post-manipulation between the two conditions. Therefore, the two conditions were collapsed and supplemental analyses were conducted to assess whether participants' anxiety post-manipulation were related to number of means generated, while controlling for pre-manipulation anxiety, age, and scores on a measure assessing past-year alcohol use frequency and problems (i.e., AUDIT). It was found that AUDIT scores predicted the number of means generated, not level of anxiety or age. Specifically, participants with greater and more problematic alcohol use generated fewer strategies to regulate anxiety. It is possible that individuals' alcohol use severity may have hindered their self-regulatory resources. This is in line with research on heavy drinkers (i.e., average AUDIT of 17), which found that enhancing cognitive resources aided in reducing their alcohol consumption (Houben, Wiers, & Jansen, 2011). It is also supported by studies using neuroimaging and cognitive assessments, which have shown brain damage and executive functioning deficits from heavy alcohol use (Houston, Derrick, Leonard, Testa, Quigley, & Kubiak, 2014; Meyerhoff et al., 2004; Sher, Martin, Wood, & Rutledge, 1997). The maximum AUDIT score of participants in the current study was 17, suggesting that limitations to self-regulatory resources from alcohol

use may arise even for those at an “at-risk” level of use. Studies of social drinkers and non-treatment seeking, heavy drinking college students further support this possibility, as executive functioning deficits have also been exhibited within these samples (Blume, Marlatt, & Schmalzing, 2000; Giancola, Zeichner, Yarnell, & Dickson, 1996). Though anxiety was not found to predict number of means generated in this study, further research is needed to understand whether state anxiety impacts self-regulation at this step. Participants’ average anxiety was approximately 42 on a 0-100 scale. It is possible that to see an impact on the ability to generate self-regulatory strategies, one’s anxiety level would need to be higher.

Generating Alcohol Use as a Mean

This study’s second hypothesis was that more participants in the high anxiety condition would list alcohol use as a mean compared to the low anxiety condition. Contrary to predictions, the two conditions did not significantly differ. Importantly, due to the failure of the anxiety manipulation, the possible effect of state anxiety on the generation of alcohol use as a mean toward self-regulation cannot be ruled out by these findings.

It was also hypothesized that drinking to cope motives would moderate the relationship between anxiety and alcohol mean generation. However, due to the low frequency of participants listing alcohol as a mean these analyses could not be conducted. Surprisingly, only six participants total (one in the high anxiety condition) listed strategies involving alcohol use when asked how they could manage their feelings after receiving the call from the academic integrity monitor in the script-driven imagery. Three strategies were implemented in hopes of increasing the probability that participants would list alcohol use as a mean. First, only participants with recent drinking behavior (i.e., at least once in the past 30 days) were included in the study. Second, study sessions were only run in the afternoon and evening. Third, the script stated that

the participant received the phone call while at home on a Friday evening. Despite these measures, few participants generated alcohol use as one of their possible anxiety regulation strategies.

One potential explanation for this outcome is that participants completed this study in a lab setting on a university campus. This context and the presence of researchers may have reduced the likelihood of participants considering alcohol use to manage their emotions in the proposed scenario. Another possibility is that the scenario used in the script-driven imagery procedure actually lends to more active coping strategies (e.g., calling family/friends, preparing for the meeting), compared to another scenario that might elicit strategies like alcohol use. The script asked participants to imagine that they had a meeting on the upcoming Monday regarding an allegation of cheating. It is possible that in addition to the intended goal of reducing anxiety (to which they were asked to generate means), the script also activated a goal to avoid punishment from the school. This could explain why the most frequently generated strategies were focused on reaching out to others, problem solving and preparation for the meeting. This is in contrast to strategies aimed at reducing or tolerating anxiety (e.g., use of entertainment, self-soothing, alcohol use), which were generated less frequently.

Commitment to Means Generated

The third hypothesis was that participants in the high anxiety condition would report significantly greater commitment to the means they generated compared to those in the low anxiety condition. This hypothesis was supported. To assess the principle of emotional transfer (PET), mediation analyses were planned to examine whether the number of means generated explained the relationship between anxiety and commitment to alcohol use means. This is because the PET suggests means gain affective value in proportion to two factors: the importance

of the goal they serve, and the strength of the relationship between the mean and the goal (Köpetz et al., 2013). Therefore, it was hypothesized that participants in the high anxiety condition would be more committed to alcohol use means due to their tendency to generate fewer means overall. Due to the low frequency of alcohol use means and, therefore, limited alcohol mean commitment ratings, these analyses could not be run. However, it is likely that if these mediation analyses could be performed they would not support the PET-driven hypothesis, as anxiety conditions did not significantly differ on the number of means generated.

As anxiety levels did not differ between conditions, and the number of means generated is likely not a mediator, the predicted explanations for the significant difference in commitment ratings between conditions were not supported. Another possibility for the greater commitment scores in the high anxiety condition may lie in the content of the script-driven imagery. For the low anxiety condition, participants were told that most students are not found guilty when they attend an academic integrity meeting. In contrast, the high anxiety condition was told they could receive consequences as extreme as suspension from the university. It is possible that participants in the high anxiety condition were more committed to their coping strategies (i.e., more irritated/upset if strategy didn't work) because the stakes were higher if the strategies failed. This interpretation again suggests that the script could have activated a second goal of avoiding punishment from school. If the importance of reaching that goal did impact mean commitment, this would partially align with the PET. Further research is needed to directly test this hypothesized relationship.

Alcohol Craving

Contrary to hypotheses, the high and low anxiety conditions did not differ on level of alcohol craving after the script-driven imagery procedure. This pattern of results is somewhat

inconsistent with past research showing that alcohol craving increases after negative affect inductions (Fox et al., 2007; Schlauch et al., 2013). One possible explanation is that these studies utilized alcohol dependent individuals, whereas the present study screened out participants with probable alcohol dependence. The failure of the mood induction to increase anxiety more in the high anxiety condition could also explain these findings. After collapsing the two conditions, supplemental regression analyses revealed that AUDIT scores predicted alcohol craving, not level of anxiety or drinking to cope motives. These findings suggest that young adult college students with more frequent and problematic alcohol use experience greater cravings for alcohol after imagining themselves in an anxiety-provoking situation.

While alcohol use severity may be a primary predictor of craving, there are other possible contributors to the current findings. One could be the setting of the study and script vignette. The script had participants imagine an academic-related situation and the study sessions were conducted in a lab. These settings could have highlighted to participants their role as a student and presence at school, which may be less likely to elicit alcohol craving than other scenarios (e.g., with friends, at home) with stronger learned associations with past alcohol use.

The measure used to assess alcohol craving could have also contributed to the current findings. While craving has been conceptualized in many ways, the most universal definition, “a desire to use a drug,” guided the conceptualization of alcohol craving for the current study (for review see, Sayette, Shiffman, Tiffany, Niaura, Martin, & Shadel, 2000, p. 2). Participants rated their current desire to drink from 0-100 on a VAS after the script-driven imagery. This measurement was based on past research examining alcohol craving after mood induction procedures (Cooney et al. 1997, Fox et al., 2007). The benefits of taking this approach included consistency with previous literature, as well as the brevity of the VAS. Brief assessments of

craving have been suggested to minimize possible interference on craving levels created by the time needed to complete the measure (Sayette et al., 2000).

