THE ROLE OF POSITIVE URGENCY IN ALCOHOL-RELATED RISK-TAKING:
AN EXPERIMENTAL INVESTIGATION

by

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ABSTRACT

The relationship between positive urgency, a personality trait reflecting rash action during extreme positive emotional states, and risk-taking has previously been experimentally examined. However, how positive urgency is related to risk-taking while under the acute influence of alcohol has not been examined. The overarching goal of this dissertation was to generate behavioral evidence concerning how the interaction between positive urgency and alcohol consumption influences risk-taking via changes in emotional arousal. In this study, 59 community-dwelling adults (mean age = 29.45 (*SD* = 10.96), 32.2% women, 78% White) completed mood induction procedures (positive or neutral) while consuming a beverage (alcohol or placebo) and then completed the Balloon Analogue Risk Task (BART) as a measure of risk-taking. The positive mood induction was effective in inducing high arousal positive emotions. Overall, study hypotheses were not supported; however, because of low power, effect sizes and patterns of relationship are reported. The relationship between positive urgency and risk-taking was positive and small in the positive mood condition but negative and small in the neutral mood condition. The alcohol group and the placebo group showed similar patterns of risk-taking that are positive and small. Finally, the relationship between positive urgency changes in emotional arousal was positive and small only in the positive/alcohol condition; however, there was no relationship between changes in emotional arousal and risk-taking. These findings suggest that, while changes in emotional arousal may result from a combination of positive urgency and alcohol consumption, it may not be a focal mechanism that explains the relationship between positive urgency and risk-taking. Further, positive urgency is a risk factor whether or not alcohol consumption is present. Although the small sample size limited the power to test the hypotheses, the effect size estimates obtained in this study provide preliminary data for a more properly powered future study. The pattern of findings suggests the viability of further developing the current positive mood induction to establish a lab-based paradigm for positive urgency and the use of a different experimental risk-taking task to examine positive emotion-based risk-taking.

INTRODUCTION

Positive urgency is an impulsive behavior trait defined as the tendency to act rashly under extreme positive emotions (Cyders et al., 2007). This impulsive behavior trait is highly associated with alcohol use and risk-taking across a number of cross-sectional and longitudinal studies (Coskunpinar et al., 2013; Cyders et al., 2007; Cyders & Smith, 2008; Um & Cyders, 2019). Four experimental studies have examined the relationship between positive urgency and alcohol consumption or risk-taking (Cyders et al., 2010; Dinc & Cooper, 2015; Morrongiello et al., 2015). An unstudied question is how positive urgency relates to risk-taking under the influence of alcohol itself. Since alcohol consumption increases positive emotions (Fromme et al., 1997; Pliner & Cappell, 1974; Reynolds et al., 2006) and such positive emotions increase risk-taking (Cyders et al., 2010; Cyders & Smith, 2008; Zapolski et al., 2009), positive urgency might interact with alcohol consumption to increase risk-taking. The overarching goal of this dissertation is to generate behavioral evidence concerning how the interaction between positive urgency and alcohol consumption influences risk-taking via changes in positive emotions.

Alcohol Effects on Risk-Taking

A broad range of research suggested that alcohol consumption is related to increased risk-taking in various domains of human behavior. Meta-analyses examining the acute effects of alcohol in laboratory settings have shown that alcohol consumption is related to greater intention to engage in unprotected sex (Rehm et al., 2012; Scott-Sheldon et al., 2016), impaired driving (Irwin et al., 2017), and male-to-female aggression (Crane et al., 2016). Also, a meta-analysis of epidemiological studies suggested that acute alcohol consumption is related to a higher likelihood of suicide attempts (Borges et al., 2017). An experimental alcohol administration study showed that acute alcohol intoxication increases risky driving as measured by shorter time-to-collision and faster driving speed (Fillmore & van Dyke, 2021). An event-level analysis among college students also showed that acute alcohol consumption events are related to subsequent unsafe sex, being a victim of coerced sex, being a perpetrator of coerced sex, aggressive behaviors, and vandalism (Neal & Fromme, 2007). Specifically, daily subjective intoxication was related to increased odds of illicit substance use and sexual behaviors (any and unsafe) (Quinn & Fromme, 2011).

Additionally, daily estimated blood alcohol concentration (BAC) was related to increased odds of aggressive behaviors, gambling, and property crimes (Quinn & Fromme, 2011). In a study with inmates sampled across state and federal correctional facilities in the United States, offenders were more likely to report violent crimes, such as homicide, physical assaults, and sexual assaults, as their reason for imprisonment when they also reported being intoxicated while committing such crimes (Felson & Staff, 2010).

In addition to real-world risk-taking behaviors, the acute effects of alcohol in behavioral risk-taking tasks have been examined in experimental alcohol administration studies. Three systematic reviews of this literature are available to date. One systematic review focused on low dose (i.e., below 0.8g/kg legal limit of driving) acute alcohol effects on lab-based behavioral risk-taking tasks, including inhibitory control, delay discounting, and risk-taking tasks (Weafer & Fillmore, 2016). This review concluded that inhibitory control tasks, such as the stop signal task and the go/no-go task, which measure the ability to inhibit prepotent go responses, show impairment after a low dose of alcohol. Risk-taking tasks with a discrete risky vs. safe choice are also sensitive to a low dose of alcohol. However, delay discounting tasks and the Balloon Analogue Risk Task (BART), which measure the trade-off between short-term and long-term gains, are not affected by a low dose of alcohol. Another systematic review examined the sensitivity of lab-based behavioral risk-taking tasks at a low dose (< 0.6 g/kg) and a high dose (> 0.6 g/kg) of acute alcohol consumption (Harmon et al., 2021). Across studies, BART performance represented greater risk-taking (i.e., a greater number of adjusted balloon pumps) at a high dose of alcohol consumption and did not differ at a lower dose compared to a placebo dose. Other behavioral risk-taking tasks, such as delay discounting, gambling tasks, and choice tasks, showed mixed findings in response to alcohol. A systematic review by Canning, Schallert, & Larimer (2021) specifically focused on the BART. The authors concluded that BART performance does not change after acute alcohol consumption in an experimental setting. In summary, these systematic reviews suggest that, overall, lab-based risk-taking tasks are generally not sensitive to alcohol and are unlikely to change in response to acute alcohol consumption. The authors of the two systematic reviews (Canning et al., 2021; Weafer & Fillmore, 2016) proposed that future studies should examine impulsivity as a potential factor explaining alcohol's variable effects on risk-taking task performance.

Positive Urgency and Risk-Taking

Positive urgency is defined as the tendency to act rashly under extreme positive emotions (Lynam et al., 2006). Positive urgency is conceptualized as an impulsive behavior trait based on the theoretical model that emotions, both positive and negative, drive risk-taking (Cyders & Smith, 2008; Smith & Cyders, 2016; Weiss et al., 2015). This theory hypothesizes that emotions focus one's attention and prepare an individual for action (Frijda, 2009, 2010; Lang et al., 1992). Thus, emotions signal a need, and the person responds to the need in a way to either reduce (e.g., in the case of negative emotions; Baker, Piper, McCarthy, Majeskie, & Fiore (2004)) or maintain (e.g., in the case of positive emotions; Fredrickson (1998)) the emotional response they are experiencing. According to urgency theory, individuals high in this trait often react to extreme emotional experiences with rash or risky behavior (e.g., alcohol consumption, binge eating, etc.), which often results in negative consequences (Cyders & Smith, 2008).

Robust cross-sectional and longitudinal evidence supports the role of positive urgency in problematic alcohol consumption and risk-taking. Three meta-analyses of cross-sectional studies showed that positive urgency is related to greater problematic alcohol use (Berg et al., 2015; Coskunpinar et al., 2013; Stautz & Cooper, 2014). Longitudinal evidence of adult populations corroborated the cross-sectional evidence. In college students, baseline positive urgency predicted higher alcohol use nine months (Cyders et al., 2009; Settles et al., 2010) and one year (Kaiser et al., 2015) later and alcohol-related problems nine months later (Cyders et al., 2009). However, two studies reported no longitudinal relationship between baseline positive urgency and alcohol consumption three months (Bravo et al., 2018) and one year (Fisher et al., 2020) later. Patients with Alcohol Use Disorder showed greater positive urgency compared to college students with an eating disorder diagnosis and healthy college students (Cyders et al., 2007). Further, in college students, positive urgency was related to increased positive emotion-based risk-taking behaviors (Cyders et al., 2007) and, longitudinally, baseline positive urgency predicted greater positive emotion-based risk-taking behaviors nine months later (Cyders & Smith, 2010).

The way in which positive urgency influences problematic alcohol use is not yet well understood, but research suggests positive urgency increases positive emotion-based risk-taking, contributing to alcohol consumption and subsequent alcohol-related negative consequences. A path analysis showed that positive urgency is related to greater failed control, which in turn is related to higher alcohol-related problems in psychiatric patients without depression (Zaso et al.,

2021). Similarly, another study showed that positive urgency is related to greater impaired control, which in turn is related to drinking frequency/quantity among individuals with low sensitivity to alcohol and greater alcohol use-related problems (Wardell et al., 2015). A longitudinal path analysis with college students showed that parental alcohol problems at baseline are related to greater positive urgency one year later, which in turn is related to a greater likelihood of dating several people at once, which was related to a greater increase in alcohol use compared to the baseline (Salvatore et al., 2016). Also, individuals with Attention-Deficit/Hyperactivity Disorder, a disorder characterized by trouble focusing and impulsive behavior, showed a stronger positive relationship between the variability in state positive urgency and alcohol-related problems than those without the disorder (Pedersen et al., 2019).

A limited number of experimental studies are available that examined the role of positive urgency in alcohol consumption and risk-taking. The first study (Cyders et al., 2010) found that positive urgency is associated with increased alcohol consumption among college students following a positive mood induction compared to a neutral mood induction. The second study (Dinc & Cooper, 2015) found that positive urgency is related to greater alcohol consumption among college students following a positive mood induction targeting high arousal positive emotions but not low arousal positive emotions or neutral emotions. The third study (Cyders et al., 2010) found that positive urgency is associated with greater risk-taking (as measured by the BART; Lejuez et al., 2002) among college students following a positive mood induction as compared to before the positive mood induction. The fourth study (Morrongiello, Stewart, Pope, Pogrebtsova, & Boulay, 2015) found that positive urgency is associated with greater injury-related risk-taking behaviors among children while they ran through an obstacle course; this relationship was found only while the obstacle course was completed after a positive mood induction only and not after a neutral mood induction.

No studies to date have experimentally examined the role positive urgency might play in risk-taking under the influence of alcohol. However, several studies have examined the role of other impulsive personality traits in this relationship, overall suggesting that impulsivity and alcohol consumption might interact to produce increased risk-taking. For example, there was a stronger positive relationship between estimated BAC level and alcohol-related negative consequences following alcohol consumption among individuals with higher levels of impulsivity than those with lower levels of impulsivity (Neal & Carey, 2007). An ecological momentary

assessment (EMA) study corroborated this result by showing a stronger positive relationship between alcohol consumption and alcohol-related problems among college students who were higher in impulsivity (Simons, Gaher, Oliver, Bush, & Palmer, 2005). Also, impulsivity was related to increased impaired inhibitory control under the acute effects of alcohol compared to placebo (Weafer & Fillmore, 2008).

Evidence suggesting that positive emotions drive alcohol consumption and risk-taking provides indirect evidence for the idea that positive urgency might drive such behaviors. For alcohol use, daily diary and EMA studies have shown that greater positive emotions throughout the day are related to increased subsequent alcohol consumption among treatment-seeking heavy drinkers (Armeli et al., 2000), women diagnosed with Borderline Personality Disorder (Jahng et al., 2011), nurses and school teachers (Steptoe & Wardle, 1999), and college students (Dvorak, Pearson, Sargent, Stevenson, & Mfon, 2016; Simons, Dvorak, Batien, & Wray, 2010; Simons et al., 2005). One study that utilized weekly telephone interviews in combination with a daily diary method found that weekly positive emotions are positively related to total weekly alcohol use (Rankin & Maggs, 2006). Another EMA study suggested that the greater variability in experiencing positive emotions throughout the day predicts subsequent alcohol consumption (Mohr et al., 2015).

A similar pattern is found in the relationship between positive emotions and risk-taking. A few experimental studies showed that positive mood induction, compared to neutral or negative mood induction, increases risk-taking among adolescents (Roberts et al., 1998), adults (Deldin & Levin, 1986), and across age groups (young vs. older sample) (Chou et al., 2007). An experimental gambling study that had participants play two rounds of a computerized card game found that greater positive emotions after the first round are related to more reckless betting on the second round (Cummins et al., 2009). A daily diary study with college students also found that greater positive emotions are related to a lower likelihood of condom use (Schroder et al., 2009). Relatedly, several studies showed lower risk-taking perception among individuals reporting positive emotions. In an experimental study with young adults, positive emotions were related to low risk perception towards risk-taking (Haase & Silbereisen, 2011). In a survey study, employed community adults who reported greater positive emotion also showed an increased willingness to risk-taking (Grable & Roszkowski, 2008). Company managers who reported positive emotions were more likely to choose a riskier option even when they perceived situations as risky than the

managers in negative emotions (Williams & Voon, 1999). Also, participants in the positive mood condition were willing to pay more for a lottery ticket regardless of the amount and probability of winning (Arkes et al., 1988). One study examined the moderating effect of impulsivity in the relationship between mood condition and risk perception. Interestingly, young adults with high impulsivity showed lower risk perception during a positive (vs. neutral) mood induction than those with low levels of impulsivity (Haase & Silbereisen, 2011). This accumulating evidence in the literature suggests that positive emotions are an important factor driving alcohol consumption and risk-taking.

Positive Urgency and High Arousal Positive Emotions

Positive urgency-driven risk-taking is likely to be driven by high (vs. low) arousal positive emotions. This idea is consistent with the arousal-based competition theory, which posits that emotional arousal influences human behavior in part by heightening bias towards high priority stimuli (i.e., arousing stimuli) in perceptual and memory processes ("winner-takes-more" approach; Mather & Sutherland, 2011), leading to faster processing and recalling of more details of high arousing stimuli. The theorized role of emotional arousal aligns well with the theory of urgency, as a heightened and salient experience of emotions leads an individual to focus on the need to reduce or maintain the emotional response that they are experiencing, making one more prone to engage in risk-taking (Cyders & Smith, 2008).

There is some evidence that high arousal positive emotions are important for alcohol use and risk-taking, which provides indirect support for their role in positive urgency. In an experimental alcohol consumption study, male college students who endorsed greater tension reduction positive alcohol expectancies consumed more alcohol in both positive and negative high arousal states, but not in the neutral states (Wardell et al., 2012). Emotional arousal showed a V-shaped trend, such that it intensifies as greater positive or negative emotions are experienced, and it is at its lowest when neutral emotions are experienced (Kuppens et al., 2013). Taken together, these studies suggest that valence and arousal are not mutually exclusive to each other, and high arousal states in the context of positive and negative valence are likely to drive alcohol consumption. An EMA study showed that higher daily average arousal was related to a greater likelihood of subsequent alcohol consumption (Peacock et al., 2015). Also, enthusiasm (a type of high arousal positive emotion) induced during mood induction led to more risk-seeking

(Druckman & McDermott, 2008). Further, Pearlstein, Johnson, Modavi, Peckham, & Carver (2019) found that individuals with higher emotion-based impulsivity show reduced accuracy in a response inhibition task completed after a positive mood induction when they experienced high emotional arousal, as measured by pupil dilation. In another study by the same group, such a relationship was not found when emotional arousal was measured by tonic skin conductance level (Johnson et al., 2016). However, some meaningful findings still emerged pointing to the role of positive urgency and high arousal positive emotions in risk-taking: For example, the authors found reduced accuracy in response inhibition after the positive mood induction only among individuals with high positive urgency scores (Johnson et al., 2016). This study also found a positive relationship between BART performance (i.e., a proportion of balloons popped) and self-reported high arousal positive emotion ratings, although this relationship was independent of positive urgency. This suggests a great need to pay attention to both positive urgency and high arousal positive emotions in understanding risk-taking under the influence of alcohol. No studies to my knowledge are available to date that have examined the interactive role of positive urgency and acute alcohol effects on risk-taking via changes in emotional arousal.

How to Study Positive Urgency and High Arousal Positive Emotions in the Experimental Alcohol Administration Study

The majority of research to date with positive urgency has used self-report data, which are limited by openness, honesty, and accuracy in reporting. Despite initial promising experimental findings of positive urgency (Cyders et al., 2010; Dinc & Cooper, 2015; Morrongiello et al., 2015), there are several limitations in the field that hamper the progress in the experimental study of positive urgency.

First, the limited progress in understanding the relationship between positive urgency and risk-taking in an experimental setting is likely to be influenced by the popular assumption linking negative emotions with negative health behaviors and outcomes and positive emotions with positive health behaviors and outcomes (Um & Cyders, 2019). First, there is a *salience bias* in research and clinical fields, where individuals are more concerned with the role of negative emotions, and not positive emotions, in risk-taking and clinical problems. This leads to an underappreciation of the role that positive emotions play in risk-taking, despite considerable research supporting their role. Second, there is a *matching bias,* where the lay public and

professionals alike tend to associate negative emotions (and their concomitant behaviors) primarily with negative outcomes and positive emotions (and their concomitant behaviors) with positive outcomes, even when the behaviors and outcomes are the same (e.g., getting intoxicated). However, urgency theory and its accumulating evidence suggest that both negative and positive emotions drive rash or risky action, resulting in negative outcomes (Cyders & Smith, 2008; Smith & Cyders, 2016). Relatedly, there is a strong focus on emotional valence in predicting differential health outcomes and behaviors without accounting for the role of emotional arousal. Emotion is comprised of both valence (unpleasant to pleasant) and arousal (calm to excited), which are related to each other (Barrett & Russell, 2005; Russell, 1980). This trend leads to the underappreciation of high arousal positive emotions and, thus, positive urgency, in risk models, despite the robust evidence suggesting significant clinical implications.

Second, existing positive mood inductions are effective in inducing arousal to moderate to large degrees (Fernández-Aguilar et al., 2019; Um, Revilla, Oglesby, et al., unpublished data); however, they are often not designed to effectively elicit risk-taking (Um, Revilla, & Cyders, under review). Many times, studies focus on the valence dimension of emotion and aim primarily to induce positive emotions without also inducing arousal. If high arousal positive emotions are necessary for positive urgency, positive mood inductions that induce both positive valence and arousal are necessary to induce risk-taking in the laboratory. Two recent meta-analyses sought to examine whether or not existing mood induction procedures also include arousal and whether the same procedures can induce risk-taking: The authors found that although positive mood inductions also induce arousal (Um et al., unpublished data), they do not induce risk-taking (Um, Revilla, & Cyders, under review). This notion is further bolstered by the study by Dinc & Cooper (2015) that was described earlier. Their study had three mood induction conditions: high arousal positive emotions targeting excitement, low arousal positive emotions targeting calmness and relaxation, and neutral emotions. In addition, they measured emotions in two domains, energetic arousal measuring high arousal positive emotions (i.e., assessing arousal domain of emotions) and hedonic tone measuring overall pleasantness (i.e., assessing valence domain of emotions). In terms of the effectiveness of mood induction conditions, they found that the increase in energetic arousal ratings was only observed in mood inductions targeting high arousal positive emotions; in contrast, the increase in hedonic tone was observed in both mood inductions targeting high and low arousal positive emotions. Of the three conditions, higher positive urgency was related to greater alcohol

consumption only in the mood induction targeting high arousal positive emotions. The evidence shows that the specificity of targeting and accuracy of measuring high arousal positive emotion in the experimental setting are critical.

Third, most positive mood inductions are passive and fail to use more powerful, ecologically valid, and personally relevant emotional stimuli. Common methods to induce positive emotions in the experimental setting include film clips, guided imagery, autobiographical recall, emotional images, false positive feedback, and emotional sounds. These methods tend to have induction materials that have been empirically validated to induce specific emotions. For example, mood inductions with film clips tend to come from a set of films introduced in the study by Hewig et al. (2005) that validated various film clips for their emotional content. Mood inductions with guided imagery tend to use the Velten mood induction, which asks participants to feel the emotions in a set of statements that gradually increase in their emotional content (Velten, 1968). Mood inductions with emotional images tend to use the International Affective Picture System (IAPS), which includes normative emotional images based on valence, arousal, and dominance (Lang et al., 1997). The benefit of using these standardized emotional stimuli is that these methods are empirically validated to induce specific emotions. However, the limitations of these methods are that, due to the strong focus on standardization, these emotional stimuli may not be particularly ecologically valid (e.g., emotional stimuli may be outdated for the current generation of participants) or personally relevant (e.g., stimuli are unfamiliar or irrelevant to participants). A recent meta-analysis showed that when the positive emotional stimuli is personally relevant and arousing to the participants, attentional bias is greater to positive emotional stimuli (Pool et al., 2015). Another meta-analysis showed a large increase in risk-taking under positive mood induction only when false positive feedback was used to induce positive emotions and there was no effect when using other mood induction methods (Um, Revilla, & Cyders, under review), further highlighting the importance of ecological validity and personal relevancy.

Current Study

The overall objective of this dissertation is to generate behavioral evidence concerning how positive urgency influences risk-taking as a function of alcohol consumption and through high arousal positive emotions. This dissertation extends previous experimental studies of positive urgency. First, it is the first study to examine the role of positive urgency in risk-taking under the

influence of alcohol, which is different from previous studies that examined its role in alcohol consumption and risk-taking separately. Second, this study utilizes a between-subjects 2 (mood: positive vs. neutral) x 2 (beverage type: alcohol vs. placebo) design to probe this relationship. Lastly, this study uses a novel mood induction procedure that has shown preliminary effectiveness to target high arousal positive emotions.

This dissertation fits into my program of research examining neurocognitive mechanisms of emotion-based impulsivity, with the long-term goal of integrating emotion-based impulsivity in the prevention and intervention of alcohol-related risk-taking. The results from this study would inform how positive urgency operates under the influence of acute alcohol consumption to influence risk-taking via changes in high arousal positive emotions. This dissertation aims to manipulate this effect in a controlled experimental setting to better test the causal relationships among these variables. If the role of positive urgency in risk-taking is strengthened because of alcohol consumption via an increase in high arousal positive emotions, it has the potential to identify novel ways to reduce alcohol-related risk-taking. For example, such findings could support developing new emotion regulation strategies or adapting existing ones to make them appropriate for individuals with high positive urgency, specifically in modulating high arousal positive emotions. Given the clinical importance concerning negative consequences of positive urgency, generating experimental evidence of positive urgency-based alcohol-related risk-taking in order to ultimately target positive urgency as a novel and promising intervention strategy would minimize societal costs and client suffering.

Aim and Hypotheses

The primary aim of this dissertation is to examine the relationship between positive urgency and subsequent risk-taking as a function of alcohol consumption and through high arousal positive emotions. Three hypotheses are described below to address this aim.

Hypothesis 1

Positive urgency will be more strongly associated with risk-taking in the positive (vs. neutral) mood induction condition.

Hypothesis 2

Positive urgency will be more strongly associated with risk-taking in the alcohol (vs. placebo) condition.

Hypothesis 3

In positive mood induction conditions, the relationship between positive urgency and risk-taking will be mediated by increases in positive emotion, and the relationship between positive urgency and increases in positive emotion will be moderated by alcohol (i.e., more change in the alcohol vs. placebo condition).

METHOD

This was a laboratory-based experimental study examining the interactive role of positive urgency and alcohol consumption in risk-taking. This study was approved by the Institutional Review Board of Indiana University. The study employed a 2 (mood induction: positive, neutral) x 2 (beverage type: alcohol, placebo) between-subjects design. Participants were quasi-randomly assigned to one of the four conditions. They were blinded to the beverage type condition.

Participants

A sample of 59 community-dwelling adults (>/= 21 years of age) were recruited for the study. Study flyers were distributed throughout the university campus and in the community, and the study was advertised in various local online forums. Individuals interested in the study contacted the research team in response to study recruitment materials. Participants completed a phone screening, and if eligible, were invited to participate in one experimental session. They were quasi-randomly assigned into one of the four conditions: 1) positive mood induction with alcohol (n = 15), 2) positive mood induction with placebo beverage (n = 14), 3) neutral mood induction with alcohol (n = 15), and 4) neutral mood induction with placebo beverage (n = 15) (see Table 1 for group characteristics). A recruitment flowsheet and phone screening materials are included in the Appendices A and B.

Inclusion criteria

The inclusion criteria for the study were as follows: healthy men and women, at least 21 years of age (verified by a valid picture identification at the start of the session), drink alcohol at least once a week, drink at least two standard drinks of alcoholic beverage per drinking occasion, able to understand questionnaires and procedures in English, watch football games, and report Indianapolis Colts as one of their three favorite football teams.

Exclusion criteria

The exclusion criteria for the study were as follows: pregnant/breast feeding (pregnancy

status verified at the start of the session via urine pregnancy test), report current or prior diagnosis of Alcohol Use Disorder, report being under medical advice not to consume alcohol or take any medications for which alcohol is a contraindication, not able to provide a negative urine drug screen at the start of the session (substances tested included amphetamines/methamphetamines, benzodiazepines, cocaine, and opiates), report current or prior diagnosis of Bipolar Disorder or Schizophrenia, positive breath alcohol level (BrAC) reading at the start of visit, report being court mandated to not drink alcohol, and report New England Patriots as one of their three favorite football teams.

One participant with a positive benzodiazepine test was allowed to participate in the study because they reported current Sertraline use, which is associated with a high false-positive benzodiazepine test rate (Nasky et al., 2009). Also, three participants with positive amphetamines/methamphetamines tests were allowed to participate in the study because they reported taking stimulant medication (i.e., Adderall, Vyvanse) for attention-deficit/hyperactivity disorders (Post & Kurlansik, 2012).

Measures

See Appendix C for measures.

Demographics

Participants reported their age, biological sex (male or female), gender (man, woman, non-binary/third gender, other), transgender status, sexual orientation, race, and highest degree earned. They also reported their length of alcohol use (i.e., by having participants report a number of years and months of alcohol use) and first age of alcohol use.

UPPS-P impulsive behavior scale (UPPS-P; Lynam, Smith, Whiteside, & Cyders, 2006)

The UPPS-P is a 59-item assessment of five impulsive behavior traits: negative urgency, lack of premeditation, lack of perseveration, sensation seeking, and positive urgency. Only the positive urgency subscale, which consists of 14 items, was used for the analysis in this study. The Likert scale ranges from 1 (Strongly agree) to 4 (Strongly disagree). Items were first reverse-scored, and the mean was computed according to the scoring instructions. Higher positive urgency mean

scores indicate higher positive urgency. The positive urgency subscale showed excellent reliability (Cronbach's α = 0.93) in the current sample, and this is comparable to a previous community sample (Cronbach's α = 0.91; Um, Hershberger, & Cyders, 2019), college student sample (Cronbach's α = 0.94; Cyders et al., 2007), and a sample of individuals diagnosed with alcohol abuse or dependence (Cronbach's α = 0.95; Cyders et al., 2007).

Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993)

The AUDIT is a 10-item screening measure developed by the World Health Organization to identify individuals with harmful alcohol use patterns. Total scores range from 0 to 40. Total scores equal to or greater than 8 are indicative of problematic alcohol use and scores equal to or greater than 16 are indicative of possible alcohol dependence (Saunders et al., 1993). The AUDIT showed acceptable reliability (Cronbach's α = 0.70) in the current sample; this is comparable to a sample of college students who drink alcohol (Cronbach's α = 0.79; Coskunpinar & Cyders, 2012) but lower than a community sample of young adults who drink alcohol weekly (Cronbach's α = 0.83; Rueger, Trela, Palmeri, & King, 2012).

Timeline Follow-Back (TLFB; Sobell & Sobell, 1992)

The TLFB is an interviewer-assisted self-report of one's drinking frequency and quantity over the previous 30 days. Past research showed that past 30-day alcohol use is a reliable representation of annual alcohol consumption (Vakili et al., 2008) and the overall level of drinking (Hoeppner et al., 2010).

A research assistant provided general instruction that encouraged participants to report their previous 30-day alcohol use as accurately as possible. First, participants were instructed to recall "marker days," such as holidays, personal events like vacations or birthdays, important school/work events, and other special occasion, as well as regular drinking days. Next, the research assistant asked for the number of drinks consumed on the drinking days. Participants were asked to provide the number of drinks based on the standard drink unit defined by the National Institute on Alcoholism and Alcohol Abuse (NIAAA). A picture was provided to explain standard drink units: One standard drink is quantified as 12 oz of regular beer with 5% alcohol content, 5 oz of wine with 12% alcohol content, and 1.5 oz of distilled spirits with 50% alcohol content (NIAAA,

2021). Total drinking days and total number of drinks across the previous 30 days were calculated.

Self-Assessment Manikin (SAM; Bradley & Lang, 1994)

The SAM is a self-report measure that assesses emotions separately in three dimensions: valence (1 = negative to 9 = positive), arousal (1 = not aroused to 9 = completely aroused), and dominance (1 = low dominance to 9 = high dominance). In this study, only valence and arousal were used. The SAM shows five pictorial figures that represent different degrees of valence and arousal, and participants were asked to select the number based on their emotional experience *right now, at the present moment*. The SAM was used to examine the effectiveness of mood induction procedures and was administered four times throughout the session (at the beginning of the session, before the mood induction, after the mood induction, after completion of the BART task). Past research showed that the SAM measures the increase in emotional arousal in response to a positive film mood induction compared to baseline (Ritz et al., 2005), which is the mood induction method that was used in this dissertation.

Alcohol Craving

Alcohol craving in the moment was measured by asking participants to rate their level of craving in response to the statement "I really CRAVE another drink right now" using a Likert scale from 0 to 100. This one item was drawn from the Alcohol Urge Questionnaire, which is a sensitive state measurement for alcohol craving (MacKillop, 2006). Alcohol craving was administered one time after the mood induction.

Patient Health Questionnaire (PHQ-9; Kroenke, Spitzer, & Williams, 2001)

The PHQ-9 is a 9-item self-report measure that assesses depression severity. The Likert scale ranges from 0 (not at all) to 3 (nearly every day). Total scores range between 0 to 27. A total score less than 4 represents minimal depression, 5-9 represents mild depression, 10-14 represents moderate depression, 15-19 represents moderately severe depression, and 20-27 represents severe depression (Kroenke et al., 2001). The PHQ-9 showed acceptable reliability (Cronbach's $\alpha = 0.69$) in the current sample, which is comparable to a study with college students (Cronbach's $\alpha = 0.71$; Dunn et al., 2018) but lower than the original sample consisting of primary care and patients in an

OB/GYN clinic (Cronbach's α = 0.89, 0.86, respectively; Kroenke et al., 2001).

Generalized Anxiety Disorder-7 (GAD-7; Spitzer, Kroenke, Williams, & Lowe, 2006)

The GAD-7 is a self-report measure that assesses anxiety severity. The Likert scale ranges from 0 (not at all) to 3 (nearly every day). Total scores range between 0 to 21. A total score less than 4 represents minimal anxiety, 5-9 represents mild anxiety, 10-14 represents moderate anxiety, and 15-21 represent severe anxiety (Spitzer et al., 2006). The GAD-7 showed acceptable reliability (Cronbach's α = 0.79) in the current sample; however, this is lower than the sample of primary care patients (Cronbach's α = 0.92) (Spitzer et al., 2006) and three cohorts of college students (Cronbach's αs = 0.91 – 0.93) (Byrd-Bredbenner et al., 2020).

Manipulation check

Seven manipulation check items assessed participants' familiarity of and enjoyment from the sport game videos, degree of identification as an Indianapolis Colts fan, effects of the beverage they consumed, and their guess of which beverage (alcoholic vs. placebo) they consumed.

Balloon Analogue Risk Task (BART; Lejuez et al., 2002)

The BART is a laboratory-based measure of general risk-taking. In this computerized task, participants see a balloon on a computer screen. The task includes 30 balloons. Each balloon has a different number of pumps associated with the explosion point, which could occur as soon as after the first pump and is unknown to the participants. The study participants were instructed to pump up a balloon, in which they earned one cent per pump. They can stop pumping the balloon at any time to collect the money. They were told that each balloon will explode at unknown number of pumps. If the balloon popped before they collect the money, they lose the money that they earned from that balloon. If they collected the money before the balloon pops, they earn the money from that balloon. They were informed that they will collect the total amount earned from this task in addition to the amount that they earned from study participation at the end of the experimental session. In this study, participants earned between $3.50 and $13.65. The decision to pay for both study participation and BART performance was made because previous research showed that participants engage more with the BART when they were compensated for both than those who

were only compensated for their BART performance and those who were not paid at all (Ferrey & Mishra, 2014).

Continued pumping of a balloon reflects higher risk-taking behavior; risk-taking is measured by the average number of pumps per balloon excluding the balloons that exploded (Lejuez et al., 2002). The number of pumps on exploded balloons is excluded because the number of pumps are constrained by explosion, making true subject variability in the number of pumps unknown in exploded balloons. The original study by Lejuez and colleagues (2002) found that other potential operationalizations of risk-taking, including number of explosions and unadjusted number of pumps, yield similar results. The BART has been positively related with impulsivity traits and real world risk-taking, including alcohol, cigarette and other drug use, gambling, risky driving, risky sexual behaviors, and stealing (Lejuez et al., 2002). In a hierarchical regression model, only the BART, and not response inhibition and delay discounting tasks, predicted alcohol use and problems among social drinkers (Fernie et al., 2010).

Procedures

Participants deemed eligible after the phone screening were invited for the in-person experimental session. Participants were randomized into one of the four experimental conditions (positive/alcohol, positive/placebo, neutral/alcohol, and neutral/placebo) prior to the study session. The random assignment order was generated using an algorithm from http://www.keamk.com/random-team-generator, stratifying across gender. Upon arrival to the laboratory and after completing the informed consent, participants **1)** completed a BrAC level test using a Drager Alcotest breathalyzer; **2)** provided a urine sample to complete drug and pregnancy (women only) "dip stick" tests; **3)** completed the demographics, UPPS-P (Lynam et al., 2006), AUDIT (Saunders et al., 1993), TLFB (Rueger et al., 2012), PHQ-9, (Kroenke et al., 2001), GAD-7 (Spitzer et al., 2006), and baseline SAM (Bradley & Lang, 1994) measures; **4)** completed the 10-minute emotion neutralizing task; **5)** completed pre-mood induction SAM; **6)** completed their assigned mood induction (positive or neutral) while consuming their assigned beverage (alcohol or placebo); **7)** completed the post-mood induction SAM as well as a single-item alcohol craving question; **8)** completed the BART (Lejuez et al., 2002); and **9)** completed the post-BART SAM, manipulation check items and the BrAC test (see Figure 1).

Participants received $15 for session completion. Participants also received up to $13.50 for completing the BART. In order to ensure participant safety, participants who were randomized into the alcohol condition remained in the lab until their BrAC level was at or below 0.02% and they passed a field sobriety test; participants received an additional $25 for this sobering-up period (approx. 2.5 hours).

Emotion neutralizing task

The emotion neutralizing task was included to neutralize participants' emotional states before the mood induction task. This task was included to produce the largest possible increase in emotional arousal (see Um et al., unpublished data). The task included a series of neutrally-rated, low arousal images chosen from the International Affective Pictures System (Lang et al., 1997) with a hidden geometrical shape. Participants were instructed to find the shape hidden inside of each picture to ensure that they sustained their attention to the neutral pictures throughout the task.

Mood induction

The mood induction included film clips in order to maximize emotional arousal, as past meta-analytic evidence suggested that film mood induction is effective in inducing emotional arousal in response to positive emotional stimuli (see Fernández-Aguilar, Navarro-Bravo, Ricarte, Ros, & Latorre (2019); Um et al., unpublished data).

Positive mood induction

The positive mood induction consisted of viewing a 30-minute video clip of the Indianapolis Colt football team defeating the New England Patriots in the 2006 AFC Championship game. The last 30-minute portion starts off with Indianapolis Colts losing the game and, towards the end, the team has an epic comeback against their rival team. This game allowed them to proceed to Super Bowl that they eventually won, which would induce the high arousal positive emotions. This emotion manipulation was designed to induce personally-relevant high arousal positive emotions, as a previous study showed sustained high arousal positive emotions among European soccer fans after the winning of their home team (Jones et al., 2012). Therefore, only the participants who self-reported that the Indianapolis Colts are one of their three favorite

teams were invited to participate in the study, given the geographical location (i.e., Indianapolis) of the study.

A small pilot study that I conducted with 10 participants (mean age = 24.11, *SD* = 7.94; 50% female; 70% White) showed the effectiveness of this positive mood induction: Repeated measures *t*-tests showed significant increases in positive emotions (as measured by the PANAS, Watson et al., 1988) pre to post mood induction ($t(9) = -3.89$, $p = .004$; total pre-positive affect = 32.60, total post-positive affect = 38.50, Cohen's $d = 0.81$ suggesting large effects), but no changes in negative emotions ($t(9) = 1.06$, $p = .32$; total pre-negative affect = 12.50, total post-negative affect = 11.30). Specifically, high arousal positive emotion words (i.e., *excited* and *enthusiastic*) showed a significantly greater increase compared to other positive emotion words ($t(9) = 2.70$, $p = .03$; mean increase in pre to post high arousal positive emotions = 0.90, mean increase in pre to post other positive emotions = 0.51). Further, there were no gender differences in the degree of positive emotion change ($t(7.96) = -0.71$, $p = .50$), suggesting that the mood induction was equally effective across gender.

Neutral mood induction

The neutral mood induction consisted of viewing a 30-minute video clip of an Australian cricket game. The video was chosen due to the relative unfamiliarity of the sports game in American culture. The first 30 minutes of the game were selected.

Beverage type condition

During the phone screening, participants reported their most frequently consumed alcoholic beverage (i.e., beer, wine, or hard liquor), and this information was used to prepare the beverage during the study session. During the informed consent phase, participants were informed that they would receive either an alcoholic beverage or a placebo beverage. Participants were blinded to the type of beverage. Participants consumed their beverage while viewing the mood induction video. In order to control the speed and pattern of drinking across participants, the total amount of beverage was divided into three glasses and each glass of drink was provided every 10 minutes of video viewing. Participants were instructed to finish each glass within each 10-minute period to ensure that they would finish their beverage in the time allotted. Previous studies have

used a similar method of oral alcohol administration (e.g., 10 equal amounts of alcohol every 3 minutes across a 30-minute period (Weissenborn & Duka, 2003), 6 equal amounts of alcohol every 3 minutes across a 15-minute period (George et al., 2005)). The beverage condition was disclosed to participants at the end of the study session.

Alcohol condition

The alcohol beverage was prepared to target a BrAC level of 0.04%, based on sex, weight, and alcohol content of their most frequently consumed alcoholic beverage. Weight was measured using a scale at the beginning of the study session. The amount of alcoholic beverage was computed using a blood alcohol level estimation method provided by the National Highway Traffic Safety Administration (National Highway Traffic Safety Administration, 1994). The timing of the measurement of risk-taking and the target alcohol dose were chosen to maximize positive, high-arousing mood effects.

First, alcohol consumption timing influences emotions. Alcohol consumption follows a biphasic pattern, such that the onset of alcohol consumption begins the ascending limb of Blood Alcohol Concentration (BAC) curve, which is followed by descending limb of BAC curve at about 45-60 minutes post-consumption (Newlin & Thomson, 1990). In the ascending limb of the curve, subjective alcohol responses are characterized by greater positive emotions, such as elation, friendliness, and vigor (thus, high arousal positive emotions) (Hendler et al., 2013; Newlin & Thomson, 1990; Sutker et al., 1983; Westman et al., 2017). In the descending limb of curve, subjective alcohol responses are characterized by greater negative emotions, such as anger, depression, and fatigue. Another study that measured arousal and positive mood on a descending BAC curve reported decreased arousal and no change in positive mood post alcohol consumption compared to the baseline (Weissenborn & Duka, 2003), suggesting the unique emotional property of the ascending limb of BAC curve in experiencing high arousal positive emotions.

Second, alcohol dose affects emotional experiences. A low dose of alcohol (0.24 – 0.29 g/kg with maximal BACs between 0.035 – 0.041%) increases feelings of happiness and stimulation (i.e., high arousal positive emotions) (Dolder et al., 2017). At 0.5 g/kg (average BAC of 0.045%), feelings of sedation are increased and there is no effect on feelings of euphoria (Richards et al., 1999). Similarly, at 0.6 g/kg (average BAC of 0.07%), feelings of anxiety are decreased and there

is no effect on feelings of vigor or elation (George et al., 2005). At 0.08 g/kg, findings are mixed (i.e., increased relaxation, Caswell et al. (2013); increased euphoria, Richards et al. (1999); no effects on vigor or energy, Nagoshi, Wilson, & Rodriguez (1991)).

Given the evidence for timing of alcohol consumption and alcohol dose effects, the alcohol condition in this study measured risk-taking within the window of the ascending limb of the BAC curve and targeted a 0.04% BrAC. The alcohol consumption occurred during the mood induction period that lasted for 30 minutes, and the BART task took place right after for about 10 minutes. The approach in the study was taken to enhance high arousal positive emotions and aligned well with existing evidence.

Placebo condition

The placebo beverage was prepared as if it was targeting a BrAC of 0.04%: The amount of beverage was computed to target a BrAC of 0.04% based on sex, weight, and alcohol content of the participant's most frequently consumed alcoholic beverage; however, the participant was given the equivalent amount of the placebo beverage rather than the alcoholic beverage. The placebo beverage consisted of a non-alcoholic version of the participant's most frequently consumed alcoholic beverage (e.g., non-alcoholic beer, wine, or hard liquor). A placebo beverage was used to control for alcohol expectancy effects (Marlatt & Rohsenow, 1980), and previous work suggests that placebo alone does not affect positive emotions (Fromme et al., 1997; Marlatt & Rohsenow, 1980) or risk-taking (Fromme et al., 1997).

Statistical Analyses

Preliminary Analyses

Preliminary analyses were conducted using SPSS version 27.0 (IBM Corp, 2020). There were 0.005% missing data, and two-way multiple imputation was used to impute missing data using a SPSS syntax that the developers of two-way imputation methods made publicly available (van Ginkel & van der Ark, 2010). The syntax was not able to impute the missing data when a single item measure or a whole measure was missing, and this bug was noted by the developers. Two-way imputation imputes missing data by summing the average of each item across all

available scores in a measurement from respondents and the average of all available items in the measurement for each respondent then subtracting the effects of the average of all available items from all respondents in the measurement (Bernaards & Sijtsma, 2000). The two-way multiple imputation method was found superior to other imputation methods in that the imputation showed closer factor loadings (Bernaards & Sijtsma, 2000) and Cronbach's alpha (van Ginkel, van der Ark, & Sijtsma, 2007) to the complete data.

Key variables (i.e., mean positive urgency scores, SAM arousal, SAM valence, BART scores) for the analyses were examined for normality, using the guideline of skewness < 3 and kurtosis < 10 (Kline, 2016). Group differences were examined using χ^2 tests for categorical variables and one-way analyses of variance (ANOVA), two-way ANOVAs, or independent samples *t*-tests for continuous variables on demographic characteristics, alcohol use-related variables, positive urgency scores, and depression and anxiety severity scores. The effectiveness of the mood induction was examined in two ways. First, repeated measures ANOVAs (time: baseline, pre-mood induction, post-mood induction, and post-BART; by group: positive/alcohol, positive/placebo, neutral/alcohol, and neutral/placebo) were conducted using SAM arousal and valence scores as dependent variables to show time effects of mood manipulation. Second, between-groups two-way ANOVAs (mood induction: positive and neutral; beverage type: alcohol and placebo) were conducted using post-mood induction SAM arousal and valence scores while controlling for the pre-mood induction SAM arousal and valence scores to show group effects of mood manipulation. Analyses for arousal and valence were conducted separately. Effect sizes were deemed small when partial $\eta^2 = 0.01$, moderate when partial $\eta^2 = 0.06$, and large when partial $\eta^2 = 0.14$. Additionally, the effectiveness of study manipulation was examined using χ^2 tests or two-way ANOVAs for responses from the seven manipulation check items.

Alcohol use-related variables (i.e., length of use, first age of use, AUDIT total scores, and past 30-day use) and mental health-related variables (i.e., PHQ-9 total scores and GAD-7 total scores) were used to examine potential group differences.