There are also multiple limitations of the VAS approach. First are its lack of reliability and inability to assess multiple proposed aspects of craving due to it being a single-item measure. Second, the craving VAS was only administered post-anxiety induction. This was done to limit any possible priming effects on the type of means generated in response to the prompt. However, by not assessing craving pre- and post-induction, it limits the conclusions that can be drawn regarding the impact of the anxiety manipulation on participants' current craving levels. Future research may also benefit from inclusion of additional measures assessing other proposed facets of alcohol craving. When examining anxiety regulation and alcohol use, such strategies may include rating one's behavioral intention to drink, monitoring their physiological response to an anxiety induction, or assessing their actual behavioral choices (e.g., measuring alcohol consumption after anxiety induction).

Limitations and Future Directions

This study's main limitation was that the anxiety manipulation did not increase anxiety more so in the high anxiety condition than the low anxiety condition. Without a difference in state anxiety, the conclusions that can be drawn from the primary analyses are limited. Additional piloting of the scripts to a larger sample of participants may have provided a better estimate of their effectiveness; this is recommended for future research using such stimuli. Future studies utilizing script-driven imagery may also benefit from the following modifications. First, the same script could be utilized with different instructions given to the participants for completing the script-driven imagery procedure. In the current study, participants were asked to close their eyes and imagine themselves in the situation, focusing on the thoughts, feelings, and

emotions described. It is possible that using stronger language in the instructions could have led to a more differentiated response between conditions, such as asking them to imagine as vividly as possible, even to the point of trying to induce the sensations and emotions described in the moment. A second modification could be to alter the scripts' content to further exaggerate the difference in anxiety cues between the two conditions. Additionally, future studies would benefit from the inclusion of a control condition to more accurately assess the script-driven imagery's ability to modify state anxiety and differentially impact outcome variables of interest. Finally, the standardized scripts used in the current study could be replaced with personalized scripts, which have also been shown to effectively induce alternate mood states (e.g., Garrison et al., 2010; Kwako et al., 2014).

Another limitation of this study was the sample recruited. Despite basing trait anxiety inclusion criterion on past research assessing young adults, a high rate of interested students were getting screened out. This resulted in loosening of the trait anxiety criteria, which were implemented to increase odds of participants responding to the anxiety manipulation. It is possible that results could have differed had the more stringent criteria been retained. Furthermore, due to the rate of recruitment the initial desired sample size of 84 participants was not reached. The proposed sample size was based on *a priori* power analyses designed to detect medium effect sizes at $\alpha = .05$ and $\beta = .80$, using one-tailed independent-samples *t*-tests. The hypothesis regarding commitment ratings was supported with a medium effect size, suggesting the current sample size may have been appropriate for this analysis. However, other primary analyses were not significant, which may be due to the failed anxiety manipulation, or to the analyses being underpowered. A final limitation to the study sample is the overrepresentation of

women and participants of non-Hispanic White ethnicity. Future studies would benefit from a more diverse sample to increase generalizability of findings.

A primary aim of this study was to assess factors influencing the generation of alcohol use as a mean to regulate anxiety. Unfortunately, few participants listed alcohol as a potential coping strategy. Future studies might benefit from using personalized script-driven imagery, not just to more effectively induce anxiety, but to also increase the frequency that alcohol use is considered. This is because the current study had participants imagine an academic-related situation. If participants instead imagined a past event from their life, these situations may include more contextual cues associated with using alcohol to cope. Another option for future studies would be to limit the potential impact of generating regulation strategies while in a laboratory setting. This could be addressed through modifying the lab environment, or by using alternative measurement strategies. For example, ecological momentary assessment (EMA), which includes having participants report on variables of interest in real-time, may better approximate actual strategies considered and chosen when participants are anxious. It is possible that in the current study participants did not consider alcohol use as a strategy to regulate their emotions, but they may have actually engaged in the behavior in real life. EMA could better assess for this possibility.

Finally, future research examining self-regulation of anxiety and alcohol use would benefit from a longitudinal design. This approach would more directly assess the question of whether mean generation and commitment predicts future alcohol use behaviors. Furthermore, any conclusions drawn from the single-item VAS used to assess commitment to means would be improved with evidence to support its validity. It is possible that ratings of how irritated/upset one would be if they failed to attain their goal with their chosen mean may not be the best

measure of commitment. This measure was chosen for the current study to replicate past research on means and goals; the operationalization of which was driven by a review of factors related to goal pursuit (Gollwitzer & Kirchhof, 1998; Kruglanski et al., 2011). However, examination of its construct validity is warranted.

Conclusions

Utilizing motivation and self-regulation theories, this study sought to contribute to our understanding of how and for whom casual alcohol use develops into dependence in young adults prone to anxiety. Script-driven imagery was employed to examine the effect of state anxiety on the number, type, and commitment to potential coping strategies for anxiety (particularly alcohol use), as well as one's current desire for alcohol. Unfortunately, while the imagery increased participants' anxiety, it did not do so more in the high anxiety condition than the low anxiety condition. Therefore, conclusions are cautiously drawn.

Results revealed that participants who were asked to imagine themselves in the more threatening scenario (i.e., could be kicked out of school) were significantly more committed to the anxiety regulation means they generated. This partially supports the principle of emotional transfer. The number of means, proportion of participants listing alcohol use as a mean, and level of alcohol craving did not differ based on anxiety condition.

Supplemental analyses suggested that young adult college students' alcohol use and problems – not state anxiety – were associated with a reduced ability to generate anxiety regulation strategies and increased desire for alcohol after undergoing the anxiety induction procedure. Few participants generated alcohol use as a mean to cope; however, this may have been limited by the scenario they were asked to consider or lack of ecological validity. If alcohol use is in fact one of their regulation strategies, these individuals may benefit from skills training

to increase their repertoire of strategies to decrease risk for worsening of alcohol use problems. Overall, due to the limitations of the anxiety induction in this study, more research is needed to assess whether state anxiety influences the generation and appraisal of coping strategies. This is particularly true for anxiety-provoking situations in which alcohol use could be used to self-regulate by those individuals most at risk for the development of alcohol related problems.

References

- Aarts, H., & Dijksterhuis, A. (2000). Habits as knowledge structures: Automaticity in goal-directed behavior. *Journal of Personality and Social Psychology*, *78*(1), 53-63. doi:10.1037//0022-3514.78.1.53
- Airaksinen, E., Larsson, M., & Forsell, Y. (2005). Neuropsychological functions in anxiety disorders in population-based samples: Evidence of episodic memory dysfunction. *Journal of Psychiatric Research*, *39*, 207-214. doi:10.1016/j.jpsychires.2004.06.001
- Allport, G. W. (1937). The functional autonomy of motives. *American Journal of Psychology*, *50*, 141-156.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Babor, T. F., Higgins-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). *AUDIT: The alcohol use disorders identification test—Guidelines for use in primary care* (2nd ed.). Geneva, Switzerland: World Health Organization.
- Balleine B. W. (2011). Sensation, incentive learning, and the motivational control of goal-directed action. In J. A. Gottfried (Ed.), *Neurobiology of sensation and reward* (Chapter 13). Boca Raton, FL: CRC Press/Taylor & Francis. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK92779/>
- Bargh, J. A., & Chartrand, T. L. (1999). The unbearable automaticity of being. *American Psychologist*, *54*(7), 462-479.
- Bargh, J. A., Lee-Chai, A., Barndollar, K., Gollwitzer, P. M., & Trötschel, R. (2001). The automated will: Nonconscious activation and pursuit of behavioral goals. *Journal of Personality and Social Psychology*, *81*(6), 1014-1027.
- Baumeister, R. F., & Heatherton, T. F. (1996). Self-regulation failure: An overview. *Psychological Inquiry*, *7*(1), 1-15.
- Bechara, A., & Martin, E. M. (2004). Impaired decision making related to working memory deficits in individuals with substance addictions. *Neuropsychology*, *18*(1), 152-162. doi:10.1037/0894-4105.18.1.152
- Blume, A. W., Marlatt, G. A., & Schmalings, K. B. (2000). Executive cognitive function and heavy drinking behavior among college students. *Psychology of Addictive Behaviors*, *14*(3), 299–302. doi:10.1037/0893-164X.14.3.299
- Buff, C., Schmidt, C., Brinkmann, I., Gathmann, B., Tupak, S., & Straube, T. (2018). Directed threat imagery in generalized anxiety disorder. *Psychological Medicine*, *48*, 617-628. doi:10.1017/S0033291717001957

- Carpenter, K. M., & Hasin, D. S. (1998a). A prospective evaluation of the relationship between reasons for drinking and DSM-IV alcohol-use disorders. *Addictive Behaviors, 23*, 41–46.
- Carpenter, K. M., & Hasin, D. S. (1998b). Reasons for drinking alcohol: Relationships with DSM-IV alcohol diagnoses and alcohol consumption in a community sample. *Psychology of Addictive Behaviors, 12*, 168–184.
- Carpenter, K. M., & Hasin, D. S. (1999). Drinking to cope with negative affect and DSM-IV alcohol use disorders: A test of three alternative explanations. *Journal of Studies on Alcohol and Drugs, 60*, 694–704.
- Carver, C. S., & Scheier, M. F. (2011). Self-regulation of action and affect. In K. D. Vohs & R. F. Baumeister (Eds.), *Handbook of self-regulation: Research, theory, and applications* (2nd ed., pp. 3–21). New York, NY: Guilford Press.
- Collins, J., Pencer, A., & Stewart, S. H. (2018). Mood-induced drinking in coping with anxiety-motivated and socially-motivated drinkers: A lab-based experiment. *International Journal of Mental Health and Addiction, 16*, 90-101. doi: 10.1007/s11469-017-9800-9
- Conger, J. (1956). Reinforcement theory and the dynamics of alcoholism. *Quarterly Journal of Studies on Alcohol, 17*, 296–305.
- Cooney, N. L., Litt, M. D., Morse, P. A., Bauer, L. O., & Gaupp, L. (1997). Alcohol cue reactivity, negative-mood reactivity, and relapse in treated alcoholic men. *Journal of Abnormal Psychology, 106*(2), 243-250.
- Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychological Assessment, 6*(2), 117.
- Cooper, M. L., Frone, M. R., Russell, M., & Mudar, P. (1995). Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology, 69*(5), 990-1005.
- Cooper, M. L., Agocha, V. B., & Sheldon, M. S. (2000). A motivational perspective on risky behaviors: The role of personality and affect regulatory processes. *Journal of Personality, 68*(6), 1059-1088.
- Cox, W. M., & Klinger, E. (1988). A motivational model of alcohol use. *Journal of Abnormal Psychology, 97*(2), 168-180.
- Curtin, J.J., Lang, A.R. 2007. Alcohol and emotion: Insights and directives from affective Science, in: Rottenberg, J., Johnson, S. L., (Eds.), *Emotion and Psychopathology: Bridging Affective and Clinical Science*, Washington, DC.

- Davies, M. (2003). The role of GABA_A receptors in mediating the effects of alcohol in the central nervous system. *Journal of Psychiatry and Neuroscience*, 28(4), 263-274.
- De Houwer, J. (2007). A conceptual and theoretical analysis of evaluative conditioning. *The Spanish Journal of Psychology*, 10(2), 230-241.
- De Houwer, J., Thomas, S., & Baeyens, F. (2001). Associative learning of likes and dislikes: A review of 25 years of research on human evaluative conditioning. *Psychological Bulletin*, 127(6), 853-869. doi:10.1037//D033-2909.127.6.853
- DeMartini, K. S., & Carey, K. B. (2011). The role of anxiety sensitivity and drinking motives in predicting alcohol use: A critical review. *Clinical Psychology Review*, 31, 169-177. doi:10.1016/j.cpr.2010.10.001
- Dickinson, A. & Balleine, B. (1994). Motivational control of goal-directed action. *Animal Learning and Behavior*, 22(1), 1-18.
- Field, M., & Powell, H. (2007). Stress increases attentional bias for alcohol cues in social drinkers who drink to cope. *Alcohol & Alcoholism*, 42(6), 560-566. doi:10.1093/alcalc/agm064
- Finn, P. R., & Hall, J. (2004). Cognitive ability and risk for alcoholism: Short-term memory capacity and intelligence moderate personality risk for alcohol problems. *Journal of Abnormal Psychology*, 113(4), 569-581. doi:10.1037/0021-843X.113.4.569
- Fishbach, A., Shah, J. Y., & Kruglanski, A. W. (2004). Emotional transfer in goal systems. *Journal of Experimental Social Psychology*, 40, 723-738. doi:10.1016/j.jesp.2004.04.001
- Fox, H. C., Bergquist, K. L., Hong, K., & Sinha, R. (2007). Stress-induced and alcohol cue-induced craving in recently abstinent alcohol-dependent individuals. *Alcoholism: Clinical and Experimental Research*, 31(3), 395-403. doi: 10.1111/j.1530-0277.2006.00320.x
- Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological Science*, 18(3), 233-239. doi:10.1111/j.1467-9280.2007.01882.x
- Gailliot, M. T., Baumeister, R. F., DeWall, C. N., Maner, J. K., Plant, E. A., Tice, D. M., Brewer, L. E., & Schmeichel, B. J. (2007). Self-control relies on glucose as a limited energy source: Willpower is more than a metaphor. *Journal of Personality and Social Psychology*, 92(2), 325-336. doi: 10.1037/0022-3514.92.2.325
- Garrison, K. J., Coyle, J. R., Baggott, M. J., Mendelson, J., & Galloway, G. P. (2010). Imagery scripts and a computerized subtraction stress task both induce stress in methamphetamine users: A controlled laboratory study. *Substance Abuse: Research and Treatment*, 4, 53-60. doi:10.4137/SART.S6019