Main analyses

All continuous variables included were mean centered (Hayes, 2017). Because the PROCESS macro does not standardize variables automatically and to avoid bias in standardization

due to missing data, variables included in each analyses were standardized separately and manually for each analyses and entered into the PROCESS (Hayes, 2017). Effect size were deemed small when standardized $\beta = 0.20$, moderate when standardized $\beta = 0.50$, and large when standardized $\beta = 0.80$. Analyses for the first two hypotheses included the entire sample, $n = 59$. Analyses for Hypothesis 3 and the first sensitivity analysis included only those who completed the positive mood induction, $n = 29$. The second sensitivity analysis included only those who completed the neutral mood induction; two participants did not complete the SAM, making the final sample size for this analysis, $n = 28$. Covariates, such as age and sex, were not included in analyses, as a previous measurement invariance study suggested that these demographic variables do not moderate the relationship between positive urgency and risk-taking (Argyriou et al., 2020). Further, the groups were matched on gender.

Hypothesis 1: Positive urgency will be more strongly associated with risk-taking in the positive (vs. neutral) mood induction condition.

A moderated multiple regression analysis was conducted using the PROCESS macro (Hayes, 2017) and SPSS (IBM Corp, 2020) to examine the main effect of mood induction condition. Mean positive urgency score was the independent variable, and mood induction condition was the dummy coded moderator (positive mood induction was dummy-coded as 1 and neutral mood induction was dummy-coded as 0). The dependent variable was mean number of pumps on unexploded balloons in the BART.

Hypothesis 2: Positive urgency will be more strongly associated with risk-taking in the alcohol (vs. placebo) condition.

A moderated multiple regression analysis was conducted using the PROCESS macro (Hayes, 2017) and SPSS (IBM Corp, 2020) to examine the main effect of beverage type condition. Mean positive urgency score was the independent variable, and beverage type was the dummy coded moderator (alcohol condition was dummy-coded as 1 and placebo condition was dummy-coded as 0). The dependent variable was mean number of pumps on unexploded balloons in the BART.

Hypothesis 3: In positive mood induction condition, the relationship between positive urgency and risk-taking will be mediated by increases in positive emotion, and the relationship between positive urgency and increases in positive emotion will be moderated by alcohol (i.e., more change in the alcohol vs. placebo condition).

A moderated-mediation multiple regression analysis was conducted using the PROCESS macro (Hayes, 2017) and SPSS (IBM Corp, 2020) (Figure 2). Mean positive urgency score was the independent variable, post-mood induction SAM arousal rating was the mediator, and beverage type condition was the dummy coded moderator (alcohol condition was dummy-coded as 1 and placebo condition was dummy-coded as 0). This analysis controlled for pre-mood induction SAM arousal rating. The dependent variable was mean number of pumps on unexploded balloons in the BART.

Sensitivity analyses

Two sensitivity analyses were conducted for Hypothesis 3. The first sensitivity analysis was identical to the analysis for Hypothesis 3 but used post-mood induction SAM valence rating as the mediator and controlled for pre-mood induction SAM valence rating. The second sensitivity analysis was identical to the analysis for Hypothesis 3, but the analysis only included the neutral mood induction condition participants.

RESULTS

Originally, the current study had a recruitment goal of $n = 120$ to have sufficient power to detect effects. For Hypotheses 1 and 2, the proposed sample size would have provided adequate power to detect a small effect ($f^2 = .02$; 80% power, $\alpha < .05$) (Aguinis et al., 2005). For Hypothesis 3, a larger sample size would have been needed to detect a small effect size ($f^2 = .02$); I expected to examine patterns and sizes of relationships to inform my theory and the choice of an adequate sample size for my future studies. However, in March 2020, the home institution instigated a research shutdown to mitigate the spread of COVID-19 in the community. At the time of the shutdown, 59 participants completed the study. Research was not allowed to restart until July 2020, after I had already left my institution. Thus, I was not able to reach the target sample size and the study is underpowered to detect effect. Therefore, in addition to significance testing, effect sizes and patterns of relationship were examined for all study hypotheses in a preliminary fashion.

Complete missing data on the SAM were observed on three participants. Since two-way multiple imputation cannot impute data when the entire data points of a measure from a respondent is missing (van Ginkel & van der Ark, 2010), analyses examining effectiveness of mood induction on SAM ratings and the moderated mediation models for Hypothesis 3 and two sensitivity analyses included a smaller number of participants in each condition (positive/alcohol $n = 14$, positive/placebo $n = 14$, neutral/alcohol $n = 15$, and neutral/placebo $n = 13$).

Preliminary Analyses

Key variables (i.e., mean positive urgency scores, SAM arousal, SAM valence, BART scores) for the analyses were deemed normally distributed.

Group differences

There were no statistically significant group differences across the four groups (i.e., positive/alcohol, positive/placebo, neutral/alcohol, and neutral/placebo) in demographic variables, alcohol use-related variables, positive urgency, BART scores, and depression and anxiety severity scores, ps = .17 – .96 (Table 1). Because Hypothesis 1 collapsed groups based on mood induction condition and Hypothesis 2 collapsed groups based on beverage type condition,

group differences were also compared between the collapsed groups (i.e., positive mood induction vs. neutral mood induction groups and alcohol condition vs. placebo condition groups) (Table 2). Again, there were no significant group differences on demographics and alcohol-related variables, *p*s = .06 – .93. There were moderate differences between mood induction groups that fell short of significance ($p < .10$) in the following variables: the neutral mood induction group showed a greater total number of drinks in the past 30 days ($p = 0.09$, Cohen's $d = 0.45$) and a greater total drinking days in the past 30 days ($p = 0.06$, Cohen's $d = 0.51$) than the positive mood induction group. There were moderate differences between beverage type groups that fell short of significance ($p < .10$) in the following variables: the placebo group showed an older first age of drinking ($p = 0.09$, Cohen's $d = 0.44$), greater total GAD-7 scores ($p = 0.08$, Cohen's $d = 0.47$), and greater positive urgency scores ($p = 0.08$, Cohen's $d = 0.46$) than the alcohol group.

Effectiveness of mood induction

Emotional arousal

First, a repeated measures ANOVA (time: baseline, pre-mood induction, post-mood induction, and post-BART by group: positive/alcohol, positive/placebo, neutral/alcohol, and neutral/placebo) was conducted to examine the time effects of mood manipulation. Mauchly's test of sphericity was violated, $\chi^2(5) = 0.35$, $p < .001$. Therefore, Greenhouse-Geisser corrected tests were reported ($\varepsilon = .63$). Levene's test indicated that the equality of error variances can be assumed for the repeated measure (i.e., SAM arousal). There was a significant interaction effect between time and group for arousal, $F(5.63, 97.57) = 3.96$, $p = .002$, partial $\eta^2 = 0.19$ (Figure 3a). This large effect indicated that experimental manipulation differentially affected arousal from each group across time. Specifically, in the positive/alcohol group, arousal ratings were significantly higher at the post-mood induction and post BART compared to the baseline ($p < .001$ for the post-mood induction; $p < .002$ for the post-BART, respectively) and pre-mood induction ($p < .007$ for the post-mood induction; $p < .001$ for the post-BART, respectively) (Table 3). In the positive/placebo group, arousal ratings were significantly higher at the post-mood induction compared to pre-mood induction ($p = .03$) and post-BART ($p = .006$). Both neutral/alcohol and neutral/placebo groups did not show significant differences in arousal ratings across time (*p*s < .161 – 1.00). There was a significant, large main effect of time on SAM arousal rating, $F(1.88, 97.57) = 16.91$, $p < .001$,

partial $\eta^2 = 0.25$. The pair-wise comparison showed that SAM arousal ratings at the post-mood induction and the post-BART were significantly higher than at baseline ($p < .001$ for post-mood induction, $p = .007$ for post-BART) and at pre-mood induction ($p < .001$ for both post-mood induction and post-BART) (Table 3). There was no significant main effect of group on SAM arousal rating, $F(3, 52) = .16$, $p = .92$.

Second, a two-way ANOVA (mood induction by beverage type) was conducted to examine the group effects of mood manipulation by examining the post-mood induction SAM arousal ratings while controlling for the pre-mood induction SAM arousal ratings. The Levene's test indicated that the equality of error variances can be assumed for the dependent variable (i.e., SAM arousal). There was a significant main effect of mood induction on arousal, $F(1, 52) = 16.35$, $p < .001$, partial $\eta^2 = 0.24$ (Figure 4(a); Table 3). Post-hoc Bonferroni comparison suggested that post-mood induction arousal was significantly higher in the positive mood induction group compared to the neutral mood induction group, $p < .001$. There was no significant main effect of beverage type on post-mood induction arousal, $F(1, 52) = 1.02$, $p = .32$, partial $\eta^2 = 0.02$. There was no significant interaction between mood induction (positive vs. neutral) and beverage type (alcohol vs. placebo) for post-mood induction arousal, $F(1,52) = 0.16$, $p = .59$, partial $\eta^2 = 0.00$.

Emotional valence

First, a repeated measures ANOVA (time by group) was conducted to examine the time effects of mood manipulation. Mauchly's test of sphericity had been violated, χ^2 (5) = 0.62, $p < .001$. Therefore, Greenhouse-Geisser corrected tests were reported ($\varepsilon = .81$). Levene's test indicated that the equality of error variances can be assumed for the repeated measure (i.e., SAM valence). There was a significant interaction effect between time and group, $F(7.26, 125.86) = 3.28$, $p = .003$, partial $\eta^2 = 0.16$ (Figure 3b). This large effect indicated that experimental manipulation differentially affected in-the-moment measurement of valence from each group across time. Specifically, in the positive/alcohol group, valence ratings were significantly higher at the post-mood induction compared to baseline ($p = .03$) and pre-mood induction ($p = .002$) (Table 3). In the positive/placebo group, valence ratings were significantly higher at the post-mood induction compared to baseline ($p = .03$), pre-mood induction ($p = .02$), and post-BART ($p = .001$). Both neutral/alcohol and neutral/placebo groups did not show significant differences in valence ratings across time ($ps < .063 – 1.00$). There was a significant main effect of time on SAM valence

ratings, $F(2.42, 125.86) = 14.39$, $p < .001$, partial $\eta^2 = 0.22$. The large effect revealed that SAM valence ratings at the post-mood induction were significantly higher than the baseline ($p < .001$), the pre-mood induction ($p < .001$), and the post-BART ($p = .001$) (Table 3). The post-BART was significantly higher than the pre-mood induction ($p = .01$). There was no significant main effect of group on SAM valence rating, $F(3,52) = .90$, $p = .45$, suggesting that the valence ratings among groups did not differ with each other when valence ratings of the four time points combined in each group were compared.

Second, a two-way ANOVA (mood induction by beverage type) was conducted to examine the group effects of mood manipulation by examining the post-mood induction SAM valence ratings while controlling for the pre-mood induction SAM valence ratings. Levene's test indicated that the equality of error variances can be assumed for the dependent variable (i.e., SAM valence). There was a significant main effect of mood induction on post-mood induction valence, $F(1, 52) = 9.32$, $p = .004$, partial $\eta^2 = 0.15$ (Figure 4(b); Table 3). Post-hoc Bonferroni comparison suggested that the post-mood induction valence was higher in the positive mood induction compared to the neutral mood induction, $p < .01$. There was no significant main effect of beverage type on post-mood induction valence, $F(1, 52) = 0.72$, $p = .40$, partial $\eta^2 = 0.01$. There was no significant interaction between mood induction (positive vs. neutral) and beverage type (alcohol vs. placebo) for post-mood induction valence, $F(1,52) = 1.52$, $p = .22$, partial $\eta^2 = 0.03$.

Manipulation checks

Mood induction

The sports game clip for the positive mood induction was familiar to about 83% of the participants while the video clip for the neutral mood induction was familiar to about 13% of the participants. There was a significant, large main effect of mood induction condition on the degree of enjoyment from watching the sports game, $F(1,55) = 40.42$, $p < .001$, partial $\eta^2 = 0.42$ (Table 4; Figure 5a). The main effect of beverage type and the interaction effect between mood induction and beverage type were not significant. Bonferroni post-hoc comparison showed that the positive mood induction groups rated their enjoyment significantly higher than the neutral mood induction groups, $p < .001$. There was a significant, large main effect of mood induction condition on the degree of identification as a Colts fan, $F(1,55) = 7.46$, $p = .008$, partial $\eta^2 = 0.12$ (Table 4; Figure

5b). Bonferroni post-hoc comparison showed that the positive mood induction groups reported greater identification as a Colts fan compared to the neutral mood induction groups, $p = .008$.

Beverage consumption

There was a significant, large main effect of beverage type condition on the BrAC tests at the end of the study session, $F(1,55) = 332.893$, $p < .001$, partial $\eta^2 = 0.86$ (Table 4; Figure 5c). Bonferroni post-hoc comparisons suggested that the alcohol groups showed higher BrAC levels compared to the placebo groups, $p < .001$. The BrAC levels of positive/alcohol group ranged between 0.017% - 0.047% and those of neutral/alcohol group ranged between 0.012% - 0.045%. About 97% of the participants in the alcohol condition guessed that they had consumed an alcoholic beverage, while about 45% of the participants in the placebo condition guessed that they had consumed an alcoholic beverage. There were significant, large main effects of beverage type condition on the subjective report of greater effects of the beverage, $F(1,53) = 25.01$, $p < .001$, partial $\eta^2 = 0.32$ (Table 4; Figure 5d) and feeling intoxicated, $F(1,53) = 16.40$, $p < .001$, partial $\eta^2 = 0.24$ (Table 4; Figure 5e). Bonferroni post-hoc comparisons suggested that alcohol groups showed higher subjective effects of the beverage and feeling intoxicated when compared to the placebo groups, ps $< .001$. Among individuals in the placebo condition, those who incorrectly guessed that they drank alcoholic beverage reported significantly higher ratings of feeling the effects of the beverage ($t(14.48) = 4.94$, $p < .001$, Cohen's $d = 13.09$; guessed alcohol, M (SD) = 30.77 (17.85); guessed placebo, M (SD) = 5.07 (5.97)) and feeling intoxicated ($t(25) = 2.69$, $p = .01$, Cohen's $d = 10.70$; guessed alcohol, M (SD) = 16.23 (11.59); guessed placebo, M (SD) = 5.14 (9.81)) compared to those who correctly guessed that that they drank non-alcoholic beverage. However, there were no group differences between those who guessed correctly and incorrectly on post-mood induction SAM valence ($t(16.36) = -1.10$, $p = .29$), post-mood induction SAM arousal ($t(25) = .59$, $p = .56$) as well as BART performance ($t(27) = -1.34$, $p = .19$).

There was a significant, moderate main effect of beverage type condition on alcohol craving measured after the mood induction, $F(1,48) = 4.89$, $p = .03$, partial $\eta^2 = 0.09$ (Table 4; Figure 5f). Bonferroni post-hoc comparisons suggested that alcohol groups showed higher alcohol craving compared to the placebo groups, $p = .03$.

Main Analyses

Hypothesis 1: Positive urgency will be more strongly associated with risk-taking in the positive (vs. neutral) mood induction condition.

The interaction between mood induction condition and positive urgency was not significant, standardized β (*SE*) = 0.52 (0.31), *95% CI* [-0.09 – 1.14] (Table 5, Figure 6). However, an examination of the pattern of the interaction suggests relationships that differ in direction across the two mood induction conditions: In the positive mood induction condition, positive urgency was not related to BART scores, standardized β (*SE*) = 0.25 (0.15), *95% CI* [-0.06 – 0.55]; however, the pattern was positive in direction and the effect was small. In the neutral mood induction condition, positive urgency was not related to BART scores, standardized β (*SE*) = -0.28 (0.27), *95% CI* [-0.81, 0.25]; however, the pattern was negative in direction and the effect was small.

Hypothesis 2: Positive urgency will be more strongly associated with risk-taking in the alcohol (vs. placebo) condition.

There was no significant interaction between beverage type condition and positive urgency, standardized β (*SE*) = 0.07 (0.28), *95% CI* [-0.49, 0.63] (Table 5, Figure 7). The relationship between positive urgency and BART scores was not significant in either condition (alcohol condition: standardized β (*SE*) = 0.18 (0.18), *95% CI* [-0.18, 0.53]; placebo condition: standardized β (*SE*) = 0.11 (0.22), *95% CI* [-0.33, 0.54]). The patterns from both conditions suggested a positive direction of the relationship, and the effects were small.

Hypothesis 3: In positive mood induction condition, the relationship between positive urgency and risk-taking will be mediated by increases in positive emotion, and the relationship between positive urgency and increases in positive emotion will be moderated by alcohol (i.e., more change in the alcohol vs. placebo condition).

The moderated mediation model was not statistically significant. In both beverage type conditions, positive urgency was not related to post-mood induction SAM arousal ratings. However, an examination of the pattern of the interaction suggests relationships that differ in direction across the two beverage type conditions (standardized β for the interaction (*SE*) = 0.50

(0.41), *95% CI* [-0.34,1.35]) (Table 6, Figure 8(a)). In the alcohol condition, positive urgency was not related to post-mood induction SAM arousal ratings, standardized *β* (*SE*) = 0.17 (0.24), *95% CI* [-0.33, 0.67]; however, the pattern was positive in direction and the effect was small. In the placebo condition, positive urgency was not related to post-mood induction SAM arousal ratings, standardized *β* (*SE*) = -0.34 (0.33), *95% CI* [-1.01, 0.34]; however, the pattern was negative in direction and the effect was small. The post-mood induction SAM arousal ratings were not related to the BART scores, standardized *β* (*SE*) = 0.04 (0.20), *95% CI* [-0.38, 0.46]. In addition, conditional indirect effects by beverage type condition were not significant and were negligible in size (*c'* alcohol, standardized *β* (*SE*) = 0.01 (0.08), *95% CI* [-0.17, 0.12]; *c'* placebo, standardized *β* (*SE*) = -0.01 (0.08), *95% CI* [-0.17, 0.12]).

Sensitivity Analyses for Hypothesis 3

Sensitivity analysis for hypothesis 3 using post-mood induction SAM valence as a mediator in positive mood induction only

The sensitivity analysis was not statistically significant. Beverage type did not significantly moderate the relationship between positive urgency and post-mood induction SAM valence ratings, standardized *β* (*SE*) = 0.65 (0.36), *95% CI* [-0.09, 1.40] (Table 6, Figure 8(b)). The direction of the relationships between positive urgency and post-mood induction SAM valence ratings was the same across the two beverage type conditions, with a significant negative relationship in the placebo condition. In the alcohol condition, positive urgency was not related to the post-mood induction SAM valence ratings, standardized *β* (*SE*) = -0.14 (0.21), *95% CI* [-0.58, 0.29]; however, the pattern was negative in direction and the effect was small. In the placebo condition, positive urgency was significantly negatively related to SAM valence ratings and the effect was large, standardized *β* (*SE*) = -0.80 (0.29), *95% CI* [-1.40, -0.19]. Post-mood induction SAM valence ratings were not related to the BART scores, standardized *β* (*SE*) = 0.03 (0.21), *95% CI* [-0.41, 0.47]. In addition, conditional indirect effects by beverage type were not significant (*c'* alcohol, standardized *β* (*SE*) = -0.01 (0.09), *95% CI* [-0.20, 0.06]; *c'* placebo, standardized *β* (*SE*) = -0.03 (0.18), *95% CI* [-0.43, 0.29]).

Sensitivity analysis for hypothesis 3 including the neutral mood induction only

The sensitivity analysis was not statistically significant. Beverage type did not significantly moderate the relationship between positive urgency and post-mood induction SAM arousal ratings, standardized β (*SE*) = -0.21 (0.24), *95% CI* [-0.70, 0.29] (Table 6, Figure 8(c)). In both conditions, an examination of the pattern of the interaction suggested relationships that were negative in direction. In the alcohol condition, positive urgency was not related to post-mood induction SAM arousal ratings, standardized β (*SE*) = -0.23 (0.17), *95% CI* [-0.57, 0.11]; however, the pattern was negative in direction and the effect was small. In placebo condition, positive urgency was not related to post-mood induction SAM arousal ratings, standardized β (*SE*) = -0.02 (0.17), *95% CI* [-0.38, 0.33]. Post-mood induction SAM arousal ratings were not related to BART scores, standardized β (*SE*) = -0.52 (0.32), 95% CI [-1.17, 0.13]; however, the pattern was negative in direction and the effect was moderate. In addition, conditional indirect effects by beverage type were not significant (*c'* alcohol, standardized β (*SE*) = 0.12 (0.25), *95% CI* [-0.10, 0.87]; *c'* placebo, standardized β (*SE*) = 0.01 (0.07), *95% CI* [-0.15, 0.15]).

DISCUSSION

The overarching goal of this dissertation was to generate behavioral evidence concerning how the interaction between positive urgency and alcohol consumption influences risk-taking via changes in emotional arousal. None of the study hypotheses were supported, suggesting that the relationship between positive urgency and risk-taking is not moderated by positive mood induction or alcohol consumption. These results also suggest that positive urgency and alcohol do not interact to increase risk-taking through changes in emotional arousal. However, it is important to note that the current study only collected half of the proposed sample size due to the COVID-19 research shutdown in March 2020. Thus, because of the limited power to detect effects and in order to avoid making a Type II error, the discussion of findings will also focus on the effect sizes and patterns of relationships found in the current analyses, as the current findings could serve as important preliminary data for future work.

The first hypothesis was not supported: Mood induction condition was not a significant moderator of the relationship between positive urgency and risk-taking. However, the pattern and the effect size of the relationship showed a small, positive relationship in the positive mood induction group and a small, negative relationship in the neutral mood induction group. These findings suggest that emotional context is likely important to study positive urgency in the experimental setting. If the experimental context was high arousal positive emotions, positive urgency would likely to show a positive relationship with behavioral risk-taking. If the experimental context was neutral emotions, positive urgency would likely to show a negative relationship with behavioral risk-taking. This suggests that, consistent with urgency theory (Cyders & Smith, 2008), positive urgency is expressed in a specific emotional context. If no mood induction was used in an experimental study of positive urgency, the varying emotional states of the participants could mask or water down relationships between positive urgency and a risk-taking outcome. Further, this pattern of findings corroborates previous experimental studies that examined the role of positive urgency in risk-taking and showed a positive relationship between positive urgency and risk-taking under positive, but not neutral, mood (Cyders et al., 2010; Morrongiello et al., 2015). These results suggest that positive mood is likely to strengthen the relationship between positive urgency and risk-taking, but only to a small degree. The pattern and size of the relationship might indicate meaningful signal concerning how mood might moderate

the relationship between positive urgency and risk-taking that may be worth examining with a future with a more properly powered sample.