- Giancola, P. R., Zeichner, A., Yarnell, J. E., & Dickson, K. E. (1996). Relation between executive cognitive functioning and the adverse consequences of alcohol use in social drinkers. *Alcoholism: Clinical and Experimental Research*, *20*(6), 1094-1098. doi:10.1111/j.1530-0277.1996.tb01952.x
- Gorka, S. M., Hedeker, D., Piasecki, T. M., & Mermelstein, R. (2017). Impact of alcohol use motives and internalizing symptoms on mood changes in response to drinking: An ecological momentary assessment investigation. *Drug and Alcohol Dependence*, *173*, 31-38. doi: 10.1016/j.drugalcdep.2016.12.012
- Goudriann, A. E., Oosterlaan, J., de Beurs, E., & van den Brink, W. (2005). Decision making in pathological gambling: A comparison between pathological gamblers, alcohol dependents, persons with Tourette syndrome, and normal controls. *Cognitive Brain Research*, *23*, 137-151. doi:10.1016/j.cogbrainres.2005.01.017
- Grant, B. F., Dawson, D. A., Stinson, F. S., Chou, S. P., Dufour, M. C., & Pickering, R. P. (2004). The 12-month prevalence and trends in DSM-IV alcohol abuse and dependence: United States, 1991-1992 and 2001-2002. *Drug and Alcohol Dependence*, *74*, 223-234. doi:10.1016/j.drugalcdep.2004.02.004
- Grant, B. F., Goldstein, R. B., Saha, T. D., Chou, S. P., Jung, J., Zhang, H., ... & Hasin, D. S. (2015). Epidemiology of DSM-5 alcohol use disorder: Results from the National Epidemiologic Survey on Alcohol and Related Conditions III. *JAMA*, *72*(8), 757-766. doi: 10.1001/jamapsychiatry.2015.0584
- Grant, V. V., Stewart, S. H., & Mohr, C. D. (2009). Coping-anxiety and coping-depression motives predict different daily mood-drinking relationships. *Psychology of Addictive Behaviors*, *23*(2), 226-237. doi:10.1037/a0015006
- Grant, V. V., Stewart, S. H., O'Connor, R. M., Blackwell, E., & Conrod, P. J. (2007). Psychometric evaluation of the five-factor Modified Drinking Motives Questionnaire – Revised in undergraduates. *Addictive Behaviors*, *32*, 2611-2632. doi:10.1016/j.addbeh.2007.07.004
- Ham, L. S., Zamboanga, B. L., Bacon, A. K., & Garcia, T. A. (2009). Drinking motives as mediators of social anxiety and hazardous drinking among college students. *Cognitive Behaviour Therapy*, *38*, 133-145. doi:10.1080/16506070802610889
- Hasin, D. S., Stinson, F. S., Ogburn, E., & Grant, B. F. (2007). Prevalence, correlates, disability, and comorbidity of DSM-IV alcohol abuse and dependence in the United States. *Archives of General Psychiatry*, *64*(7), 830-842.
- Houben, K., Wiers, R. W., & Jansen, A. (2011). Getting a grip on drinking behavior: Training working memory to reduce alcohol abuse. *Psychological Science*, *22*(7), 968-975. doi:10.1177/0956797611412392

- Houston, R. J., Derrick, J., Leonard, K., Testa, M., Quigley, B., & Kubiak, A. (2014). Effects of heavy drinking on executive cognitive functioning in a community sample. *Addictive Behavior, 39*(1), 345-349.
- Huang, J. Y., & Bargh, J. A. (2014). The selfish goal: Autonomously operating motivational structures as the proximate cause of human judgment and behavior. *Behavioral and Brain Sciences, 37*, 121-175. doi:10.1017/S0140525X13000290
- John, O. P., & Srivastava, S. (1999). The Big-Five trait taxonomy: History, measurement, and theoretical perspectives. In L. A. Pervin & O. P. John (Eds.), *Handbook of personality: Theory and research* (Vol. 2, pp. 102–138). New York: Guilford Press.
- Kalaydjian, A., Swendsen, J., Chiu, W., Dierker, L., Degenhardt, L., Glantz, M., Merikangas, K. R., Sampson, N., & Kessler, R. (2009). Sociodemographic predictors of transitions across stages of alcohol use, disorders, and remission in the National Comorbidity Survey Replication. *Comprehensive Psychiatry, 50*, 299-306. doi:10.1016/j.comppsy.2008.09.012
- Khantzian, E. J. (1997). The self-medication hypothesis of substance use disorders: A reconsideration and recent applications. *Harvard Review of Psychiatry, 4*(5), 231-244.
- Khantzian, E. J. (2003). The self-medication hypothesis revisited: The dually diagnosed patient. *Primary Psychiatry, 10*(9), 47-54.
- Kober, H., Mende-Siedlecki, P., Kross, E. F., Weber, J., Mischel, W., Hart, C. L., & Ochsner, K. N. (2010). Prefrontal-striatal pathway underlies cognitive regulation of craving. *PNAS, 107*(33), 14811-14816. doi:10.1073/pnas.1007779107
- Köpetz, C. E., Collado, A., & Lejuez, C. W. (2015). When the end (automatically) justifies the means: Automatic tendency toward sex exchange for crack cocaine. *Motivation Science, 1*(4), 233-244. doi:10.1037/mot0000025.
- Köpetz, C. E., Lejuez, C. W., Wiers, R. W., & Kruglanski, A. W. (2013). Motivation and self-regulation in addiction: A call for convergence. *Perspectives on Psychological Science, 8*(1), 3-24. doi:10.1177/1745691612457575
- Köpetz, C., & Orehek, E. (2015). When the end justifies the means: Self-defeating behaviors as “rational” and “successful” self-regulation. *Current Directions in Psychological Science, 24*(5), 386-391. doi:10.1177/0963721415589329
- Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine, 16*, 606-613.
- Kruglanski, A.W. & Köpetz, C. (2009). What is so special (and nonspecial) about goals?: A view from the cognitive perspective. In: Moskowitz, G.B., Grant, H., editors. *The psychology of goals*. New York, NY: Guilford Press, p. 27-55.

- Kruglanski, A. W., Pierro, A., & Sheveland, A. (2011). How many roads lead to Rome? Equifinality set-size and commitment to goals and means. *European Journal of Social Psychology, 41*, 344-352. doi:10.1002/ejsp.780
- Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. (2005). Why do young people drink? A review of drinking motives. *Clinical Psychology Review, 25*, 841-861. doi:10.1016/j.cpr.2005.06.002
- Kuntsche, E., Knibbe, R., Gmel, G., & Engels, R. (2006). Who drinks and why? A review of sociodemographic, personality, and contextual issues behind the drinking motives in young people. *Addictive Behaviors, 31*, 1844-1857.
- Kwako, L. E., Schwandt, M. L., Sells, J. R., Ramchandani, V. A., Hommer, D. W., George D. T., Sinha, R., & Heilig, M. (2014). Methods for inducing alcohol craving in individuals with co-morbid alcohol dependence and posttraumatic stress disorder: Behavioral and physiological outcomes. *Addiction Biology, 20*, 733-746. doi:10.1111/adb.12150
- Labouvie, E., & Bates, M. E. (2002). Reasons for alcohol use in young adulthood: Validation of a three-dimensional measure. *Journal of Studies on Alcohol and Drugs, 63*, 145-155.
- Lehmann, R., Denissen, J. A., Allemand, M., & Penke, L. (2013). Age and gender differences in motivational manifestations of the Big Five from age 16 to 60. *Developmental Psychology, 49*(2), 365-383. doi: 10.1037/a0028277
- Lejuez, C. W., O'Donnell, J., Wirth, O., Zvolensky, M. J., & Eifert, G. H. (1998). Avoidance of 20% carbon dioxide—enriched air with humans. *Journal of the Experimental Analysis of behavior, 70*(1), 79-86. doi:10.1016/S0005-7916(98)00018-4
- Lewis, M. A., Hove, M. C., Whiteside, U., Lee, C. M., Kirkeby, B. S., Oster-Aaland, L., Neighbors, C., & Larimer, M. E. (2008). Fitting in and feeling fine: Conformity and coping motives as mediators of the relationship between social anxiety and problematic drinking. *Psychology of Addictive Behaviors, 22*(1), 58-67. doi:10.1037/0893-164X.22.1.58
- Lovallo, W. R., Farag, N. H., & Vincent, A. S. (2010). Use of a resting control day in measuring the cortisol response to mental stress: Diurnal patterns, time of day, and gender effects. *Psychoneuroendocrinology, 35*(8), 1253-1258. doi:10.1016/j.psyneuen.2010.02.015
- Martens, M. P., Rocha, T. L., Martin, J. L., & Serrao, H. F. (2008). Drinking motives and college students: Further examination of a four-factor model. *Journal of Counseling Psychology, 55*(2), 289-295. doi:10.1037/0022-0167.55.2.289
- McNally, A. M., Palfai, T. P., Levine, R. V., & Moore, B. M. (2003). Attachment dimensions and drinking-related problems among young adults: The mediational role of coping motives. *Addictive Behaviors, 28*, 1115-1127. doi:10.1016/S0306-4603(02)00224-1