Compared to the neutral mood induction groups, the positive mood induction group showed significant and large increases in both arousal (i.e., more aroused) and valence (i.e., more positive), supporting the effectiveness of the current study's positive mood induction to induce high arousal positive emotions. The results from the manipulation check items further support the effectiveness of the mood induction, in that the positive mood induction group rated that they enjoyed the video clip more than the neutral mood induction group. Typical positive mood induction studies that use film clips tend to target *amusement* (Hewig et al., 2005) or other low arousal positive emotions, which may be why existing positive mood induction studies using film clips did not change behavioral risk-taking in the laboratory setting. Given that the current study specifically targeted high arousal positive emotions using a film clip that is highly relevant to the participants (e.g., self-identified Colts fans watching the Colts win), the context differs from previous studies and the effects were large. The findings provide important preliminary data to follow up with a larger sample in the future work.

However, it is possible that the mood induction used in this study may not be powerful enough to elicit risk-taking experimentally. A recent meta-analysis that examined the effectiveness of mood inductions in eliciting behavioral risk-taking suggested that using film clips as a positive mood induction is not an effective method to elicit behavioral risk-taking and that false positive feedback is the best mood induction technique to elicit risk-taking under positive emotional states (Um, Revilla, & Cyders, under review). It is possible that its effects on risk-taking could be observed with more power. Similar degrees of a large increase in high arousal positive emotions were shown in previous studies using false positive feedback (Morrongiello et al., 2015) and guided imagery that instructed participants to imagine themselves as protagonists in a high activating positive event combined with high activating background music (Dinc & Cooper, 2015).

Further, although the positive mood induction significantly increased valence and arousal, the emotion neutralizing task failed to match groups in the level of arousal and valence before the mood induction. The emotion neutralizing task was added because a recent meta-analysis showed large effects when emotion changes were compared between positive vs. neutral mood induction groups (Um, Revilla, Oglesby, et al., unpublished data). However, in this dissertation, the emotion neutralizing task increased the variability in arousal and valence compared to the baseline. If the

emotion neutralizing task was effective, more prominent group effects might have shown, especially in changes in valence. Lastly, even though the positive mood induction aimed to increase the high arousal positive emotions by matching participants with the specificity of emotional stimulus, individual variability in emotional experience still existed. Therefore, future studies should examine the effectiveness of the current positive mood induction in eliciting risk-taking in a larger, more powerful sample. Future studies could fine tune the positive mood induction by adding false positive feedback (e.g., adding a comment of how well they are doing when delivering a drink) or by increasing self-relevancy (e.g., instructing participants to imagine themselves as football players in the sports game or the watch party with other Colts fans) as means to increase effects on risk-taking. Future studies could also carefully consider whether including the emotion neutralizing task is warranted and develop more generalizable, but effective, mood induction that can be used more broadly (e.g., having participants cheer for one team that is going to win later on an unfamiliar sports game).

The second hypothesis was not supported: Beverage type was not a significant moderator of the relationship between positive urgency and risk-taking. The relationship was small and positive across both conditions. The finding suggests that the relationship between positive urgency and risk-taking may not differ across the type of beverage consumed. This pattern corroborates several systematic reviews suggesting that BART performance is not affected by acute effects of low-dose alcohol consumption (Harmon et al., 2021; Weafer & Fillmore, 2016) and that BART is not a sensitive behavioral measure of risk-taking change after acute alcohol consumption (Canning et al., 2021). No previous study had examined alcohol as a moderator of the relationship between positive urgency and risk-taking measured by the BART. Typically, positive urgency is considered a risk factor for alcohol use itself (Coskunpinar et al., 2013), and this study suggests that positive urgency does not interact with alcohol consumption to increase risk-taking. In this case, positive urgency is an independent risk factor for both alcohol consumption (Coskunpinar et al., 2013; Cyders et al., 2010; Dinc & Cooper, 2015) and risk-taking (Cyders et al., 2010; Morrongiello et al., 2015), and the effect of positive urgency is not influenced by alcohol consumption. Coupled with the pattern of the first hypothesis, this result suggests that positive urgency is a general risk factor for risk-taking that occurs regardless of whether alcohol consumption is present or not. This suggests that controlling alcohol consumption might not be a viable intervention to reduce the effects of positive urgency.

Alternatively, methodological considerations might also in part explain these null results. First, it is possible that the mean BrAC level of 0.03% in the alcohol consumption group in this current study may not be high enough to probe this relationship and that individual variability in BrAC levels (0.012% - 0.047%) is confounding the results. Also, the range of BrAC level achieved in the current study is wider and lower than the previous study reporting the feeling of happiness and stimulation in response to the range of BAC between 0.035 – 0.041% (Dolder et al., 2017). Therefore, it may not be enough for some participants to experience stimulant effects on the ascending limb of the BAC curve (Hendler et al., 2013; Newlin & Thomson, 1990). Second, BART performance or emotion changes were not sensitive to the alcohol dose given in this study. A qualitative review found that low doses of alcohol (0.035% - 0.071% mean BACs) generally did not change risk-taking measured by BART (Weafer & Fillmore, 2016). Additionally, BART performance did not significantly differ even at higher alcohol doses (Euser et al., 2011; Peacock et al., 2013; Reed et al., 2012; Reynolds et al., 2006), although one systematic review suggested that BART performance was sensitive to higher doses of alcohol (Harmon et al., 2021). A recent systematic review that examined the relationship between BART and various alcohol-related constructs further supports this notion (Canning et al., 2021). The authors of the review concluded that BART scores do not appear to change in response to acute alcohol consumption. Lastly, the current study did not verify whether or not participants were in the ascending limb when they were tested, which could have confounded the results. In sum, lower BrAC levels and wide variabilities in both the BrACs achieved in this study and the timing of the BrAC ascending and descending limbs could have resulted in watering down or masking changes in emotions across participants. Coupled with the accumulating evidence that BART is an insensitive behavioral risk-taking measure in response to acute alcohol effects, probing the role of positive urgency in risk-taking by beverage type was not a fruitful endeavor in the current study. Future studies could use the intravenous alcohol administration to achieve consistent BrACs across participants (Cyders et al., 2020), target a higher, and better controlled, BrAC level whether alcohol is administered orally or intravenously, or administer BART during the ascending limb by systematically measuring the BrAC levels for precision.

The third hypothesis was also not supported. Despite non-significant findings, the current study provides some preliminary evidence that there might be an interaction between positive urgency and beverage type for emotion changes in a larger, more properly powered study. In the

current study, there was a small, positive relationship between positive urgency and emotional arousal in the positive/alcohol condition only. Otherwise, there were small negative relationships between positive urgency and emotional arousal in the positive/placebo condition and across the neutral mood induction conditions, as well as between positive urgency and emotional valence across the positive mood induction conditions. Thus, our findings further support the idea that positive mood inductions, in combination of alcohol consumption, are more likely to show a positive relationship between positive urgency and emotional arousal. The presence of this relationship only in the alcohol/positive condition might explain a previous finding that failed to find a relationship between positive urgency and changes in subjective, in-the-moment emotional experiences in response to positive emotional stimulus (Johnson et al., 2017). Relatedly, another study showed that positive urgency, and not the frequency and quantity of positive emotions, is a unique predictor of risk-taking (Cyders & Coskunpinar, 2010). If the research goal was to understand the relationship between positive urgency and emotional arousal, including both a positive mood induction and alcohol consumption might be important.

However, increased positive arousal states under alcohol consumption were not related to risk-taking measured by the BART. Instead, there were only direct, moderate effects between positive urgency and BART performance in the positive mood induction group. These findings suggest that, while changes in emotional arousal may result from a combination of positive urgency and alcohol consumption, it may not be a focal mechanism that explains the relationship between positive urgency and risk-taking. This suggests that the relationship between positive urgency and risk-taking may function independently of changes in emotional arousal and alcohol consumption. The moderate, direct relationship between positive urgency and risk-taking was only shown in the positive mood induction group regardless of the beverage type. In fact, positive urgency and emotional arousal may be inversely related to risk-taking when positive emotions are not on board. This finding suggests that individuals with high positive urgency become more vulnerable to risk-taking only when they experience high arousal positive emotions because having higher positive urgency does not translate to the greater tendency to risk-taking during the neutral emotional experience. This means that maladaptive behavioral responses to high arousal positive emotions should be examined in research and might be a potential treatment target in the clinical settings, rather than modifying the strength of the arousal itself. It should be noted that the average arousal ratings in the neutral mood induction groups were significantly lower than the positive

mood induction groups, further supporting the role that emotional arousal plays in positive urgency to increase risk-taking. As such, experiencing high arousal positive emotions is indeed an important contextual factor to study positive urgency in the research laboratory; however, the strength of the emotional experience itself does not appear to drive this relationship. Therefore, future experimental studies of positive urgency should aim to induce such emotional experiences among study participants in order to behaviorally measure positive urgency, but modifying emotional expression might not be a key mechanism to target.

Importantly, this study provides evidence that alcohol consumption and emotional arousal may not be key mechanism for future research aimed at targeting and reducing positive urgency-based risk-taking. This is useful, as it suggests the testing of other potential mechanisms that might prove more viable. Based on the existing literature, it is possible that a focal mechanism for how positive urgency influences risk-taking is the difficulty of inhibiting prepotent responses during high arousal positive emotional experiences (Johnson et al., 2016, 2020; Pearlstein et al., 2019) rather than the actual emotional experience itself. Although this possible relationship has not been directly tested in the current dissertation, urgency theory supports this notion. Urgency theory posits that individuals high in urgency often react to extreme emotional experiences with risk-taking to reduce or maintain the emotional experiences (Cyders & Smith, 2008; Smith & Cyders, 2016). Further, urgency traits facilitate learning through a repeated association between extreme emotional experiences and risk-taking coupled with the immediate gain from risk-taking that modulates the emotion in the desired direction (Settles et al., 2010). This learning process may make risk-taking itself the prepotent response in which an individual engages, characterized by the inability to control prepotent responses (i.e., engaging in risk-taking) during the intense emotional experiences. Some indirect evidence points to this possibility. For example, impaired control over drinking fully mediated the relationship between positive urgency and peak BAC among community adults in the free-access intravenous alcohol self-administration study (Vaughan et al., 2019). Among motorcycle riders, those with high impulsivity showed impaired response inhibition measured by a Stroop task and greater risk-taking measured by BART compared to those with low impulsivity (Cheng & Lee, 2012). In an EMA study, the positive relationship between pre-drinking positive emotions and various alcohol use domains (i.e., the likelihood of alcohol consumption, number of drinks on drinking days, and acute AUD symptoms on drinking days) was stronger among those with poor inhibitory control (Dvorak et al., 2016). Interestingly, the systematic review

by Weafer & Fillmore (2016) suggested that alcohol consumption regardless of dosage impairs the inhibitory ability to the prepotent response. Taken together, a possible interaction may exist between positive urgency and alcohol consumption in influencing risk-taking via impaired inhibitory control in positive arousal states.

The degree of identification as a Colts fan significantly differed across groups, such that positive mood induction groups showed the higher identification as Colts fans compared to the neutral mood induction groups. According to the arousal-based competition theory, emotional arousal drives human behavior to recall more details of highly arousing stimuli by increasing the saliency towards the stimuli (Mather & Sutherland, 2011; Sutherland & Mather, 2018). Therefore, it is likely that watching highly arousing content, such as participants' home team winning against their rival team, increased the saliency of their enthusiasm for their home team, making them consider themselves more enthusiastic Colts fans especially given that the question was presented after watching the video clip. Within the positive mood induction groups, the only groups to view the Colts video, the degree of identification as a Colts fan did not differ significantly by beverage type, suggesting that results are not likely to be influenced by this confound. Further, about 13% of participants in the neutral mood induction reported being familiar with the clip. The high response to the familiarity of neutral mood clips could be due to the wording of the question (i.e., "Have you seen the sports game you just watched before?"), in which the participants might interpret as a cricket game in general, not the specific sports game clip provided.

Limitations

There were several limitations to the current study. First, there was a limited power to detect meaningful effects in the study. The study required participants to physically attend the research lab to complete the study session. In March 2020, the home institution instituted a research shutdown to mitigate the spread of COVID-19 in the community, which ended data collection for this study prematurely and resulted in a much smaller sample size than the study intended to target. Initially, a sample size of 120 participants was planned to achieve adequate power for hypotheses 1 and 2 to detect a small effect (f^2 = .02; 80% power, α < .05) (Aguinis et al., 2005); the current study had about one-half of this planned sample size. For hypothesis 3, the study was even more underpowered, as a sample much larger than 120 would have been needed to detect a small effect size (f^2 = .02) given the complexity of the model. Specifically, the small

sample size in this study increases the likelihood of Type II error, assuming that other factors (i.e., significance level, variability in study variables, and magnitude of effects) affecting the error were constant, which results in not rejecting the null hypotheses when there are significant relationships that exist in the data (Banerjee et al., 2009). The likelihood of the Type II errors becomes more concerning given that a meta-analysis found a small effect size ($\bar{r}$ = 0.10) in the positive relationship between impulsivity and BART scores, suggesting that a larger sample size is warranted to detect the signal (Lauriola et al., 2014).

Second, the alcohol consumption manipulation had a few notable limitations. The current study used participants' most frequently consumed alcoholic beverage of choice as the beverage given to increase ecological validity. Since these beverages have different levels of alcohol content, the volume needed to target a BrAC level of 0.04% differed greatly among participants, which led to a varied amount of liquid intake, even after basing the dose on biological sex, weight, and alcohol content of the beverage. This led to varied consumption patterns throughout the drinking period, as some were able to finish each drink (e.g., hard liquor) at the beginning of each 10-minute period while others had to spend the whole 10-minute to finish each drink (e.g., beer). Further, some requested a bathroom break after the mood induction and before completing the BART, which may have interfered with their emotional states. Because this study used oral consumption as a route for alcohol intake to increase the ecological validity, BrAC level varied across the participants, ranging between 0.012% - 0.047%; this limitation of oral dosing is well documented in the literature (Cyders et al., 2020). This variability could have confounded the results. Further, the placebo condition was not as effective because about half of the participants guessed that they did not receive alcohol, which would lead to varied alcohol expectancy effects (Cyders et al., 2020). In fact, those who incorrectly guessed that they drank alcoholic beverage reported significantly higher ratings of feeling the effects of the beverage and feeling intoxicated compared to those who correctly guessed that that they drank non-alcoholic beverage. Therefore, the placebo condition did not successfully control alcohol expectancy effects (Marlatt & Rohsenow, 1980). When those who guessed correctly and incorrectly were compared for positive emotion changes and risk-taking, the results were similar to the previous findings (Fromme et al., 1997; Marlatt & Rohsenow, 1980), indicating that varied alcohol expectancy effects are not likely to influence the current findings.

Third, various individual characteristics may have confounded changes in emotional arousal and risk-taking. For example, individuals with a family history of alcoholism and women

who drink heavily show greater sensitivity to alcohol in the ascending limb of the BAC curve (Newlin & Thomson, 1990; Reed et al., 2012). Individuals with a higher level of impulsivity also show greater stimulant effects of alcohol in the ascending limb of the BAC curve (Leeman et al., 2014; Westman et al., 2017). Further, light drinkers who have low impulsivity reported less subjective stimulant response compared to light drinkers who have high impulsivity and heavy drinkers across the level of impulsivity (Berey et al., 2019). Those who have higher (vs. lower) heart rates in response to alcohol intake show greater positive feelings and higher reward sensitivity (Brunelle et al., 2004). This suggests that participants who have these individual characteristics might have responded differently to alcohol consumption than those who do not, which may have confounded the results. Many of these characteristics were not assessed.

Lastly, there may be limits to generalizability due to the race/ethnic and gender makeup of the sample and emotional stimuli used in the study. Due to the geographical location of the study, a high proportion of the sample was White. The number of men who completed the study was twice as many as women; however, a pilot study that examined the effectiveness of positive mood induction showed no gender differences in changes in high arousal positive emotions in response to the mood induction used here. Also, the emotional stimulus was highly specific and less generalizable, such that participants had to self-report that the Indianapolis Colts are one of their three favorite football teams. Careful consideration was made to the choice of emotional stimulus to specifically induce high arousal positive emotional states. This was done to increase ecological validity, which is a common limitation of laboratory-based paradigms. However, in increasing ecological validity, generalizability may have been compromised to some extent.

Conclusions, Implications, and Future Directions

In conclusion, despite the non-significant findings, the study showed meaningful patterns that can be used as preliminary data for future work. Currently, there are only a handful of studies available that have examined positive urgency experimentally to study its role in risk-taking. This dissertation has a few important and interesting implications. First, future studies could probe these relationships using a properly powered sample size informed by the effect size estimates of this dissertation. Studying positive urgency in positive emotional contexts would be important because varying emotional context would water down or mask the relationship between positive urgency and risk-taking. A properly powered examination of the moderating role of mood induction

manipulation would better inform and guide the experimental examination of positive urgency in future studies.

Second, there are methodological implications for the current study. The elicitation of high arousal positive emotions obtained with the current study design was successful; however, no significant relationships between positive urgency and risk-taking emerged with the current positive mood induction, although a similar pattern from previous studies was found. This could mean that further development is needed for positive mood inductions that can successfully induce high arousal positive emotions to elicit risk-taking in this context. It could also mean that laboratory-based risk-taking tasks other than BART might be better suited to examine the positive urgency and risk-taking relationship in the laboratory setting. For example, future studies could increase the effectiveness of positive mood induction in eliciting risk-taking by incorporating false positive feedback informed by a recent meta-analysis (Um, Revilla, & Cyders, under review) or by using inhibitory control tasks as a measure of risk-taking (Johnson et al., 2016; Pearlstein et al., 2019).

Lastly, current findings showed that emotional arousal is an important context for positive urgency expression and measurement in the laboratory, but it is not a focal mechanism explaining the relationship between positive urgency and risk-taking. Further, positive urgency is a risk factor for risk-taking whether or not alcohol consumption is also present. Therefore, it may not be emotional experience per say that is concerning and needs targeting in research and treatment. It is likely that the maladaptive responses to such emotional experience, which is consistent to the theoretical definition of positive urgency (i.e., rash action in response to extreme positive emotions), warrant further investigation as potential treatment targets. Interventions suggested for positive urgency, such as identifying and learning safer means of indulging in positive mood, are aligned with this idea (Zapolski et al., 2010). Future studies may leverage past research to identify other potential mechanisms of positive urgency. A number of studies have identified potential mechanisms for positive urgency that may be relevant for its relationship to alcohol-related risk-taking including impaired control (Vaughan et al., 2019; Wardell et al., 2015; Zaso et al., 2021), positive expectancy about alcohol consumption (Coskunpinar & Cyders, 2012; Settles et al., 2010; Treloar & McCarthy, 2012), positive beliefs about alcohol (Burton et al., 2012), and difficulties inhibiting prepotent responses (Johnson et al., 2016; Pearlstein et al., 2019), although the majority of findings are from self-report data. This provides a reasonable starting point for the future studies

to study positive urgency and risk-taking under acute alcohol effects in a controlled experimental setting.

These efforts would stimulate experimental investigation of positive urgency, which would broaden the experimental evidence base to inform the development or adaptation of interventions directly targeting positive urgency. In turn, effective positive urgency-based intervention would equip individuals with high positive urgency with skills to respond to their emotions more safely, leading to a lower likelihood of having negative consequences. Understanding and expanding the role of positive urgency in alcohol-related risk-taking would inform treatment directions among individuals suffering from excessive alcohol use and negative alcohol-related consequences in the long term. This endeavor is not an easy task and would require more extensive research in this area; however, this dissertation helped to provide some of the important preliminary evidence that can be used to design future studies to expand positive urgency research in this direction.

Table 1. Group characteristics by demographics, alcohol use-related variables, UPPS-P impulsive personality traits, and depression and anxiety severity

		Positive/Alcohol (*n* = 15)	Positive/Placebo (*n* = 14)	Neutral/Alcohol (*n* = 15)	Neutral/Placebo (*n* = 15)	χ^2 test or one-way ANOVA, *p*-value
Demographics						
Age, *M* (*SD*)		29.20 (13.20)	29.21 (10.13)	27.93 (5.30)	31.33 (13.67)	$F(3,54) = 0.23$, $p = .87$
Gender, *n*	Male	9	10	10	11	$\chi^2(3) = 0.72$, $p = .87$
	Female	6	4	5	4	
Sexual Orientation, *n*	Heterosexual	14	14	15	11	$\chi^2(9) = 10.20$, $p = .34$
	Bisexual	1	0	0	2	
	Other	0	0	0	2	
Race, *n*	Asian	1	2	1	0	$\chi^2(12) = 13.63$, $p = .33$
	Black	0	1	2	4	
	White	14	11	11	10	
	More than one race	0	0	1	0	
	Other	0	0	0	1	
Education, *n*	High school diploma, GED or below	4	4	3	4	$\chi^2(15) = 13.13$, $p = .59$
	Associate degree or vocational degree/license	0	0	1	2	
	Bachelor's degree	8	7	8	6	

Table 1, continued

	Master's degree	2	3	2	1	
	Doctorate, Professional	1	0	1	0	
	Other	0	0	0	2	
Alcohol-related variables						
Length of alcohol use in months, *M* (*SD*)		145.60 (154.22)	131.93 (117.95)	118.50 (62.87)	139.33 (171.48)	$F(3,54) = 0.11$, $p = .96$
First age of drinking, *M* (*SD*)		17.67 (1.50)	18.71 (2.02)	18.33 (1.54)	19.40 (3.85)	$F(3,55) = 1.33$, $p = .27$
AUDIT total, *M* (*SD*)		5.53 (1.88)	6.50 (3.92)	7.07 (3.08)	6.33 (3.81)	$F(3,55) = 0.56$, $p = .64$
TLFB – 30 days	Total number of drinks, *M* (*SD*)	25.80 (20.66)	28.29 (22.85)	39.20 (19.45)	48.50 (66.36)	$F(3,55) = 1.12$, $p = .35$
	Total drinking days, *M* (*SD*)	9.13 (6.88)	8.43 (4.09)	12.60 (5.36)	11.33 (8.10)	$F(3,55) = 1.37$, $p = .26$
Mental Health						
PHQ-9, *M* (*SD*)		2.67 (1.95)	2.38 (2.81)	2.27 (2.12)	3.33 (3.15)	$F(3,54) = 0.42$, $p = .67$
GAD-7, *M* (*SD*)		3.20 (2.27)	4.14 (3.53)	1.87 (2.45)	3.53 (2.75)	$F(3,55) = 1.76$, $p = .17$
Other study related variables						
BART, M (*SD*)		43.52 (15.69)	45.98 (15.57)	43.98 (16.11)	39.72 (10.18)	$F(3,55) = 0.47$, $p = .70$
Positive Urgency, *M* (*SD*)		1.44 (0.69)	1.72 (0.51)	1.33 (0.32)	1.52 (0.36)	$F(3,55) = 1.61$, $p = .20$

Table 2. Group differences of demographics, alcohol use-related variables, UPPS-P impulsive personality traits, and depression and anxiety severity collapsed across (1) positive vs. neutral mood conditions; (2) alcohol vs. placebo beverage conditions

		Mood Induction			**Beverage Type**		
		Positive (*n* = 29)	**Neutral** (*n* = 30)	χ^2 test or independent samples t-test, *p*-value	**Alcohol** (n = 30)	**Placebo** (*n* = 29)	χ^2 test or independent samples t-test, *p*-value
Demographics							
Age, *M* (*SD*)		29.21 (11.61)	26.69 (10.47)	$t(56) = 0.17$, $p = .87$	30.31 (11.93)	28.59 (10.03)	$t(56) = 0.60$, $p = .55$
Gender, *n*	Men	19	21	$\chi^2(1) = 0.71$, $p = .79$	19	21	$\chi^2(1) = 0.56$, $p = .46$
	Women	10	9		11	8	
Sexual Orientation, *n*	Heterosexual	28	26	$\chi^2(3) = 2.39$, $p = .50$			$\chi^2(3) = 2.61$, $p = .46$
	Bisexual	1	2		29	25	
	Other	0	2		1	2	
Race, *n*	Asian	3	1	$\chi^2(4) = 6.90$, $p = .14$	2	2	$\chi^2(4) = 3.62$, $p = .46$
	Black	1	6		2	5	
	White	25	21		25	21	
	More than one race	0	1		1	0	
	Other	0	1		0	1	
Education, *n*	High school diploma, GED or below	8	7	$\chi^2(5) = 5.59$, $p = .35$	7	8	$\chi^2(5) = 4.70$, $p = .45$

Table 2, continued

	Associate degree or vocational degree/license	0	3		1	2	
	Bachelor's degree	15	14		16	13	
	Master's degree	5	3		4	4	
	Doctorate, Professional	1	1		2	0	
	Other	0	2		0	2	
Alcohol-related variables							
Length of alcohol use in months, *M* (*SD*)		139.00 (135.64)	129.28 (129.04)	$t(56) = -0.28$, $p = .78$	132.52 (117.97)	135.76 (145.52)	$t(56) = 0.09$, $p = .93$
First age of drinking, *M* (*SD*)		18.17 (1.81)	18.87 (2.93)	$t(57) = 1.09$, $p = .28$	18.00 (1.53)	19.07 (3.07)	$t(40.81) = 1.68$, $p = .10$
AUDIT total, *M* (*SD*)		6.00 (3.02)	6.70 (3.43)	$t(57) = 0.83$, $p = .40$	6.30 (2.63)	6.41 (3.79)	$t(57) = 0.13$, $p = .89$
TLFB – 30 days	Total number of drinks, *M* (*SD*)	27.00 (21.39)	43.85 (48.28)	$t(57) = 1.72$, $p = .09$	32.50 (20.86)	38.74 (50.49)	$t(57) = 0.62$, $p = .54$
	Total drinking days, *M* (*SD*)	8.79 (5.61)	11.97 (6.78)	$t(57) = 1.96$, $p = .06$	10.87 (6.31)	9.93 (6.54)	$t(57) = -0.56$, $p = .58$
Mental Health							
PHQ-9, *M* (*SD*)		2.54 (2.35)	2.80 (2.70)	$t(56) = 0.40$, $p = .69$	2.47 (2.01)	2.89 (2.99)	$t(46.90) = 0.63$, $p = .53$
GAD-7, *M* (*SD*)		3.66 (2.93)	2.70 (2.69)	$t(1,57) = -1.30$, $p = .20$	2.53 (2.42)	3.83 (3.11)	$t(57) = 1.79$, $p = .08$

Table 2, continued

Other study related variables							
BART, *M* (*SD*)		44.71 (15.40)	41.85 (13.42)	$t(1,57) = -0.76$, $p = .45$	3.75 (15.63)	42.74 (13.21)	$t(57) = -0.27$, $p = .79$
Positive Urgency, *M* (*SD*)		1.58 (0.62)	1.42 (0.35)	$t(57) = -1.91$, $p = .24$	1.39 (0.53)	1.62 (0.45)	$t(57) = 1.78$, $p = .08$

Table 3. SAM arousal and valence rating (1) across four time points and (2) between groups at post mood induction

	Arousal, *M* (*SD*)					**Valence, *M* (*SD*)**				
	Positive/ Alcohol	Positive/ Placebo	Neutral/ Alcohol	Neutral/ Placebo	Total	Positive/ Alcohol	Positive/ Placebo	Neutral/ Alcohol	Neutral/ Placebo	Total
Time 1: baseline	3.00 (1.47)	3.79 (2.23)	3.67 (1.80)	3.69 (2.29)	3.54 (1.94)	6.79 (1.48)	6.93 (0.92)	7.20 (1.08)	7.23 (1.59)	7.04 (1.26)
Time 2: pre-mood induction	2.86 (1.83)	3.36 (1.69)	3.27 (2.02)	4.15 (2.15)	3.39 (1.93)	6.71 (1.27)	5.79 (1.93)	6.93 (1.49)	7.31 (1.44)	6.68 (1.61)
Time 3: post-mood induction	5.29 (2.13)	5.36 (2.06)	4.00 (2.00)	3.92 (1.61)	4.64 (2.03)	8.00 (0.88)	7.79 (0.98)	7.67 (0.98)	7.31 (1.44)	7.70 (1.08)
Time 4: post-BART	5.00 (2.04)	4.43 (2.10)	4.20 (2.34)	4.00 (2.27)	4.41 (2.16)	7.57 (0.94)	6.57 (1.56)	7.67 (1.05)	7.31 (1.38)	7.29 (1.29)
	Mood Induction		Beverage Type			Mood Induction		Beverage Type		
	Positive	Neutral	Alcohol	Placebo		Positive	Neutral	Alcohol	Placebo	
	5.34 (2.02)	3.96 (1.80)	4.67 (2.11)	4.67 (1.96)		7.90 (0.90)	7.50 (1.20)	7.83 (0.91)	7.56 (1.22)	

Table 4. Manipulation check ratings

	Positive/Alcohol	Positive/Placebo	Neutral/Alcohol	Neutral/Placebo
Enjoying the video clip, *M* (*SD*)	92.20 (11.49)	81.93 (16.95)	51.47 (25.56)	51.60 (27.49)
Degree of identification as a Colts fan, *M* (*SD*)	82.07 (13.63)	70.43 (17.78)	66.27 (21.28)	57.27 (26.38)
BrAC, *M* (*SD*)	0.029 (0.009);	0.00 (0.00)	0.030 (0.009)	0.00 (0.00)
Subjective beverage effects, *M* (*SD*)	45.60 (21.82)	19.57 (17.02)	42.87 (21.48)	15.15 (20.08)
Feeling of intoxication, *M* (*SD*)	23.80 (11.76)	13.57 (12.12)	24.40 (15.38)	7.15 (11.19)
Alcohol craving post-mood induction, *M* (*SD*)	32.64 (24.72)	27.54 (21.42)	42.42 (26.71)	19.00 (19.56)

Table 5. Hypotheses 1 and 2 with BART as a dependent variable

	BART		
	Standardized *β*	**Standardized *SE***	**95% CI**
Hypothesis 1: Mood induction as a moderator			
Intercept	-0.14	0.18	-0.51 – 0.23
Positive Urgency	-0.28	0.27	-0.81 – 0.25
Interaction: Positive urgency x mood induction	0.52	0.31	-0.09 – 1.14
Conditional effect of neutral mood	-0.28	0.27	-0.81 – 0.25
Conditional effect of positive mood	0.25	0.15	-0.06 – 0.55
Hypothesis 2: Beverage type as a moderator			
Intercept	-0.60	0.20	-0.45 – 0.33
Positive Urgency	0.11	0.22	-0.33 – 0.54
Interaction: Positive urgency x beverage type	0.07	0.28	-0.49 – 0.63
Conditional effect of placebo	0.11	0.22	-0.33 – 0.54
Conditional effect of alcohol	0.18	0.18	-0.18 – 0.53

Notes. BART included $n = 59$

Table 6. Hypothesis 3 with BART scores as a dependent variable effect size comparison

	Main analysis: *emotional arousal* as a mediator in positive mood induction only			Sensitivity analysis: *emotional valence* as a mediator in positive mood induction only			Sensitivity analysis: emotional arousal as a mediator in *neutral induction* only		
	Stand. *β*	**Stand. *SE***	***95% CI***	**Stand. *β***	**Stand. *SE***	***95% CI***	**Stand. *β***	**Stand. *SE***	***95% CI***
***a*:** PUR → SAM	-0.34	0.33	-1.01 – 0.34	-0.80	0.29	-1.40 – -0.19	-0.02	0.17	-0.38 – 0.33
***a*w*:** Interaction between PUR and beverage type	0.50	0.41	-0.34 – 1.35	0.65	0.36	-0.09 – 1.40	-0.21	0.24	-0.70 – 0.29
***a* (placebo):** PUR → SAM	-0.34	0.33	-1.01 – 0.34	-0.80	0.29	-1.40 – -0.19	-0.02	0.17	-0.38 – 0.33
***a* (alcohol):** PUR → SAM	0.17	0.24	-0.33 – 0.67	-0.14	0.21	-0.58 – 0.29	-0.23	0.17	-0.57 – 0.11
***b*:** SAM → BART	0.04	0.20	-0.38 – 0.46	0.03	0.21	-0.41 – 0.47	-0.52	0.32	-1.17 – 0.13
Direct effect (*c*): PUR → BART	0.31	0.20	-0.09 – 0.71	0.34	0.20	-0.08 – 0.76	-0.33	0.19	-0.73 – 0.06
Indirect effect (*c'*) of placebo consumption: PUR → BART	-0.01	0.08	-0.17 – 0.14	-0.03	0.18	-0.43 – 0.29	0.01	0.07	-0.15 – 0.15
Indirect effect (*c'*) of alcohol consumption: PUR → BART	0.01	0.08	-0.17 – 0.12	-0.01	0.09	-0.20 – 0.06	0.12	0.25	-0.10 – 0.87

Notes. PUR = Positive urgency; Main analysis & sensitivity 1 included $n = 29$; sensitivity 2 included $n = 28$

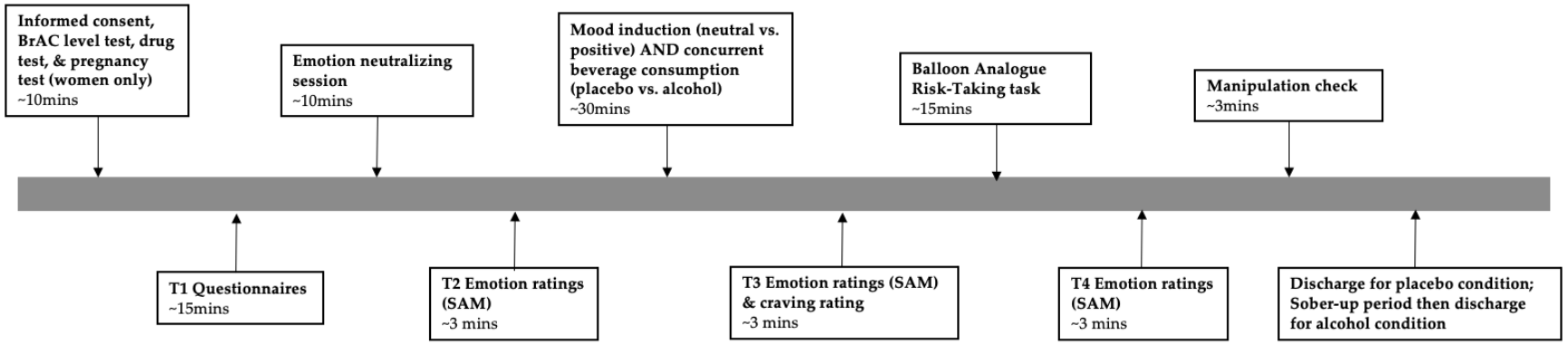


Figure 1. Study Procedures

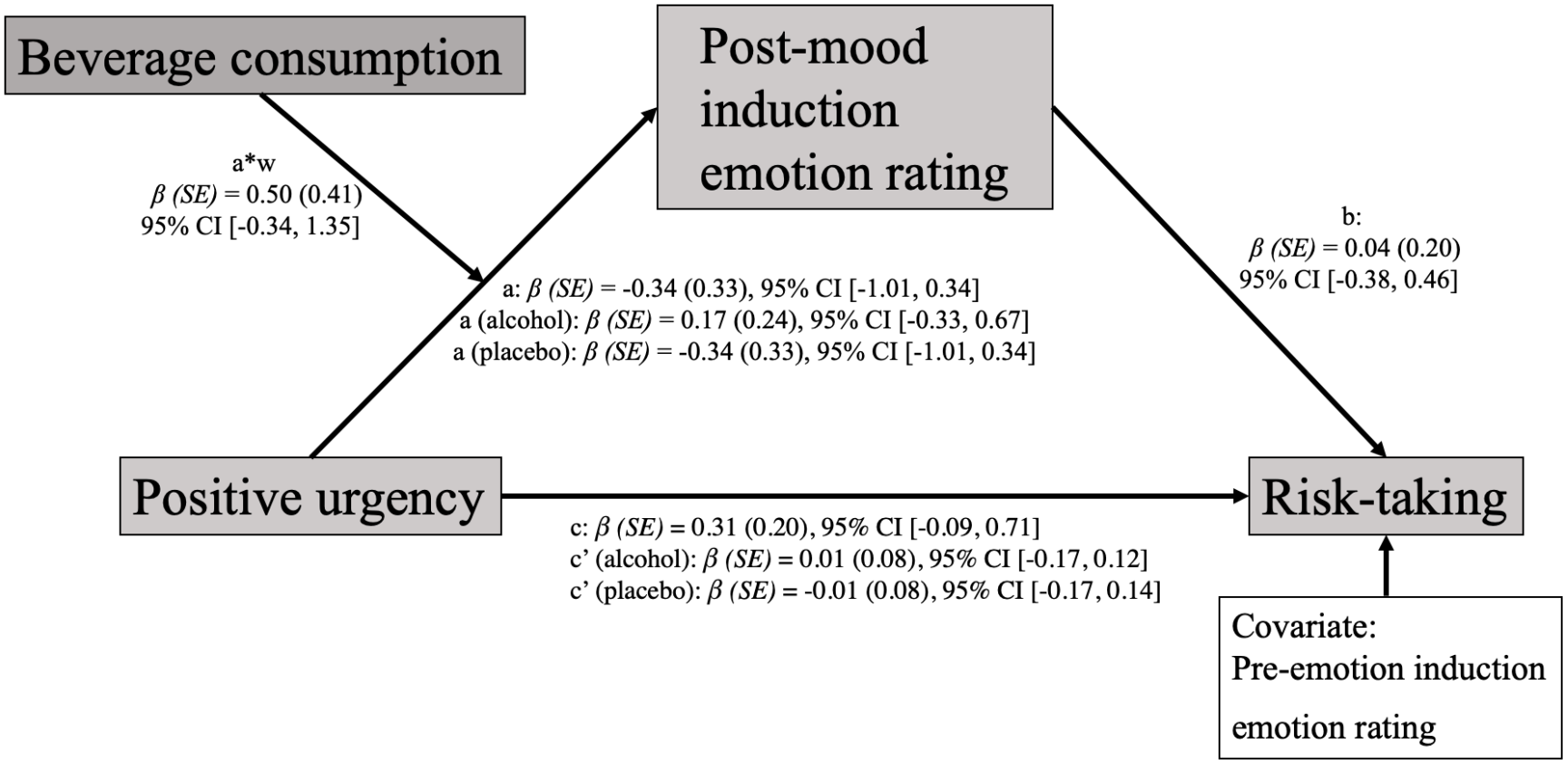
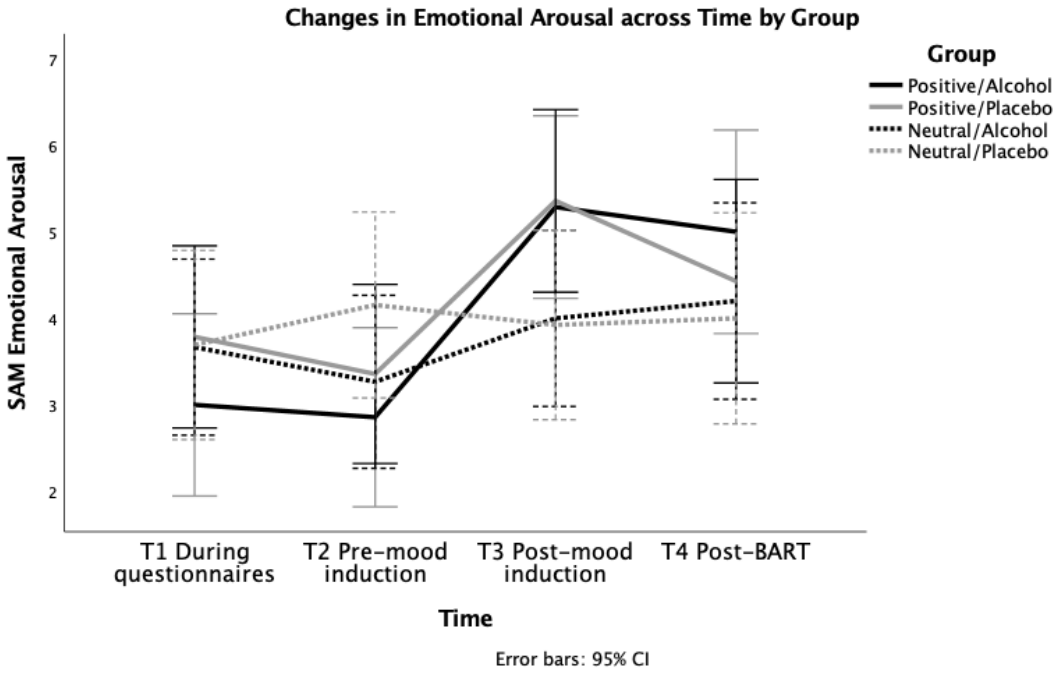


Figure 2. Hypothesis 3 moderated mediation model

(a)



(b)

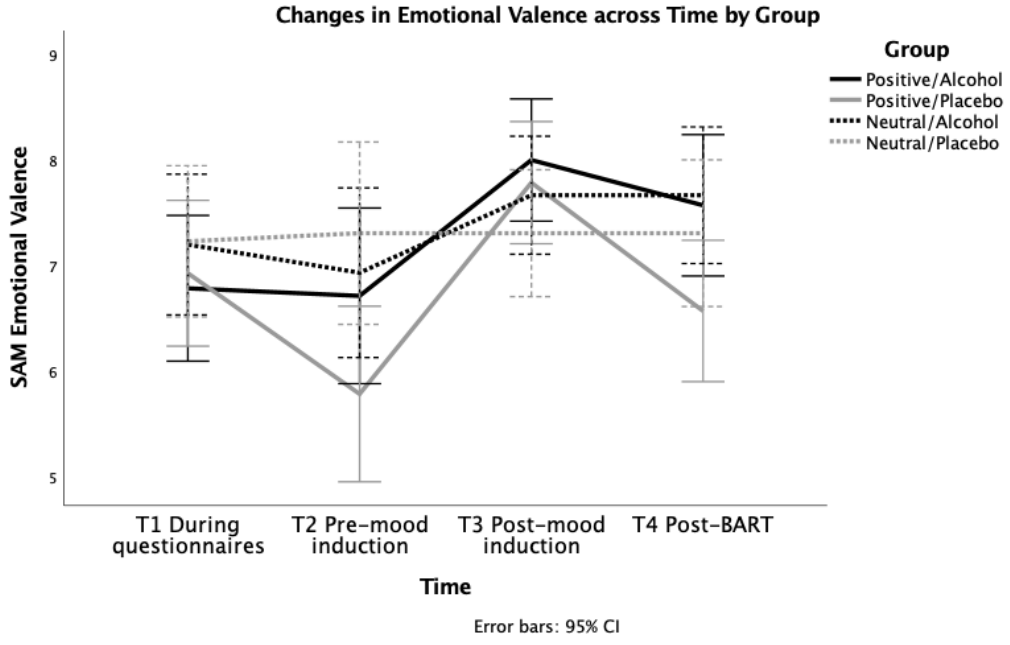
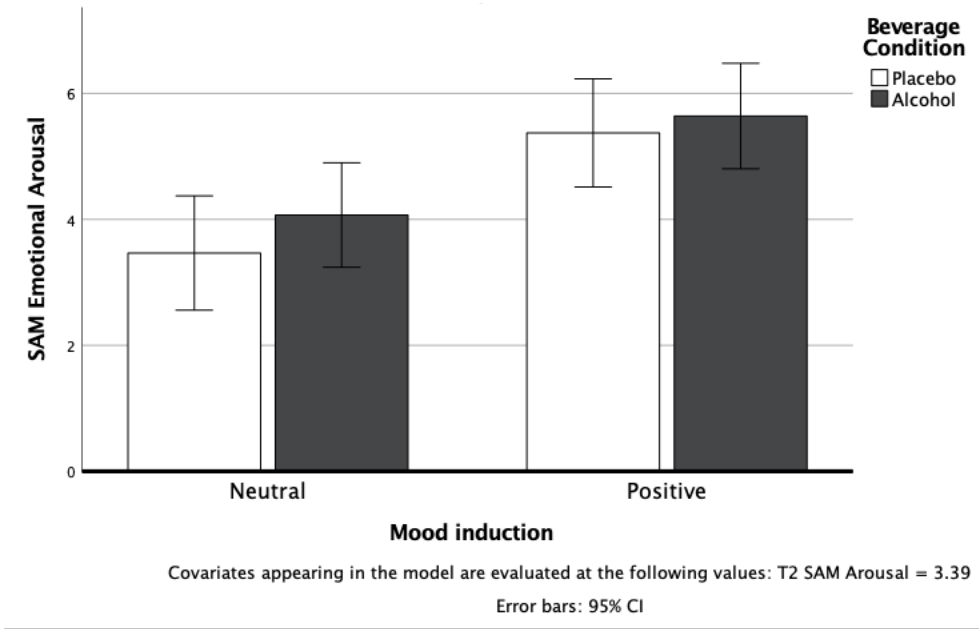