- McTeague, L. M., & Lang, P. J. (2012). The anxiety spectrum and the reflex physiology of defense: From circumscribed fear to broad distress. *Depression and Anxiety, 29*(4), 264-281. doi:10.1002/da.21891
- Menary, K. R., Kushner, M. G., Maurer, E., & Thuras, P. (2011). The prevalence and clinical implications of self-medication among individuals with anxiety disorders. *Journal of Anxiety Disorders, 25*(3), 335-339. doi:10.1016/j.janxdis.2010.10.006
- Meyerhoff, D. J., Blumenfeld, R., Truran, D., Lindgren, J., Flenniken, D., Cardenas, V.... & Weiner, M. W. (2004). Effects of heavy drinking, binge drinking, and family history of alcoholism on regional brain metabolites. *Alcoholism: Clinical and Experimental Research, 28*(4), 650-661. doi:10.1097/01.ALC.0000121805.12350.CA
- Mezquita, L., Stewart, S. H., Ibanez, M. I., Ruiperez, M. A., Villa, H., Moya, J., & Ortet, G. (2011). Drinking motives in clinical and general populations. *European Addiction Research, 17*(5), 250-261. doi:10.1159/000328510
- Mitchell, J. M., O'Neil, J. P., Janabi, M., Marks, S. M., Jagust, W. J., & Fields, H. L. (2012). Alcohol consumption induces endogenous opioid release in the human orbitofrontal cortex and nucleus accumbens. *Science Translational Medicine, 4*(116), 116ra6. doi:10.1126/scitranslmed.3002902
- Montorio, I., Nuevo, R., Cabrera, I., Marquez, M., & Izal, M. (2015). Differential effectiveness of two anxiety induction procedures in youth and older adult populations. *Anales de Psicología, 31*(1), 28-36. doi:10.6018/analesps.31.1.162281
- Najmi, S., Kuckertz, J. M., & Amir, N. (2012). Attentional impairment in anxiety: Inefficiency in expanding the scope of attention. *Depression and Anxiety, 29*, 243-249. doi:10.1002/da.20900
- Nigg, J. T., Wong, M. M., Martel, M. M., Jester, J. M., Puttlre, L. I., Glass, J. M.,...& Zucker, R. A. (2006). Poor response inhibition as a predictor of problem drinking and illicit drug use in adolescents at risk for alcoholism and other substance use disorders. *Journal of the American Academy of Child and Adolescent Psychiatry, 45*(4), 468-475. doi:10.1097/01.chi.0000199028.76452.a9
- Noël, X., Bechara, A., Dan, B., Hanah, C., & Verbanck, P. (2007). Response inhibition deficit is involved in poor decision making under risk in nonamnesic individuals with alcoholism. *Neuropsychology, 21*(6), 778-786. doi:10.1037/0894-4105.21.6.778
- Noël, X., Van der Linden, M., d'Acremont, M., Colmant, M., Hanah, C., Pelc, I.,...& Bechara, A. (2005). Cognitive biases toward alcohol-related words and executive deficits in polysubstance abusers with alcoholism. *Addiction, 100*(9), 1302-1309. doi:10.1111/j.1360-0443.2005.01125.x
- Poma, S. Z., Milleri, S., Squassante, L., Nucci, G., Bani, M., Perini, G. I., & Merlo-Pich, E. (2005). Characterization of a 7% carbon dioxide (CO₂) inhalation paradigm to evoke

- anxiety symptoms in healthy subjects. *Journal of Psychopharmacology*, 19(5), 494-503. doi:10.1177/0269881105056533
- Raghunathan, R., & Pham, M. T. (1999). All negative moods are not equal: Motivational influences of anxiety and sadness on decision making. *Organizational Behavior and Human Decision Processes*, 79(1), 56-77. doi:obhd.1999.2838
- Rauch, S. L., van der Kolk, B.A., Fisler, R. E., Alpert, N. M., Orr, S. P., Savage, C. R., Fischman, A. J., Jenike, M. A., & Pitman, R. K. (1996). A symptom provocation study of posttraumatic stress disorder using positron emission tomography and script-driven imagery. *Archives of General Psychiatry*, 53, 380-387.
- Roos, C. R., & Witkiewitz, K. (2017). A contextual model of self-regulation change mechanisms among individuals with addictive disorders. *Clinical Psychology Review*, 57, 117-128. doi:10.1016/j.cpr.2017.08.008
- Sayette, M. A., Shiffman, S., Tiffany, S. T., Niaura, R. S., Martin, C. S., & Shadel, W. G. (2000). The measurement of drug craving. *Addiction*, 95(Suppl 2), S189-S210.
- Schlauch, R. C., Gwynn-Shapiro, D., Stasiewicz, P. R., Molnar, D. S., & Lang, A. R. (2013). Affect and craving: Positive and negative affect are differentially associated with approach and avoidance inclinations. *Addictive Behaviors*, 38(4), 1970-1979. doi:10.1016/j.addbeh.2012.12.003.
- Sheehan, D., Lecrubier, Y., Sheehan, K. H., Sheehan, K., Amorim, P., Janavs, J., ... & Dunbar, G. (1998). Diagnostic Psychiatric Interview for DSM-IV and ICD-10. *Journal of Clinical Psychiatry*, 59, 22-33.
- Sher, K., & Levenson, R. (1982). Risk for alcoholism and individual differences in the stress-response-dampening effect of alcohol. *Journal of Abnormal Psychology*, 91, 350-367.
- Sher, K. J., Martin, E. D., Wood, P. K., & Rutledge, P. C. (1997). Alcohol use disorders and neuropsychological functioning in first-year undergraduates. *Experimental and Clinical Psychopharmacology*, 5(3), 304-315. doi:10.1037/1064-1297.5.3.304
- Simons, J., Correia, C. J., Carey, K. B. (2000). A comparison of motives for marijuana and alcohol use among experienced users. *Addictive Behaviors*, 25, 153-160.
- Skinner, B. F. (1953). *Science and human behavior*. Oxford, England: Macmillan.
- Soto, C. J., & John, O. P. (2009). Ten facet scales for the Big Five Inventory: Convergence with NEO PI-R facets, self-peer agreement, and discriminant validity. *Journal of Research in Personality*, 43, 84-90. doi:10.1016/j.jrp.2008.10.002
- Srivastava, S., John, O. P., Gosling, S. D., & Potter, J. (2003). Development of personality in early and middle adulthood: Set like plaster or persistent change? *Journal of Personality*

and Social Psychology, 84, 1041-1053.