Figure 3. Mood Induction Effectiveness across time by (a) SAM emotional arousal and (b) SAM emotional valence

(a)



(b)

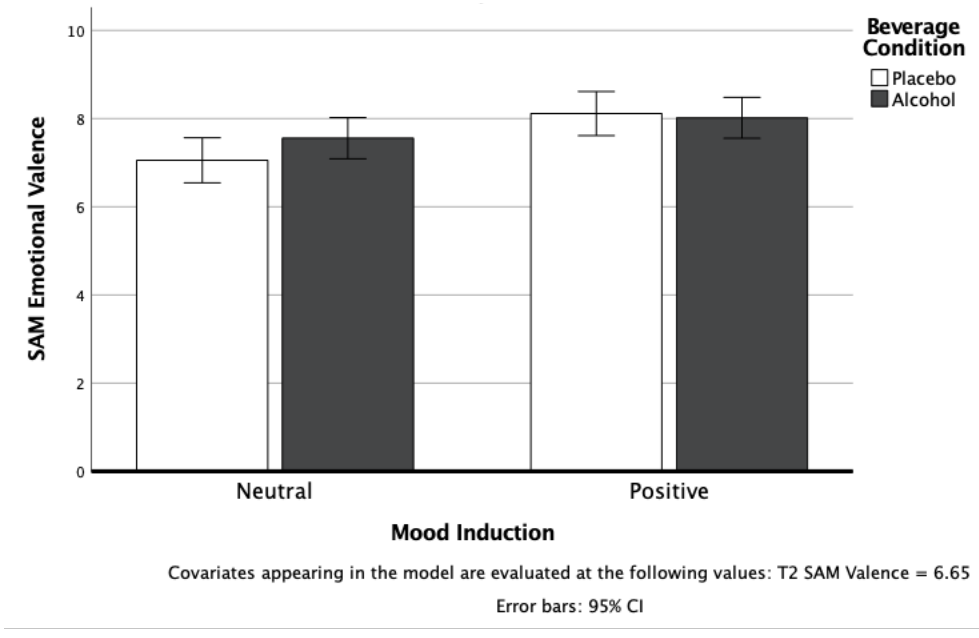
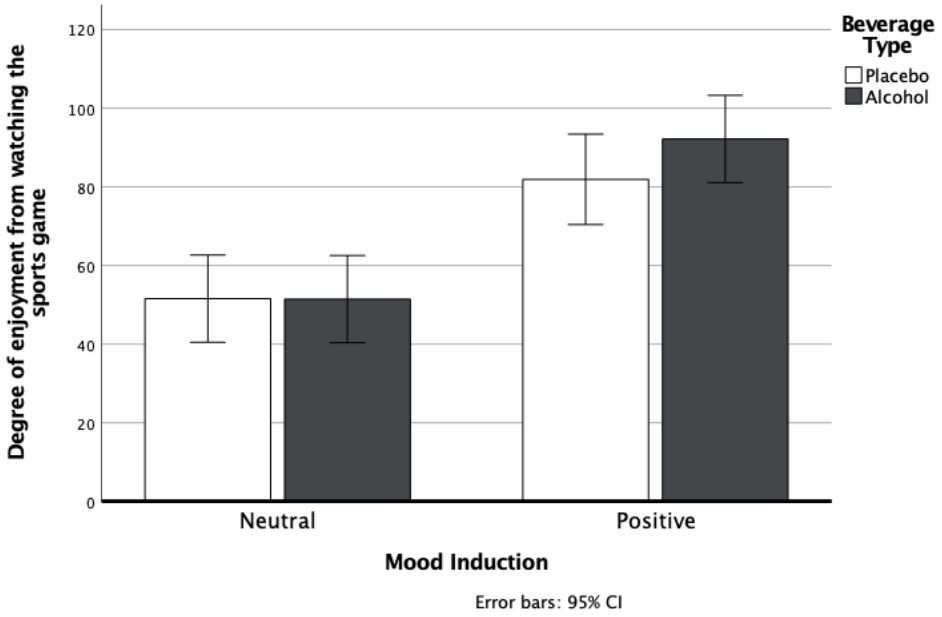


Figure 4. Mood Induction Effectiveness by group by (a) SAM emotional arousal and (b) SAM emotional valence

Figure 5. Manipulation check group comparisons (a) How much did you enjoy watching the sports game you just watched? (b) How big of a Colts fan are you? (c) BrAC level at the end of the study session, (d) How much are you feeling the effects of the beverage right now? (e) How INTOXICATED (impaired, drunk, tipsy) do you feel right now? and (f) I really CRAVE another drink right now.

(a)


Degree of enjoyment from watching the sports game
120
100
80
60
40
20
0
Neutral
Positive
Mood Induction
Beverage Type
Placebo
Alcohol
Error bars: 95% CI

(b)

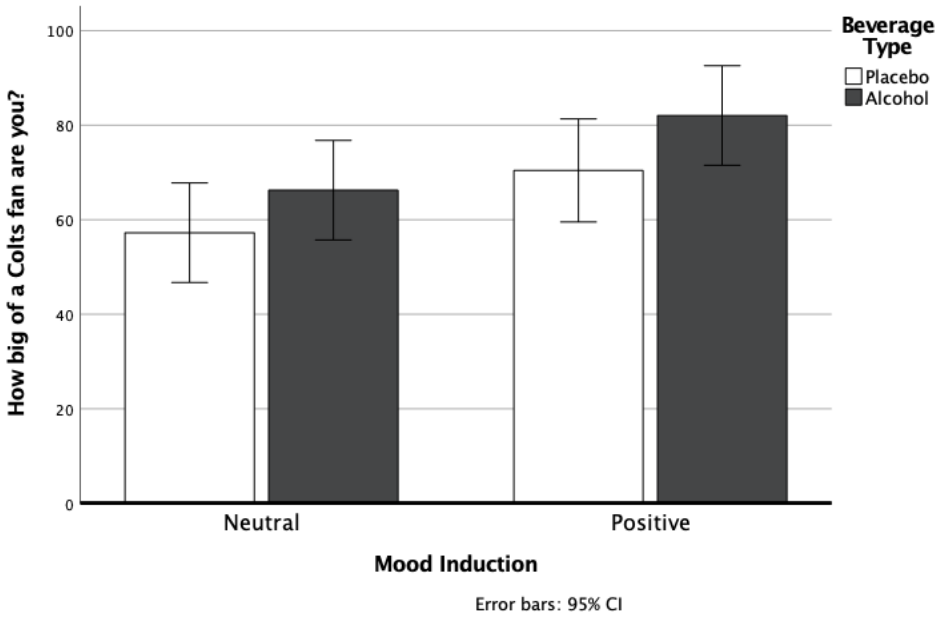
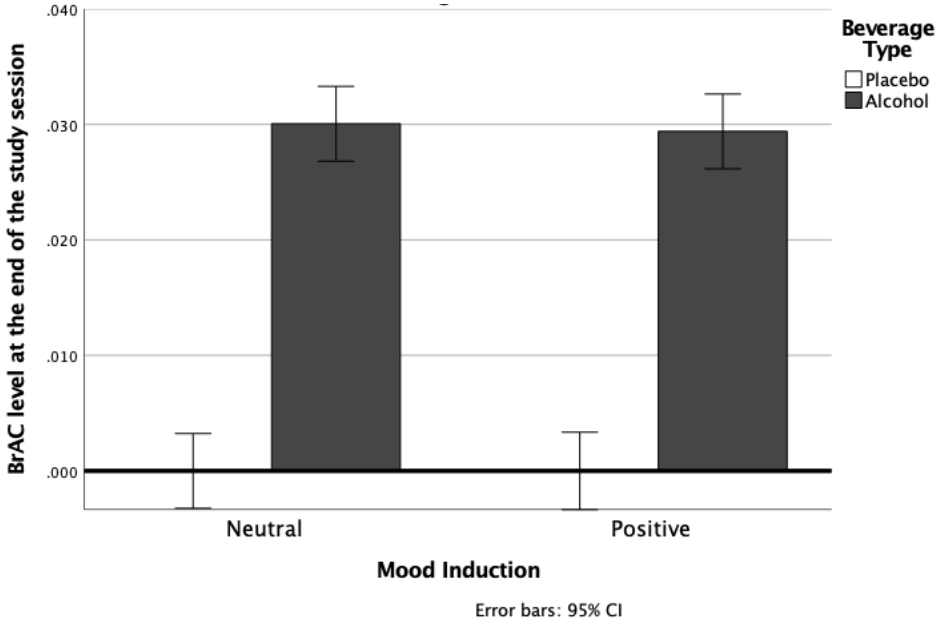

How big of a Colts fan are you?
100
80
60
40
20
0
Neutral
Positive
Mood Induction
Beverage Type
Placebo
Alcohol
Error bars: 95% CI

Figure 5, Continued

(c)



(d)

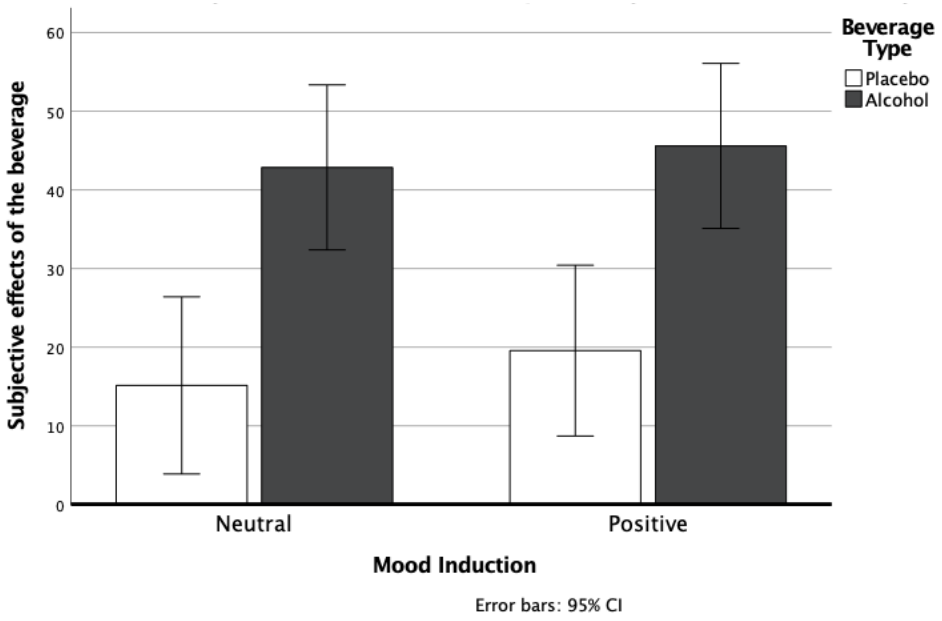
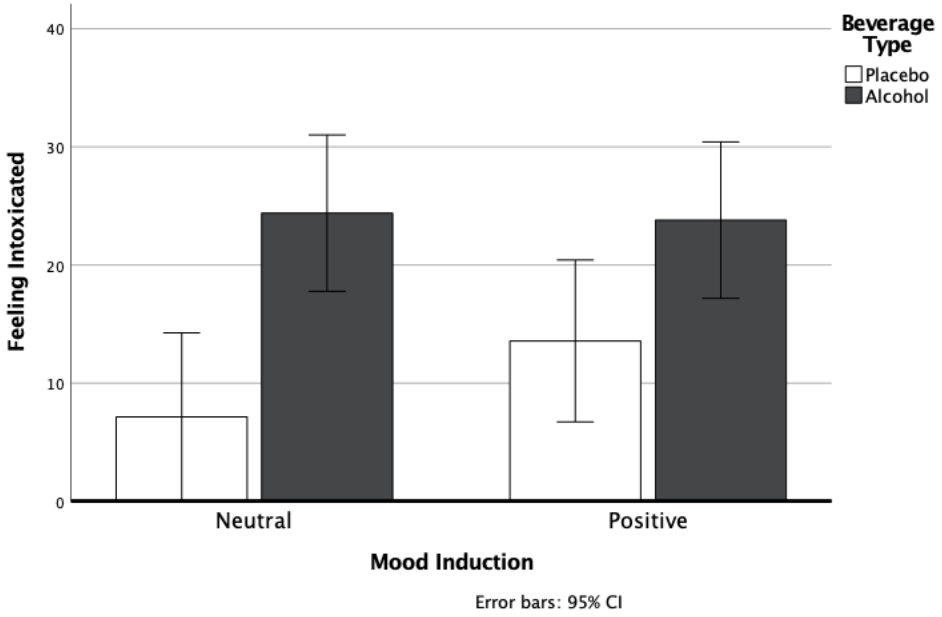
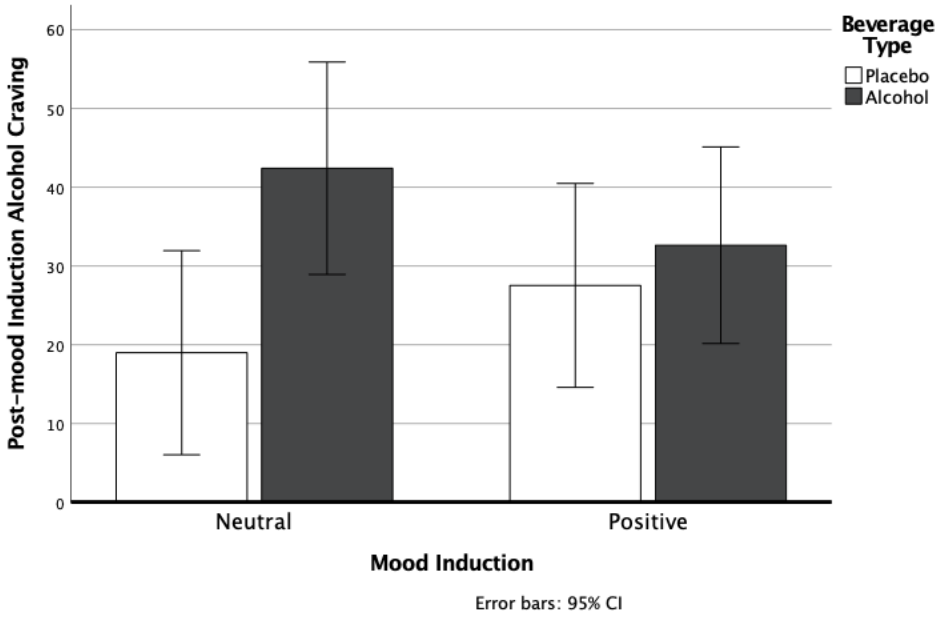


Figure 5, Continued

(e)



(f)



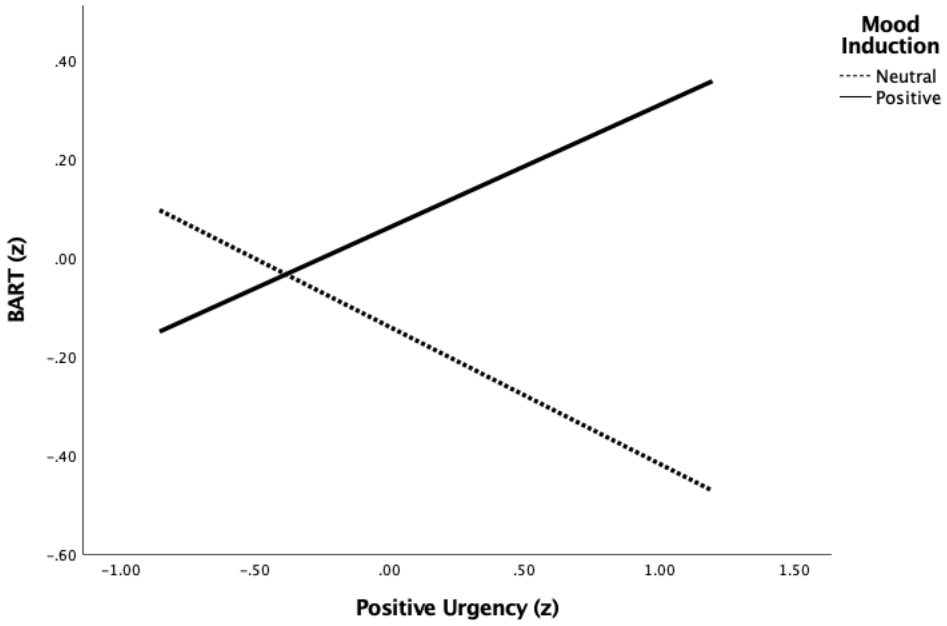


Figure 6. Mood induction as a moderator in the relationship between positive urgency and BART scores

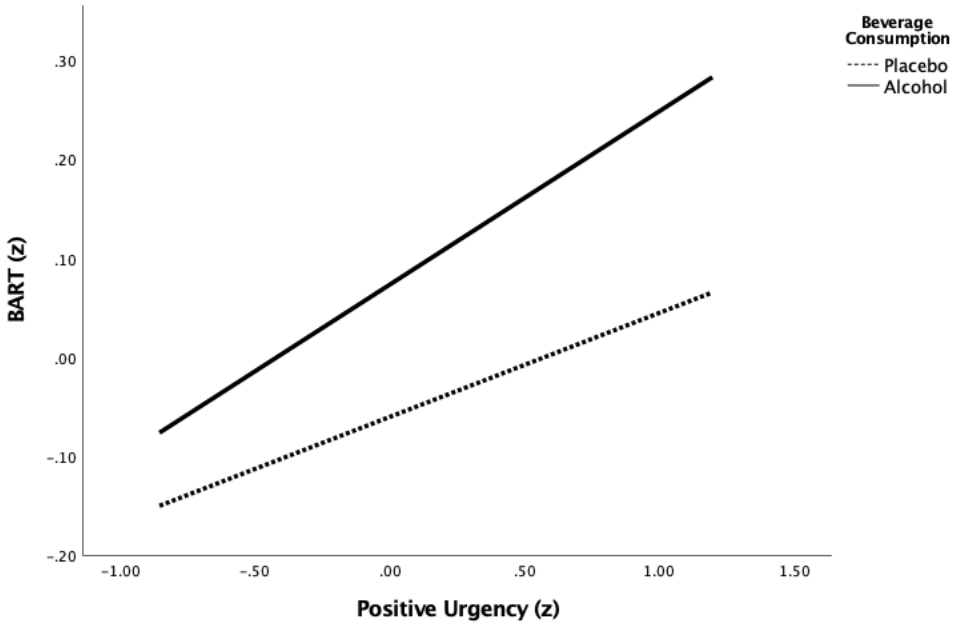
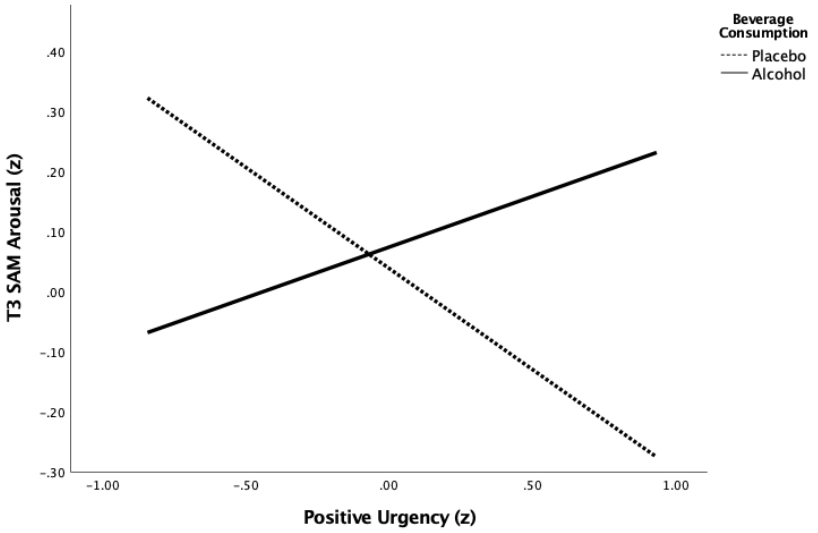


Figure 7. Beverage type as a moderator in the relationship between positive urgency and BART scores

Figure 8. Hypothesis 3 moderating effect of beverage type in the relationship between positive urgency and SAM ratings

(a) the relationship between positive urgency and SAM emotional arousal in positive mood induction only



(b) the relationship between positive urgency and SAM emotional valence in positive mood induction only