- Tabakoff, B. & Hoffman, P. L. (2013). The neurobiology of alcohol consumption and alcoholism: An integrative history. *Pharmacology, Biochemistry and Behavior, 113*, 20-37. doi:10.1016/j.pbb.2013.10.009
- Toren, P., Sadeh, M., Wolmer, L., Eldar, S., Koren, S., Weizman, R., & Laor, N. (2000). Neurocognitive correlates of anxiety disorders in children: A preliminary report. *Journal of Anxiety Disorders, 14*(3), 239-247.
- Vedhara, K., Miles, J., Bennett, P., Plummer, S., Tallon, D., Brooks, E., ...& Farndon, J. (2003). An investigation into the relationship between salivary cortisol, stress, anxiety, and depression. *Biological Psychology, 62*, 89-96.
- Vytal, K., Cornwell, B., Arkin, N., & Grillon, C. (2012). Describing the interplay between anxiety and cognition: From impaired performance under low cognitive load to reduced anxiety under high load. *Psychophysiology, 49*, 842-852. doi:10.1111/j.1469-8986.2012.01358.x

Appendix

Table 1

Means and Standard Deviations of Demographic Variables (N = 69)

Variable	Anxiety Condition		<i>t</i>	df	<i>p</i>
	Low (<i>n</i> = 34) <i>M</i> (<i>SD</i>)	High (<i>n</i> = 35) <i>M</i> (<i>SD</i>)			
Age	19.32 (1.07)	19.20 (1.43)	0.41	67	.686
Drinking Days in Past 30 Days	5.31 (3.69) Range: 1-15	3.80 (3.34) Range: 1-14	1.78	67	.079
AUDIT Total	6.50 (3.70) Range: 1-17	6.06 (3.95) Range: 1-17	0.48	67	.633
BFI Anxiety Facet Average Score	3.19 (1.05)	3.31 (0.94)	-0.48	67	.630
Vividness VAS	76.85 (21.76)	71.20 (27.64)	0.94	67	.350
DASS Depression	7.41 (9.45)	7.89 (8.82)	-0.22	67	.830
DMQR Coping	11.24 (4.96)	9.11 (4.34)	1.89	67	.063
DMQR Sociability	18.44 (5.08)	17.17 (4.89)	1.06	67	.294
DMQR Enhancement	17.35 (5.16)	15.66 (5.88)	1.27	67	.208
DMQR Convivial	8.68 (3.74)	7.66 (3.65)	1.15	67	.256

Note. AUDIT = Alcohol Use Disorder Identification Test; BFI = Big Five Inventory; DASS = Depression Anxiety Stress Scales; DMQR = Drinking Motives Questionnaire Revised; VAS = Visual Analogue Scale

Table 2*Frequencies of Categorical Demographic Variables (N = 69)*

Variable	Anxiety Condition		χ^2	df (N = 69)	p
	Low (n = 34) n (%)	High (n = 35) n (%)			
Gender			0.25	1	.614
Female	27 (79.4%)	26 (74.3%)			
Male	7 (20.6%)	9 (25.7%)			
Education			1.15	2	.563
Freshman	15 (44.1%)	19 (54.3%)			
Sophomore	11 (32.4%)	11 (31.4%)			
Junior	6 (17.6%)	2 (5.7%)			
Senior	1 (2.9%)	2 (5.7%)			
Graduate	1 (2.9%)	1 (2.9%)			
Race/Ethnicity			0.40	1	.526
White (Non-Hispanic)	30 (88.2%)	29 (82.9%)			
African American (Non-Hispanic)	0 (0%)	1 (2.9%)			
Hispanic or Latino/a	1 (2.9%)	1 (2.9%)			
Asian or Asian American	2 (5.9%)	2 (5.7%)			
Native American/ Alaskan Native	0 (0%)	1 (2.9%)			
Middle Eastern	1 (2.9%)	1 (2.9%)			

Note. For the chi-square test to determine race/ethnicity differences across anxiety groups, non-White race/ethnicity categories were collapsed and compared to White (non-Hispanic). For the chi-square test to determine education differences across anxiety groups, junior, senior, and graduate categories were collapsed and compared to freshman and sophomore categories.

Table 3*Descriptive Statistics of Outcome Variables by Anxiety Condition*

Outcome Variable	<i>n</i>	<i>M (SD)</i>	Range
Number of Means Generated			
High Anxiety	35	3.37 (1.44)	1-8
Low Anxiety	34	3.24 (1.72)	0-7
Average Commitment to Means			
High Anxiety	35	5.18 (1.33)	1-7
Low Anxiety	34	4.35 (1.58)	0-7
Alcohol Craving			
High Anxiety	33	8.76 (15.26)	0-70
Low Anxiety	33	11.36 (15.66)	0-55

Table 4*Type and Frequency of Means Generated*

Mean Type	Total Sample	Anxiety Condition	
	<i>n</i> (%)	Low Anxiety	High Anxiety
Alcohol Use	7 (3.1%)	6 (2.6%)	1 (0.4%)
Non-Alcohol Strategy	222 (96.9%)	105 (47.3%)	117 (52.7%)
Talk to Family	44 (19.2%)	21 (9.2%)	23 (10%)
Talk to Friends	25 (10.9%)	11 (4.8%)	14 (6.1%)
Prepare for Academic Integrity Meeting	21 (9.2%)	9 (3.9%)	12 (5.2%)
Breathe	18 (7.9%)	8 (3.5%)	10 (4.4%)
Get Feedback/Support from Others	13 (5.7%)	4 (1.7%)	9 (3.9%)
Walk/Exercise	13 (5.7%)	9 (3.9%)	4 (1.7%)
Avoid/Distract (e.g., take mind off it, try not to worry about it)	9 (3.9%)	3 (1.3%)	6 (2.6%)
Contact Professor/Academic Integrity Board	9 (3.9%)	2 (0.9%)	7 (3/1%)
Non-alcohol Beverage	7 (3.1%)	6 (2.6%)	1 (0.4%)
Entertainment (TV, read, video game)	7 (3.1%)	6 (2.6%)	1 (0.4%)
Think/Ruminate	7 (3.1%)	4 (1.7%)	3 (1.3%)
Console Self (e.g., remember did not cheat)	7 (3.1%)	2 (0.9%)	5 (2.2%)
Sit/Lay Down/Sleep	6 (2.6%)	4 (1.7%)	2 (0.9%)
Listen to Music	6 (2.6%)	4 (1.7%)	2 (0.9%)
Cry	5 (2.2%)	1 (0.4%)	4 (1.7%)
Cook/Eat	4 (1.7%)	4 (1.7%)	0 (0%)
Write	4 (1.7%)	2 (0.9%)	2 (0.9%)
Aggression (e.g., hit something, shout)	4 (1.7%)	0 (0%)	4 (1.7%)
Shower/Bath	3 (1.3%)	1 (0.4%)	2 (0.9%)
Try to Relax	3 (1.3%)	0 (0%)	3 (1.3%)
Spend Time with Friends	2 (0.9%)	2 (0.9%)	0 (0%)
Speak with Counselor	2 (0.9%)	1 (0.4%)	1 (0.4%)
Smoke	2 (0.9%)	0 (0%)	2 (0.9%)
Go for Drive	1 (0.4%)	1 (0.4%)	0 (0%)
Total Number of Means	229	111	118

Note. Independent coders were utilized for the alcohol/no alcohol determination; the subcategories of “non-alcohol” were coded by the researcher for descriptive purposes. Frequencies presented in this table represent total number of occurrences, such that one participant could have multiple means coded within same category (e.g., a participant in the low anxiety condition listed two means that involved alcohol use, both of which were counted toward the total frequency presented).

Table 5*Comparison of Pre and Peak VAS Scores Within High and Low Anxiety Conditions*

	VAS Rating		<i>t</i>	df	<i>p</i>
	Pre-Induction <i>M (SD)</i>	Peak-Induction <i>M (SD)</i>			
Low Anxiety (<i>n</i> = 34)					
VAS-Fear	1.48 (4.21)	49.15 (27.23)	10.09	32	< .001
VAS-Anger	3.39 (14.08)	36.76 (25.71)	7.57	32	< .001
VAS-Relaxation	51.33 (29.65)	21.91 (23.61)	-6.83	32	< .001
VAS-Happiness	50.75 (28.06)	16.75 (22.88)	-5.91	31	< .001
High Anxiety (<i>n</i> = 35)					
VAS-Fear	3.37 (6.16)	52.40 (26.84)	10.84	34	< .001
VAS-Anger	1.23 (4.35)	34.20 (28.09)	6.66	34	< .001
VAS-Relaxation	55.24 (29.19)	14.71 (22.09)	-8.12	33	< .001
VAS-Happiness	53.64 (25.49)	8.82 (16.95)	-10.39	32	< .001

Note. VAS = Visual Analogue Scale.

Table 6*Comparison of VAS Change Scores Between High and Low Anxiety Conditions*

	Anxiety Condition		<i>t</i>	df	<i>p</i>
	Low (<i>n</i> = 34) <i>M</i> (<i>SD</i>)	High (<i>n</i> = 35) <i>M</i> (<i>SD</i>)			
VAS-Fear	47.67 (27.15)	49.03 (26.76)	-0.21	66	.836
VAS-Anger	33.36 (25.31)	32.97 (29.29)	0.59	66	.953
VAS-Relaxation	-29.42 (24.76)	-40.53 (28.86)	1.69	65	.096
VAS-Happiness	-34.00 (32.53)	-44.82 (24.77)	1.51	63	.136

Note. VAS = Visual Analogue Scale; Change scores for each emotion were calculated by subtracting pre-VAS ratings from retrospective peak-VAS ratings.

Table 7*Bivariate Correlations and Descriptive Statistics of Study Variables*

Model	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Pre-induction VAS-A	-	.408**	-.004	.073	.191	-.034	.445***	.508***	.033	-.169	.282*	.004
2. Post-induction VAS-A		-	.023	.013	.065	-.011	.181	.078	-.046	-.111	.117	.170
3. Number of Means Generated			-	.056	-.170	.242*	-.054	-.071	-.255*	-.208	-.050	.098
4. Average Commitment to Means				-	-.077	-.133	.118	.217	.061	-.121	-.014	.177
5. Alcohol Craving					-	.084	.088	.061	.441***	.258*	.392**	-.019
6. Age						-	-.056	-.142	-.037	.186	-.091	-.233
7. BFI Anxiety Score							-	.333**	.162	.082	.280*	-.049
8. DASS Depression Score								-	.160	-.056	.307*	.068
9. AUDIT Score									-	.543***	.529***	.058
10. Number of Past-month Drinking Days										-	.395**	-.076
11. DMQR Coping Score											-	-.109
12. Vividness VAS												-
<i>M (SD)</i>	14.42 (15.95)	41.86 (24.89)	3.30 (1.57)	4.77 (1.51)	10.06 (15.40)	19.26 (1.26)	13.00 (3.96)	7.65 (9.07)	6.28 (3.81)	4.54 (3.57)	10.16 (4.74)	73.99 (24.90)

Note. AUDIT = Alcohol Use Disorder Identification Test; BFI = Big Five Inventory; DASS Depression Anxiety Stress Scales; DMQR = Drinking Motives Questionnaire Revised; VAS-A = Visual Analogue Scale-Anxiety. * $p < .05$, ** $p < .01$, *** $p < .001$.

Table 8

Supplemental Analyses: Hierarchical Linear Regressions Predicting Means Generation, Commitment, and Alcohol Craving

Model	Model <i>F</i>	<i>R</i> ²	<i>p</i>	β
Number of Means Generated				
Model 1	52.93	.119	.040	
Age			.050	.233
AUDIT			.038	-.246
Pre-induction VAS-A			.917	.012
Model 2	2.16	.119	.083	
Age			.051	.233
AUDIT			.041	-.246
Pre-induction VAS-A			.954	.007
Post-induction VAS-A			.928	.012
Average Commitment to Means				
Model 1	.363	.005	.549	
Pre-induction VAS-A				.073
Model 2	.190	.006	.828	
Pre-induction VAS-A			.546	.082
Post-induction VAS-A			.882	-.020
Alcohol Craving				
Model 1	6.83	.248	< .001	
AUDIT			.009	.363
DMQR Coping			.284	.152
Pre-induction VAS-A			.207	.152
Model 2	5.09	.250	.001	
AUDIT			.009	.370
DMQR Coping			.303	.147
Pre-induction VAS-A			.281	.137
Post-induction VAS-A			.702	.046

Note. AUDIT = Alcohol Use Disorder Identification Test; DMQR = Drinking Motives Questionnaire Revised; VAS-A = Visual Analogue Scale – Anxiety.