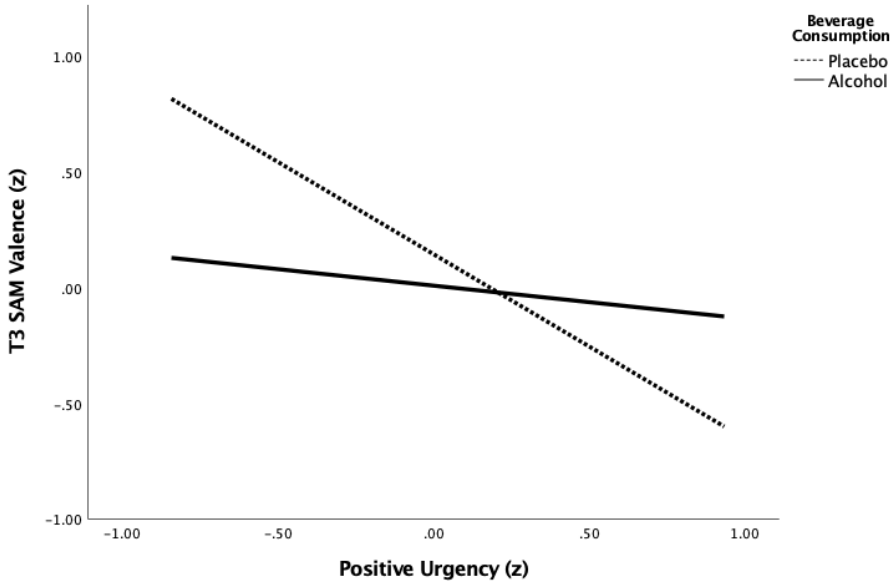
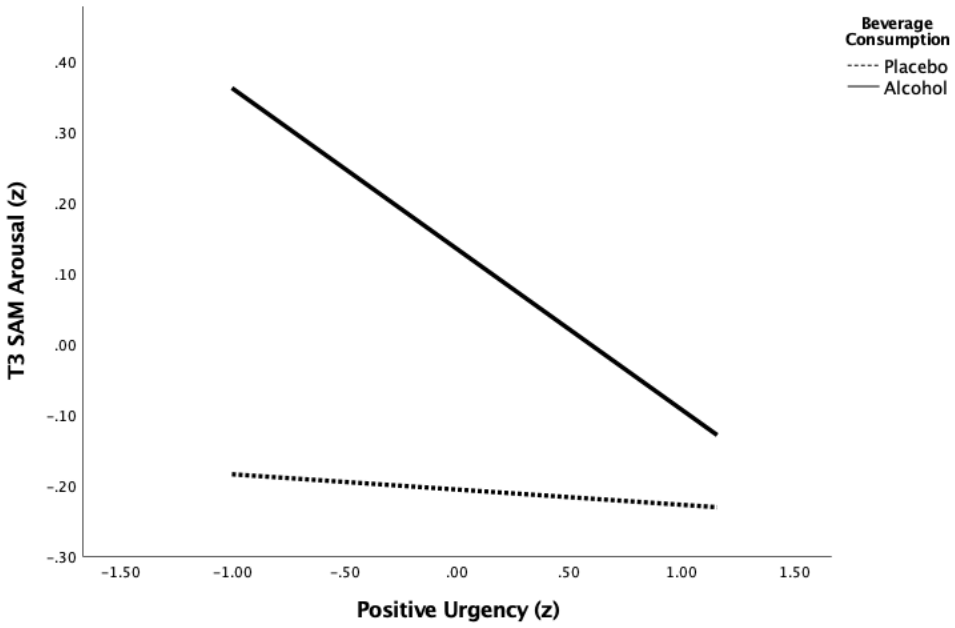
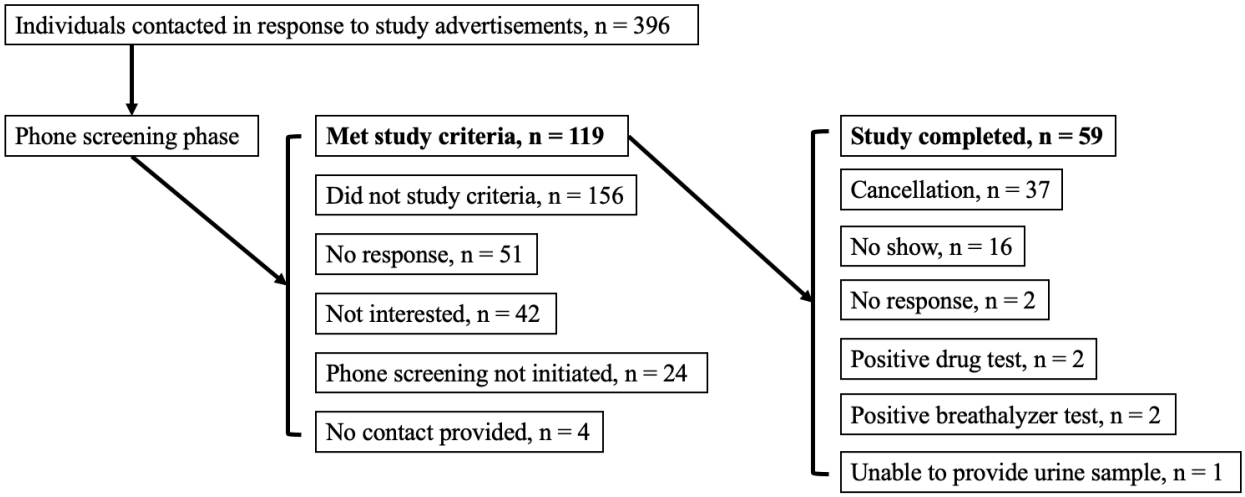


Figure 8, Continued

(c) the relationship between positive urgency and SAM emotional arousal in neutral mood induction only



APPENDIX A. RECRUITMENT FLOWSHEET



APPENDIX B. PHONE SCREENING

Telephone Screen
Reactions to drinks and sports video clips

Today's Date: _____/_____/_____

SAY: "We would like to know if you are interested in participating in our study. If you qualify and agree to participate for our study, you would come in for one session held at the IUPUI Department of Psychology. In the session you will be asked to do a urine screen for pregnancy and drugs, complete some questionnaires about your personality and behaviors, drink a beverage while watching a sports video, and complete a computerized task. You would be randomly assigned to either receive alcohol in the study or to receive a non-alcoholic drink. Your chances of drinking alcohol will be 50% and we will tell you if you had alcohol during the session. We will hold your car keys during the session and verify your age via picture ID at the beginning of the session.

How did you hear about our study?

_____

IF RECRUITED FROM SONA SYSTEM: If you receive alcohol, your session will last approximately 3.5 hours and you would receive 1.5 research credits plus an additional payment of $20. If you do not receive alcohol, your session will last approximately 1.5 hours and you would receive 1.5 research credits. Additionally, all participants have the chance to earn up to an additional $15.00 based on your performance in a computerized task during the session.

OTHERWISE: If you receive alcohol, your session will last approximately 3.5 hours and you would receive $35 for your participation. If you do not receive alcohol, your session will last approximately 1.5 hours and you would receive $15 for your participation. Additionally, all participants have the chance to earn up to an additional $15.00 based on your performance in a computerized task during the session.

ALL: In order to see if you meet requirements for the study, we need to ask you a few questions over the phone, which will take about 5-10 minutes. Some of these questions are about medical and psychological conditions, and some are about drug and alcohol use. Your name will not be kept with your answers. If you do not qualify for this study, based on this conversation, we will destroy all the information you provided us. Would you like to continue?"

Circle response given:

1. Age: **<21** 21 OR OLDER

2. Biological sex: MALE FEMALE
   If female: Are you pregnant or breast feeding? **YES** NO

3. Do you drink alcohol? YES **NO**
   If YES:
   a. On average, how many days per week do you drink? **<ONCE** AT LEAST ONCE
   b. On average, how many drinks of alcohol do you drink when you do drink? **<TWO** 2 OR MORE
   c. What is your most frequently consumed alcohol beverages?

      _____

      If the answer is not specific (e.g., beer or wine), probe for a specific answer (e.g., "Coors Light").

4. Do you watch football games? YES **NO**
   If YES: What are your top three favorite teams?
   1.
   2.
   3.

Is the person able to understand/converse in English?* YES **NO

__STOPPING POINT__**: If any of bolded responses above are circled or their top three teams __does not__ include Colts or __does__ include Patriots, END SCREENING and EXCLUDE.** __SAY:__ "Based on the information you have provided, you do not meet the specific requirements of the study but thank you for your interest." **Do not tell the participant why they do not meet criteria.**

5. Are you court mandated not to consume alcohol? **YES** NO
6. Do you have or have you ever had bipolar disorder or schizophrenia? **YES** NO
7. Do you or have you ever had an alcohol use disorder? **YES** NO
8. Has a medical profession told you to refrain from alcohol consumption? **YES** NO
9. Would you be able to provide a urine sample that would test negative for amphetamines/methamphetamines, barbiturates, benzodiazepines, cocaine, opiates, or PCP [1-phencyclohexyl piperidine] YES **NO**

Medications
What medications that you take on a regular basis?
____
____
____

IF __NO__ BOLDED RESPONSES ARE CIRCLED AND __NO__ MEDICATION CONTRA-INDICATIONS, INCLUDE. **INCLUDE or EXCLUDE** (circle one)

If **EXCLUDE**: "Based on the information you have provided in the previous several sections, you do not meet the specific requirements of the study but thank you for your interest."

IF **INCLUDE**: "Based on the information you have provided, you do meet the requirements of this study." Complete next section:

__**SEPARATE THIS PAGE FROM SUBJECT INFORMATION**__

- -

Name:______________________________. Telephone Number: (_____)________ ______.

Email: ____.

Session Date: ______/______/______. Session Time: ____:_____ am/pm Researcher initials: _________

__SAY:__ "You are scheduled on [*date*] from [*start time*] to [*start time plus 3.5 hours*]. We will send

a confirmation email with instructions prior to your session. The session will be held at IUPUI's Department of Psychology, which is located at 402 N. Blackford street in the LD (Science) Building, in room 107. This building is located at the corner of Michigan and Blackford streets. You will park in the Gateway garage and we will validate your parking. Please plan to arrive 30 minutes before your session time to accommodate locating the garage, parking, and walking to the building. Please eat a meal approximately 1- 1.5 hours prior to your session and refrain from alcohol use on your study day. Remember we will do a urine drug screen on your study day that will need to be negative. Please contact us at 317-278-6761 or mijium@iupui.edu should you need to cancel or reschedule your session. Any questions? Thank you for your participation and we will see you on [*scheduled study date*/*time*]. "

APPENDIX C. SURVEYS

Appendix C1. Demographics

1. How old are you (in years)?
2. What is your biological sex? □Male □Female
3. What is your gender? □Man □Woman □Non-binary/third gender □Prefer to self-describe:_____ □Prefer not to say
4. Do you identify as transgender? □Yes □No □Prefer not to say
5. What is your sexual orientation? □Straight/Heterosexual □Gay or Lesbian □Bisexual □Prefer to self-describe:____ □Prefer not to say
6. What race(s) do you most identify with or consider yourself to be? □American Indiana or Alaska Native □Asian □Black or African American □Native Hawaiian or Other Pacific Islander □White □More than one race □Unknown or Prefer not to say
7. Are you Hispanic or Latino? □Yes □No □Unknown or Prefer not to say
8. Highest degree earned: □High school diploma or equivalency (GED) □Associated degree (junior college) or vocational degree/license □Bachelor's degree □Master's degree □Doctorate, Professional (MD, JD, DDS) □None of the above, please specify other:____
9. How long have you been an alcohol user? Year (ex.14)_____ Month (ex. 05)_____
10. What age did you first start drinking?

Appendix C2. UPPS-P Impulsive Behavior Scale

Below are a number of statements that describe ways in which people act and think. For each statement, please indicate how much you agree or disagree with the statement.

If you **Agree Strongly** circle **1**, if you **Agree Somewhat** circle **2**, if you **Disagree somewhat** circle **3**, and if you **Disagree Strongly** circle **4**. Be sure to indicate your agreement or disagreement for every statement below. Also, there are questions on the following pages.

	Strongly agree (1)	Agree some (2)	Disagree some (3)	Disagree strongly (4)
1. I have a reserved and cautious attitude toward life.	1	2	3	4
2. I have trouble controlling my impulses.	1	2	3	4
3. I generally seek new and exciting experiences and sensations.	1	2	3	4
4. I generally like to see things through to the end.	1	2	3	4
5. When I am very happy, I can't seem to stop myself from doing things that can have bad consequences.	1	2	3	4
6. My thinking is usually careful and purposeful.	1	2	3	4
7. I have trouble resisting my cravings (for food, cigarettes, etc.).	1	2	3	4
8. I'll try anything once.	1	2	3	4
9. I tend to give up easily.	1	2	3	4
10. When I am in great mood, I tend to get into situations that could cause me problems.	1	2	3	4
11. I am not one of those people who blurt out things without thinking.	1	2	3	4
12. I often get involved in things I later wish I could get out of.	1	2	3	4
13. I like sports and games in which you have to choose your next move very quickly.	1	2	3	4

14. Unfinished tasks really bother me.	1	2	3	4
15. When I am very happy, I tend to do things that may cause problems in my life.	1	2	3	4
16. I like to stop and think things over before I do them.	1	2	3	4
17. When I feel bad, I will often do things I later regret in order to make myself feel better now.	1	2	3	4
18. I would enjoy water skiing.	1	2	3	4
19. Once I get going on something I hate to stop.	1	2	3	4
20. I tend to lose control when I am in a great mood.	1	2	3	4
21. I don't like to start a project until I know exactly how to proceed.	1	2	3	4
22. Sometimes when I feel bad, I can’t seem to stop what I am doing even though it is making me feel worse.	1	2	3	4
23. I quite enjoy taking risks.	1	2	3	4
24. I concentrate easily.	1	2	3	4
25. When I am really ecstatic, I tend to get out of control.	1	2	3	4
26. I would enjoy parachute jumping.	1	2	3	4
27. I finish what I start.	1	2	3	4
28. I tend to value and follow a rational, "sensible" approach to things.	1	2	3	4
29. When I am upset I often act without thinking.	1	2	3	4
30. Others would say I make bad choices when I am extremely happy about something.	1	2	3	4
31. I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.	1	2	3	4
32. I am able to pace myself so as to get things done on time.	1	2	3	4
33. I usually make up my mind through careful reasoning.	1	2	3	4

34. When I feel rejected, I will often say things that I later regret.	1	2	3	4
35. Others are shocked or worried about the things I do when I am feeling very excited.	1	2	3	4
36. I would like to learn to fly an airplane.	1	2	3	4
37. I am a person who always gets the job done.	1	2	3	4
38. I am a cautious person.	1	2	3	4
39. It is hard for me to resist acting on my feelings.	1	2	3	4
40. When I get really happy about something, I tend to do things that can have bad consequences.	1	2	3	4
41. I sometimes like doing things that are a bit frightening.	1	2	3	4
42. I almost always finish projects that I start.	1	2	3	4
43. Before I get into a new situation I like to find out what to expect from it.	1	2	3	4
44. I often make matters worse because I act without thinking when I am upset.	1	2	3	4
45. When overjoyed, I feel like I can't stop myself from going overboard.	1	2	3	4
46. I would enjoy the sensation of skiing very fast down a high mountain slope.	1	2	3	4
47. Sometimes there are so many little things to be done that I just ignore them all.	1	2	3	4
48. I usually think carefully before doing anything.	1	2	3	4
49. When I am really excited, I tend not to think of the consequences of my actions.	1	2	3	4
50. In the heat of an argument, I will often say things that I later regret.	1	2	3	4
51. I would like to go scuba diving.	1	2	3	4
52. I tend to act without thinking when I am really excited.	1	2	3	4
53. I always keep my feelings under control.	1	2	3	4

54. When I am really happy, I often find myself in situations that I normally wouldn't be comfortable with.	1	2	3	4
55. Before making up my mind, I consider all the advantages and disadvantages.	1	2	3	4
56. I would enjoy fast driving.	1	2	3	4
57. When I am very happy, I feel like it is ok to give in to cravings or overindulge.	1	2	3	4
58. Sometimes I do impulsive things that I later regret.	1	2	3	4
59. I am surprised at the things I do while in a great mood.	1	2	3	4

Appendix C3. Alcohol Use Disorders Identification Test

1. How often do you have a drink containing alcohol?

(0) Never [Skip to Qs 9-10]

(1) Monthly or less

(2) 2 to 4 times a month

(3) 2 to 3 times a week

(4) 4 or more times a week

2. How many drinks containing alcohol do you have on a typical day when you are drinking?

(0) 1 or 2

(1) 3 or 4

(2) 5 or 6

(3) 7 to 9

(4) 10 or more

3. How often do you have six or more drinks on one occasion?

(0) Never

(1) Less than monthly

(2) Monthly

(3) Weekly

(4) Daily or almost daily

4. How often during the last year have you found that you were not able to stop drinking once you had started?

(0) Never

(1) Less than monthly

(2) Monthly

(3) Weekly

(4) Daily or almost daily

5. How often during the last year have you failed to do what was normally expected from you because of drinking?

(0) Never

(1) Less than monthly

(2) Monthly

(3) Weekly

(4) Daily or almost daily

6. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?

(0) Never

(1) Less than monthly

(2) Monthly

(3) Weekly

(4) Daily or almost daily

7. How often during the last year have you had a feeling of guilt or remorse after drinking?

(0) Never

(1) Less than monthly

(2) Monthly

(3) Weekly

(4) Daily or almost daily

8. How often during the last year have you been unable to remember what happened the night before because of your drinking?

(0) Never

(1) Less than monthly

(2) Monthly

(3) Weekly

(4) Daily or almost daily

9. Have you or someone else been injured because of your drinking?

(0) No

(2) Yes, but not in the last year

(4) Yes, during the last year

10. Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?

(0) No

(2) Yes, but not in the last year

(4) Yes, during the last year

Appendix C4. Timeline Follow-Back

Research assistant will assist the completion

For each day below, report your drinking over the past 30 days.

- Try to be as accurate as possible
- We recognize you won't remember perfectly; that's **OKAY**.
- On days when you did not drink alcohol, **put a "0" in the box**.
- On days when you did drink alcohol, put a **number** in the box for the **number of alcohol drinks** you had.
- Each of the following counts as **ONE** drink:

HELPFUL HINTS

- If you recorded your drinking on a **calendar** you can use it to help you recall your drinking.
- On the left column, you will indicate certain **MARKER days**, i.e., holidays, important school/work dates, sporting events, news events, your own or others' birthdays, vacation beginning and end dates, other personal events (e.g., changing jobs, buying a house), or other special occasions that will help you recall your use over the past 30 days.
- If you have **regular alcohol use patterns** you can use these to help you recall your use. For example, you may typically drink on weekends or with a certain group of friends.
- We realize it isn't easy to recall things with 100% accuracy. If you are not sure how much or what day you drank, give it your **best guess!**

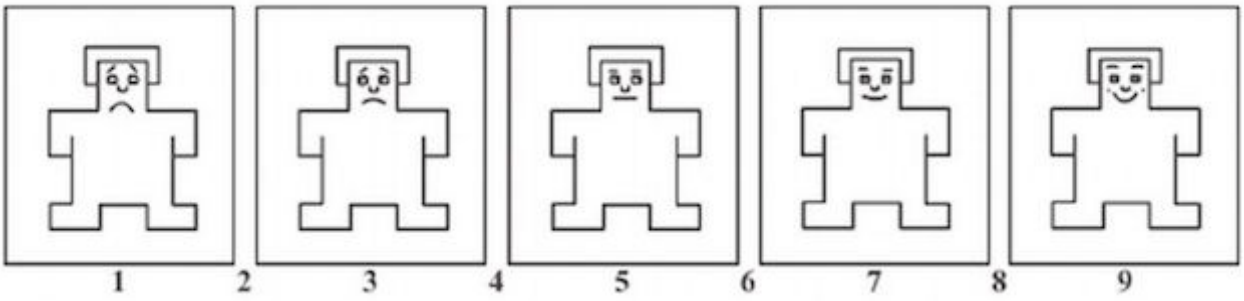
IMPORTANT: Each box on the Alcoholic Drinks Consumed column should have either "0", an "x" or a number in it when you are done.

Please fill in the amount of alcohol you drank and in what setting you drank for the following days.

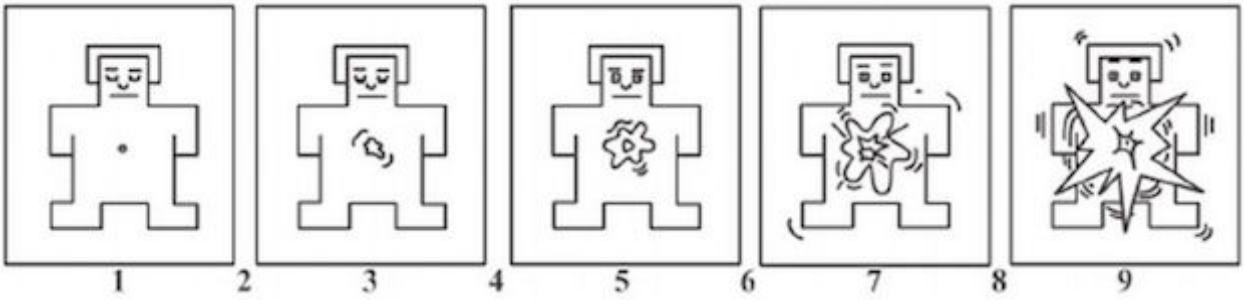
	MARKER Days	Alcoholic Drinks Consumed
Saturday, January 24		
	….	
	[*The exact days will vary for each participant to reflect the past 30 days of alcohol consumption prior to the date they report to the lab for the study]*	

Appendix C5. Self-Assessment Manikin

Indicate to what extent you feel this way **right now**, that is, at the present moment.



Negative ----------Positive



Not aroused----------Completely aroused

Appendix C6. Single-Item Alcohol Craving Questionnaire

1. I really CRAVE another drink right now.

0----------10----------20---------30-----40-----50-----60-----70-----80-----90-----100

Appendix C7. Patient Health Questionnaire

Over the last *2 weeks,* how often have you been bothered by any of the following problems?
(use "✓" to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite — being so figety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself	0	1	2	3
	add columns		+	+

(Healthcare professional: For interpretation of TOTAL, please refer to accompanying scoring card). TOTAL:

10. If you checked off *any problems,* how *difficult* have these problems made it for you to do your work, take care of things at home, or get along with other people?	Not difficult at all _____ Somewhat difficult _____ Very difficult _____ Extremely difficult _____

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Appendix C8. Generalized Anxiety Disorder-7

Over the last 2 weeks, how often have you been bothered by the following problems?	Not at all sure	Several days	Over half the days	Nearly every day
1. Feeling nervous, anxious, or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Worrying too much about different things	0	1	2	3
4. Trouble relaxing	0	1	2	3
5. Being so restless that it's hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid as if something awful might happen	0	1	2	3
Add the score for each column	+	+	+	
Total Score *(add your column scores)* =				

If you checked off any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all _____
Somewhat difficult _____
Very difficult _____
Extremely difficult _____

Source: Spitzer RL, Kroenke K, Williams JBW, Lowe B. A brief measure for assessing generalized anxiety disorder. *Arch Inern Med.* 2006;166:1092-1097.