Figures

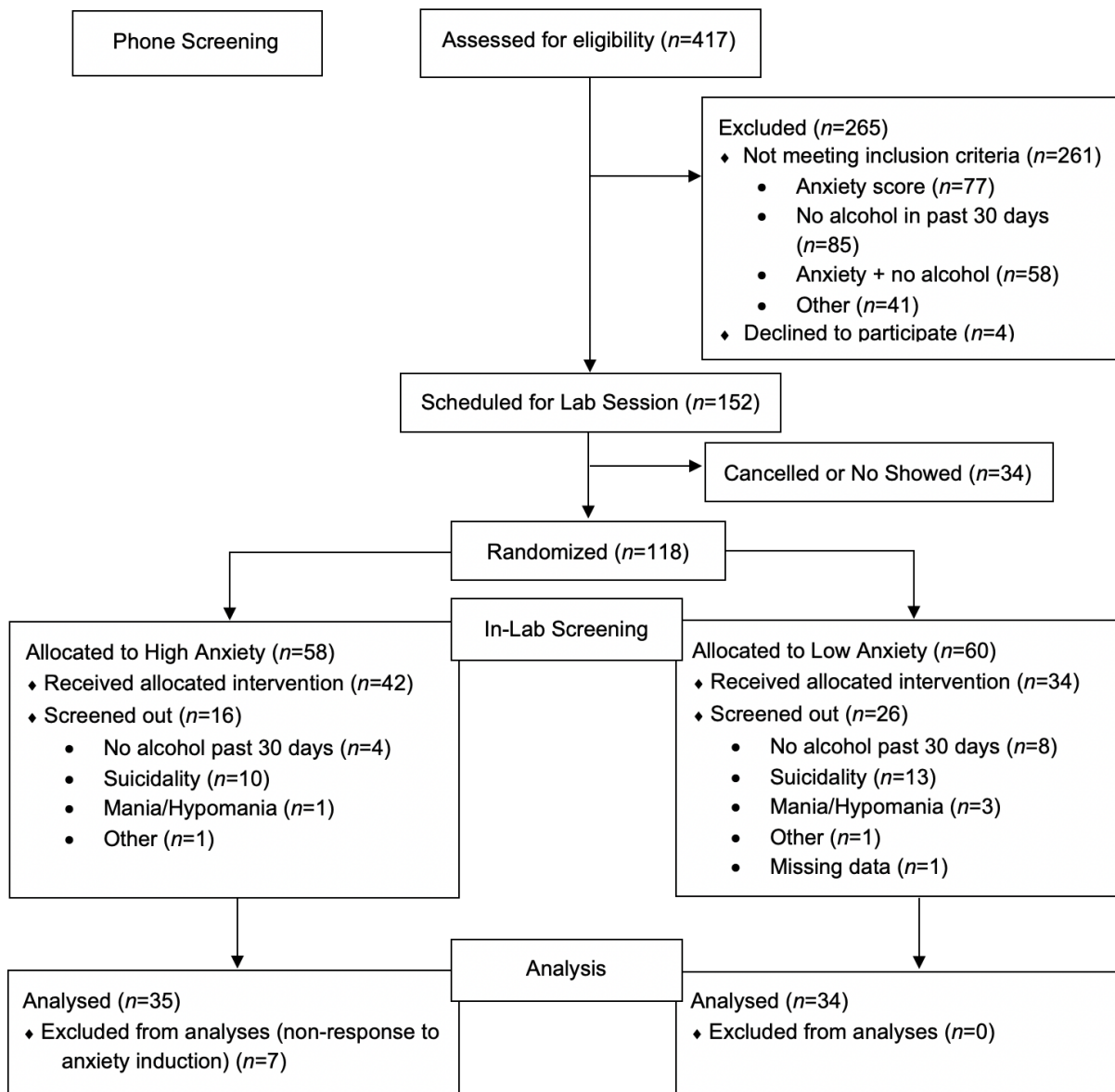


Figure 1. *Flowchart of Participants Through Study*

Appendix A

High Anxiety Induction Script

“Today you have an important exam in your hardest course. It’s Friday and you’ve spent the last two nights studying. You really want to do better than you did on the last test. You head to class and take a seat at your desk. As the professor starts handing out the tests you feel nauseous and begin fiddling with your pencil. You start answering the questions, but are really nervous because you can’t tell if you studied enough. During the test, you look around room and out the window when you are trying to think of the answers. About half way through the test, you notice that your professor keeps looking over at you. You feel on edge and your mind starts racing about all the reasons why they could be staring. When you finally finish the exam, you go to your last class of the day, and then head back home, looking forward to starting the weekend. It’s about five o’clock when all of a sudden your phone rings. When you answer, a man tells you that he is the academic integrity monitor for the university. You are immediately anxious and your heart starts pounding. He says that allegations of academic dishonesty have been filed against you and pending the investigation you could receive sanctions ranging from automatic failure of the course to suspension from the university. Your jaw is clenched so tight it hurts and your stomach is in knots. You’re pacing around the room, trying to figure out what to say; it feels as if you are gasping for air. He tells you that you will need to report to a meeting with him on Monday and then ends call. It feels like an elephant is sitting on your chest and your whole body is shaking. You’re overwhelmed with panic and worry and can feel a lump form in your throat. You have a million thoughts racing through your head: “Why would my professor do this?” “There’s nothing I can do to make this better.” “Everyone is going to think I’m a cheater.” “I’m going to get kicked out of school!”

Appendix B

Low Anxiety Induction Script

“Today you have an important exam in your hardest course. It’s Friday and you’ve spent the last two nights studying. You really want to do better than you did on the last test. You head to class and take a seat at your desk. As the professor starts handing out the tests you can feel butterflies in your stomach and you take out your pencil. You start answering the questions and your nerves lessen because you can tell all your studying has paid off. During the test, you look around room and out the window when you are trying to think of the answers. About half way through the test you notice that your professor keeps looking over at you. You feel a little tense and wonder why they could be staring. When you finally finish the exam you go to your last class of the day, and then head back home looking forward to starting the weekend. It’s about five o’clock when all of a sudden your phone rings. When you answer, a man tells you that he is the academic integrity monitor for the university. You feel nervous and your heart skips a beat. He says that allegations of academic dishonesty have been filed against you, which could lead to sanctions, but that in most cases the student is found to have not broken any university policies. You unclench your jaw and can feel your stomach ease. You walk across the room to sit down, trying to figure out what to say; you take a deep breath. He tells you that you will need to report to a meeting with him on Monday and then ends call. A heaviness in your chest lightens and you realize your foot has stopped bouncing. You’re concerned but glad he said sanctions are rare. Your mouth is a little dry so you look for your water bottle. You think to yourself: “Did my professor report me?” “I should prepare for this meeting.” “People who know me would never think I would cheat.” “They have to believe me. I doubt I’ll get in trouble.”

Appendix C

High Anxiety Follow-Up Script

“The academic integrity monitor called you to say that allegations of academic dishonesty have been filed against you and you will have to report to a meeting on Monday. You’re immediately anxious and your heart is pounding. Your jaw is clenched so tight it hurts and your stomach is in knots. You’re pacing around the room and gasping for air. It feels like an elephant is sitting on your chest and your whole body is shaking. You’re overwhelmed with panic and worry and can feel a lump form in your throat. You have a million thoughts racing through your head: “Why would my professor do this?” “There’s nothing I can do to make this better.” “Everyone is going to think I’m a cheater.” “I’m going to get kicked out of school!”

Appendix D

Low Anxiety Follow-Up Script

“The academic integrity monitor called you to say that allegations of academic dishonesty have been filed against you and you will have to report to a meeting on Monday. You feel nervous and your heart skips a beat. However, he says in most cases the student is found to have not broken any university policies. You unclench your jaw and can feel your stomach ease. You walk across the room to sit down and take a deep breath. A heaviness in your chest lightens and you realize your foot has stopped bouncing. You’re concerned but glad he said sanctions are rare. Your mouth is a little dry so you look for your water bottle. You think to yourself: “Did my professor report me?” “I should prepare for this meeting.” “People who know me would never think I would cheat.” “They have to believe me. I doubt I’ll get in trouble.”

Appendix E

IRB Approval Letter



To: Lauren E Hurd
BELL 4188

From: Douglas James Adams, Chair
IRB Committee

Date: 01/03/2019

Action: **Exemption Granted**

Action Date: 01/03/2019

Protocol #: 1810152055

Study Title: Emotion, Imagination, and Coping Study

The above-referenced protocol has been determined to be exempt.

If you wish to make any modifications in the approved protocol that may affect the level of risk to your participants, you must seek approval prior to implementing those changes. All modifications must provide sufficient detail to assess the impact of the change.

If you have any questions or need any assistance from the IRB, please contact the IRB Coordinator at 109 MLKG Building, 5-2208, or irb@uark.edu.

cc: Lindsay S Ham-Holm, Investigator
Hope Elaine Erickson, Investigator