Appendix C9. Manipulation Check

1. Have you seen the sports game you just watched before?
   - ○ Yes
   - ○ No
   - ○ Do not remember

2. How much did you enjoy watching the sports game you just watched?
   0----------10----------20---------30-----40-----50-----60-----70-----80-----90-----100

   0 = Not at all

   25 = Slightly

   50 = Somewhat

   75 = Noticeably

   100 = Very much

3. How big of a Colts fan are you?
   0----------10----------20---------30-----40-----50-----60-----70-----80-----90-----100

   0 = Not a fan

   50 = Average fan

   100 = Superfan

4. How familiar are you with cricket?
   0----------10----------20---------30-----40-----50-----60-----70-----80-----90-----100

   0 = Not at all

   50 = Somewhat

   100 = Very

5. How much do you feel the effects of the beverage right now?
   0----------10----------20---------30-----40-----50-----60-----70-----80-----90-----100

   0 = Not at all

   25 = Slightly

   50 = Somewhat

   75 = Noticeably

   100 = Most ever

6. How INTOXICATED (impaired, drunk, tipsy) do you feel right now?
   0----------10----------20---------30-----40-----50-----60-----70-----80-----90-----100

   0 = Not at all

   25 = Slightly

   50 = Somewhat

   75 = Noticeably

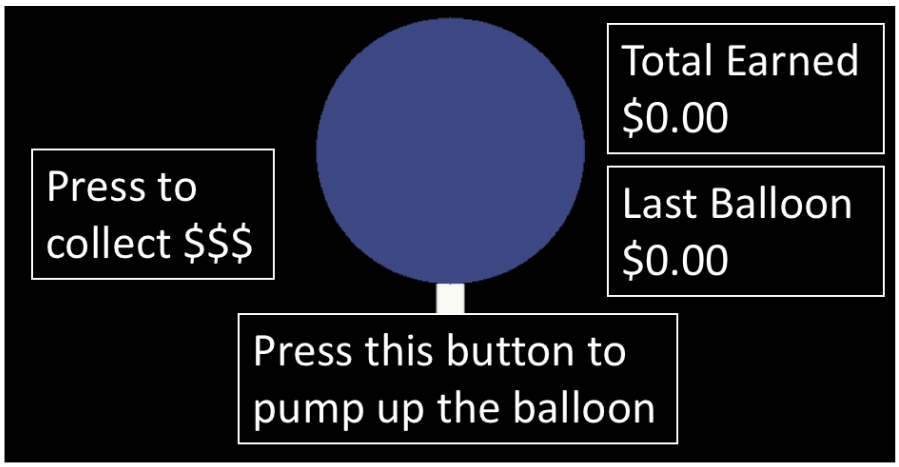
   100 = Most ever

7. What type of beverage do you guess you have consumed?

   ○ Alcoholic beverage

   ○ Non-alcoholic beverage

Appendix C10. Balloon Analogue Risk Task



Appendix C11. Emotion Neutralizing Task

REFERENCES

Aguinis, H., Beaty, J. C., Boik, R. J., & Pierce, C. A. (2005). Effect size and power in assessing moderating effects of categorical variables using multiple regression: a 30-year review. *The Journal of Applied Psychology*, *90*(1), 94–107. https://doi.org/10.1037/0021-9010.90.1.94

Argyriou, E., Um, M., Wu, W., & Cyders, M. A. (2020). Measurement Invariance of the UPPS-P Impulsive Behavior Scale Across Age and Sex Across the Adult Life Span. *Assessment*, *27*(3), 432–453. https://doi.org/10.1177/1073191119832660

Arkes, H. R., Herren, L. T., & Isen, A. M. (1988). The role of potential loss in the influence of affect on risk-taking behavior. *Organizational Behavior and Human Decision Processes*, *42*(2), 181–193. https://doi.org/10.1016/0749-5978(88)90011-8

Armeli, S., Tennen, H., Affleck, G., & Kranzler, H. R. (2000). the Association between Daily Events and Alcohol Use? *Journal of Studies on Alcohol*, *61*, 862–871.

Baker, T. B., Piper, M. E., McCarthy, D. E., Majeskie, M. R., & Fiore, M. C. (2004). Addiction Motivation Reformulated: An Affective Processing Model of Negative Reinforcement. *Psychological Review*, *111*(1), 33–51. https://doi.org/10.1037/0033-295X.111.1.33

Banerjee, A., Chitnis, U. B., Jadhav, S. L., Bhawalkar, J. S., & Chaudhury, S. (2009). Hypothesis testing, type I and type II errors. *Industrial Psychiatry Journal*, *18*(2), 127. https://doi.org/10.4103/0972-6748.62274

Berey, B. L., Leeman, R. F., Chavarria, J., & King, A. C. (2019). Relationships between generalized impulsivity and subjective stimulant and sedative responses following alcohol administration. *Psychology of Addictive Behaviors*, *33*(7), 616–625. https://doi.org/10.1037/adb0000512

Berg, J. M., Latzman, R. D., Bliwise, N. G., & Lilienfeld, S. O. (2015). Parsing the Heterogeneity of Impulsivity: A Meta-Analytic Review of the Behavioral Implications of the UPPS for Psychopathology. *Psychological Assessment*, *27*(2). https://doi.org/10.1037/pas0000111

Bernaards, C. A., & Sijtsma, K. (2000). Influence of imputation and EM methods on factor analysis when item nonresponse in questionnaire data is nonignorable. *Multivariate Behavioral Research*, *35*(3), 321–364. https://doi.org/10.1207/S15327906MBR3503

Borges, G., Bagge, C., Cherpitel, C. J., Conner, K., Orozco, R., & Rossow, I. (2017). A meta-analysis of acute alcohol use and the risk of suicide attempt. *Psychological*, *47*(5), 949–957. https://doi.org/10.1017/S0033291716002841

Bradley, M. M., & Lang, P. J. (1994). Measuring emotion: the self-assessment manikin and the semantic differential. *Journal of Behavior Therapy and Experimental Psychiatry*, *25*(1), 49–59. https://doi.org/10.1016/0005-7916(94)90063-9

Bravo, A. J., Pearson, M. R., Pilatti, A., Read, J. P., Mezquita, L., Ibáñez, M. I., & Ortet, G. (2018). Impulsivity-related traits, college alcohol beliefs, and alcohol outcomes: Examination of a prospective multiple mediation model among college students in Spain, Argentina, and USA. *Addictive Behaviors*, *81*, 125–133. https://doi.org/10.1016/j.addbeh.2018.02.009

Brunelle, C., Assaad, J., Barrett, S. P., Ávila, C., Conrod, P. J., Tremblay, R. E., & Pihl, R. O. (2004). Heightened Heart Rate Response to Alcohol Intoxication Is Associated With a Reward-Seeking Personality Profile. *Alcoholism: Clinical and Experimental Research*, *28*(3), 394–401. https://doi.org/10.1097/01.ALC.0000117859.23567.2E

Burton, C. M., Pedersen, S. L., & McCarthy, D. M. (2012). Impulsivity moderates the relationship between implicit associations about alcohol and alcohol use. *Psychology of Addictive Behaviors*, *26*(4), 766–772. https://doi.org/10.1037/a0028742

Byrd-Bredbenner, C., Eck, K., & Quick, V. (2020). Psychometric Properties of the Generalized Anxiety Disorder-7 and Generalized Anxiety Disorder-Mini in United States University Students. *Frontiers in Psychology*, *11*(September). https://doi.org/10.3389/fpsyg.2020.550533

Canning, J. R., Schallert, M. R., & Larimer, M. E. (2021). A Systematic Review of the Balloon Analogue Risk Task (BART) in Alcohol Research. *Alcohol and Alcoholism*, 1–19. https://doi.org/10.1093/alcalc/agab004

Caswell, A. J., Morgan, M. J., & Duka, T. (2013). Acute alcohol effects on subtypes of impulsivity and the role of alcohol-outcome expectancies. *Psychopharmacology*, *229*, 21–30. https://doi.org/10.1007/s00213-013-3079-8

Cheng, A. S. K., & Lee, H. C. (2012). Risk-taking behavior and response inhibition of commuter motorcyclists with different levels of impulsivity. *Transportation Research Part F: Traffic Psychology and Behaviour*, *15*(5), 535–543. https://doi.org/10.1016/j.trf.2012.05.005

Chou, K.-L., Lee, T. M. C., & Ho, A. H. Y. (2007). Does mood state change risk taking tendency in older adults? *Psychology and Aging*, *22*(2), 310–318. https://doi.org/10.1037/0882-7974.22.2.310

Coskunpinar, A., & Cyders, M. A. (2012). Mediation-moderation analysis of problematic alcohol use: The roles of urgency, drinking motives, and risk/benefit perception. *Addictive Behaviors*, *37*(7), 880–883. https://doi.org/10.1016/j.addbeh.2012.03.014

Coskunpinar, A., Dir, A. L., & Cyders, M. a. (2013). Multidimensionality in Impulsivity and Alcohol Use: A Meta-Analysis Using the UPPS Model of Impulsivity. *Alcoholism: Clinical and Experimental Research*, *37*(9), 1441–1450. https://doi.org/10.1111/acer.12131

Crane, C. A., Godleski, S. A., Przybyla, S. M., Schlauch, R. C., & Testa, M. (2016). The Proximal Effects of Acute Alcohol Consumption on Male-to-Female Aggression: A Meta-Analytic Review of the Experimental Literature. *Trauma, Violence, and Abuse*, *17*(5), 520–531. https://doi.org/10.1177/1524838015584374

Cummins, L. F., Nadorff, M. R., & Kelly, A. E. (2009). Winning and Positive Affect Can Lead to Reckless Gambling. *Psychology of Addictive Behaviors*, *23*(2), 287–294. https://doi.org/10.1037/a0014783

Cyders, M. A., & Coskunpinar, A. (2010). Is urgency emotionality? Separating urgent behaviors from effects of emotional experiences. *Personality and Individual Differences*, *48*(7), 839–844. https://doi.org/10.1016/j.paid.2010.02.009.Is

Cyders, M. A., Flory, K., Rainer, S., & Smith, G. T. (2009). The role of personality dispositions to risky behavior in predicting first-year college drinking. *Addiction*, *104*(2), 193–202. https://doi.org/10.1111/j.1360-0443.2008.02434.x

Cyders, M. A., Plawecki, M. H., Corbin, W., King, A., McCarthy, D. M., Ramchandani, V. A., Weafer, J., & O'Connor, S. J. (2020). To Infuse or Ingest in Human Laboratory Alcohol Research. *Alcoholism: Clinical and Experimental Research*, *44*(4), 764–776. https://doi.org/10.1111/acer.14305

Cyders, M. A., & Smith, G. T. (2008). Emotion-based dispositions to rash action: positive and negative urgency. *Psychological Bulletin*, *134*(6), 807–828. https://doi.org/10.1037/a0013341

Cyders, M. A., & Smith, G. T. (2010). Longitudinal validation of the urgency traits over the first year of college. *Journal of Personality Assessment*, *92*(1), 63–69. https://doi.org/10.1080/00223890903381825

Cyders, M. A., Smith, G. T., Spillane, N. S., Fischer, S., Annus, A. M., & Peterson, C. (2007). Integration of impulsivity and positive mood to predict risky behavior: Development and validation of a measure of positive urgency. *Psychological Assessment*, *19*(1), 107–118. https://doi.org/10.1037/1040-3590.19.1.107

Cyders, M. A., Zapolski, T. C. B. B., Combs, J. L., Settles, R. F., Fillmore, M. T., & Smith, G. T. (2010). Experimental effect of positive urgency on negative outcomes from risk taking and on increased alcohol consumption. *Psychology of Addictive Behaviors*, *24*(3), 367–375. https://doi.org/10.1037/a0019494

Deldin, P. J., & Levin, I. P. (1986). The effect of mood induction in a risky decision-making task. *Bulletin of the Psychonomic Society*, *24*(1), 4–6.

Dinc, L., & Cooper, A. J. (2015). Positive affective states and alcohol consumption: The moderating role of trait positive urgency. *Addictive Behaviors*, *47*, 17–21. https://doi.org/10.1016/j.addbeh.2015.03.014

Dolder, P. C., Holze, F., Liakoni, E., Harder, S., Schmid, Y., & Liechti, M. E. (2017). Alcohol acutely enhances decoding of positive emotions and emotional concern for positive stimuli and facilitates the viewing of sexual images. *Psychopharmacology*, *234*(1), 41–51. https://doi.org/10.1007/s00213-016-4431-6

Druckman, J. N., & McDermott, R. (2008). Emotion and the framing of risky choice. *Political Behavior*, *30*(3), 297–321. https://doi.org/10.1007/s11109-008-9056-y

Dunn, B. D., Burr, L. A., Smith, H. B., Hunt, A., Dadgostar, D., Dalglish, L., Smith, S., Attree, E., Jell, G., Martyn, J., Bos, N., & Werner-Seidler, A. (2018). Turning gold into lead: Dampening appraisals reduce happiness and pleasantness and increase sadness during anticipation and recall of pleasant activities in the laboratory. *Behaviour Research and Therapy*, *107*(May), 19–33. https://doi.org/10.1016/j.brat.2018.05.003

Dvorak, R. D., Pearson, M. R., Sargent, E. M., Stevenson, B. L., & Mfon, A. M. (2016). Daily associations between emotional functioning and alcohol involvement: Moderating effects of response inhibition and gender. *Drug and Alcohol Dependence*, *163*, S46–S53. https://doi.org/10.1016/j.drugalcdep.2015.09.034

Euser, A. S., van Meel, C. S., Snelleman, M., & Franken, I. H. A. (2011). Acute effects of alcohol on feedback processing and outcome evaluation during risky decision-making: An ERP study. *Psychopharmacology*, *217*(1), 111–125. https://doi.org/10.1007/s00213-011-2264-x

Feldman Barrett, L., & Russell, J. A. (2005). Independence and bipolarity in the structure of current affect. *Journal of Personality and Social Psychology*, *74*(4), 967–984. https://doi.org/10.1037/0022-3514.74.4.967

Felson, R. B., & Staff, J. (2010). The effects of alcohol intoxication on violent versus other offending. *Criminal Justice and Behavior*, *37*(12), 1343–1360. https://doi.org/10.1177/0093854810382003

Fernández-Aguilar, L., Navarro-Bravo, B., Ricarte, J., Ros, L., & Latorre, J. M. (2019). How effective are films in inducing positive and negative emotional states? A meta-analysis. *PLoS ONE*, *14*(11), 1–28. https://doi.org/10.1371/journal.pone.0225040

Fernie, G., Cole, J. C., Goudie, A. J., & Field, M. (2010). Risk-taking but not response inhibition or delay discounting predict alcohol consumption in social drinkers. *Drug and Alcohol Dependence*, *112*(1–2), 54–61. https://doi.org/10.1016/j.drugalcdep.2010.05.011

Ferrey, A. E., & Mishra, S. (2014). Compensation method affects risk-taking in the Balloon Analogue Risk Task. *Personality and Individual Differences*, *64*, 111–114. https://doi.org/10.1016/j.paid.2014.02.008

Fillmore, M. T., & van Dyke, N. (2021). DUI Offenders Display Reduced Perception of Intoxication and Heightened Impulsive Choice in Response to Alcohol. *Experimental and Clinical Psychopharmacology*, *859*.

Fisher, S., Hsu, W. W., Adams, Z., Arsenault, C., & Milich, R. (2020). The effect of impulsivity and drinking motives on alcohol outcomes in college students: a 3-year longitudinal analysis. *Journal of American College Health*, 1–10. https://doi.org/10.1080/07448481.2020.1817033

Fredrickson, B. L. (1998). What good are positive emotions? *Review of General Psychology*, *2*(3), 300–319. https://doi.org/10.1037/1089-2680.2.3.300.What

Frijda, N. H. (2009). Emotion experience and its varieties. *Emotion Review*, *1*(3), 264–271. https://doi.org/10.1177/1754073909103595

Frijda, N. H. (2010). Impulsive action and motivation. *Biological Psychology*, *84*(3), 570–579. https://doi.org/10.1016/j.biopsycho.2010.01.005

Fromme, K., Katz, E., & D'Amico, E. (1997). Effects of alcohol intoxication on the perceived consequences of risk taking. *Experimental and Clinical Psychopharmacology*, *5*(1), 14–23. https://doi.org/10.1037/1064-1297.5.1.14

George, S., Rogers, R. D., & Duka, T. (2005). The acute effect of alcohol on decision making in social drinkers. *Psychopharmacology*, *182*, 160–169. https://doi.org/10.1007/s00213-005-0057-9

Grable, J. E., & Roszkowski, M. J. (2008). The influence of mood on the willingness to take financial risks. *Journal of Risk Research*, *11*(7), 905–923. https://doi.org/10.1080/13669870802090390

Haase, C. M., & Silbereisen, R. K. (2011). Effects of positive affect on risk perceptions in adolescence and young adulthood. *Journal of Adolescence*, *34*(1), 29–37. https://doi.org/10.1016/j.adolescence.2010.03.004

Harmon, D. A., Haas, A. L., & Peterkin, A. (2021). Experimental tasks of behavioral risk taking in alcohol administration studies: A systematic review. *Addictive Behaviors*, *113*(February 2020). https://doi.org/10.1016/j.addbeh.2020.106678

Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (Second). Guilford Press.

Hendler, R. A., Ramchandani, V. A., Gilman, J. M., & Hommer, D. W. (2013). Stimulant and sedative effects of alcohol. *Current Topics in Behavioral Neurosciences*, *13*, 489–509. https://doi.org/10.1007/7854_2011_135

Hewig, J., Hagemann, D., Seifert, J., Gollwitzer, M., Naumann, E., & Bartussek, D. (2005). A revised film set for the induction of basic emotions. *Cognition and Emotion*, *19*(7), 1095–1109. https://doi.org/10.1080/02699930541000084

Hoeppner, B. B., Stout, R. L., Jackson, K. M., & Barnett, N. P. (2010). How good is fine-grained Timeline Follow-back data? Comparing 30-day TLFB and repeated 7-day TLFB alcohol consumption reports on the person and daily level. *Addictive Behaviors*, *35*(12), 1138–1143. https://doi.org/10.1016/j.addbeh.2010.08.013

IBM Corp. (2020). *IBM SPSS Statistics for Macintosh, Version 27.0*. IBM Corp.

Irwin, C., Iudakhina, E., Desbrow, B., & McCartney, D. (2017). Effects of acute alcohol consumption on measures of simulated driving: A systematic review and meta-analysis. *Accident Analysis and Prevention*, *102*, 248–266. https://doi.org/10.1016/j.aap.2017.03.001

Jahng, S., Solhan, M. B., Tomko, R. L., Wood, P. K., Piasecki, T. M., & Trull, T. J. (2011). Affect and Alcohol Use: An Ecological Momentary Assessment Study of Outpatients With Borderline Personality Disorder. *Journal of Abnormal Psychology*, *120*(3), 572–584. https://doi.org/10.1037/a0024686

Johnson, S. L., Elliott, M. V., & Carver, C. S. (2020). Impulsive Responses to Positive and Negative Emotions: Parallel Neurocognitive Correlates and Their Implications. *Biological Psychiatry*, *87*(4), 338–349. https://doi.org/10.1016/j.biopsych.2019.08.018

Johnson, S. L., Haase, C. M., Beermann, U., Sanchez, A. H., Tharp, J. A., Lwi, S. J., Casey, J. J., & Nguyen, N. K. (2017). Positive urgency and emotional reactivity: Evidence for altered responding to positive stimuli. *Emotion*, *17*(3), 442–449. https://doi.org/10.1037/emo0000240

Johnson, S. L., Tharp, J. A., Peckham, A. D., Sanchez, A. H., & Carver, C. S. (2016). Positive urgency is related to difficulty inhibiting prepotent responses. *Emotion*, *16*(5), 750–759. https://doi.org/10.1037/emo0000182

Jones, M. V., Coffee, P., Sheffield, D., Yangüez, M., & Barker, J. B. (2012). Just a game? Changes in English and Spanish soccer fans' emotions in the 2010 World Cup. *Psychology of Sport and Exercise*, *13*(2), 162–169. https://doi.org/10.1016/j.psychsport.2011.10.008

Kaiser, R. H., Andrews-Hanna, J. R., Wager, T. D., & Pizzagalli, D. A. (2015). Large-Scale Network Dysfunction in Major Depressive Disorder: A Meta-analysis of Resting-State Functional Connectivity. *JAMA Psychiatry*, *72*(6), 603–611. https://doi.org/10.1001/jamapsychiatry.2015.0071

Kline, R. B. (2016). *Principles and practices of structural equation modeling* (4th ed.). The Guilford Press.

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine*, *16*(9), 606–613.

Kuppens, P., Tuerlinckx, F., Russell, J. A., & Barrett, L. F. (2013). The relation between valence and arousal in subjective experience. *Psychological Bulletin*, *139*(4), 917–940. https://doi.org/10.1037/a0030811

Lang, P J, Bradley, M. M., & Cuthbert, B. N. (1997). *International Affective Picture System (IAPS): Technical Manual and Affective Ratings*.

Lang, Peter J., Bradley, M. M., & Cuthbert, B. N. (1992). A motivational analysis of emotion: reflecx-cortex connections. *Psychological Science*, *3*(1), 39–43.

Lauriola, M., Panno, A., Levin, I. P., & Lejuez, C. W. (2014). Individual Differences in Risky Decision Making: A Meta-analysis of Sensation Seeking and Impulsivity with the Balloon Analogue Risk Task. *Journal of Behavioral Decision Making*, *27*(1), 20–36. https://doi.org/10.1002/bdm.1784

Leeman, R. F., Ralevski, E., Limoncelli, D., Pittman, B., Malley, S. S. O., & Petrakis, I. L. (2014). Relationships between impulsivity and subjective response in an IV ethanol paradigm. *Psychopharmacology*, *231*, 2867–2876. https://doi.org/10.1007/s00213-014-3458-9

Lejuez, C. W., Read, J. P., Kahler, C. W., Richards, J. B., Ramsey, S. E., Stuart, G. L., Strong, D. R., & Brown, R. A. (2002). Evaluation of a behavioral measure of risk taking: the Balloon Analogue Risk Task (BART). *Journal of Experimental Psychology: Applied*, *8*(2), 75–84. https://doi.org/10.1037/1076-898X.8.2.75

Lynam, D. R., Smith, G. T., Whiteside, S. P., & Cyders, M. A. (2006). *The UPPS-P: Asessing five personality pathways to impulsive behavior.* Purdue University.

MacKillop, J. (2006). Factor structure of the alcohol urge questionnaire under neutral conditions and during a cue-elicited urge state. *Alcoholism: Clinical and Experimental Research*, *30*(8), 1315–1321. https://doi.org/10.1111/j.1530-0277.2006.00159.x

Marlatt, G. A., & Rohsenow, D. J. (1980). Cognitive processes in alcohol use: Expectancy and the balanced placebo design. *Advances in Substance Use, Beahvioral and Biological Research*, *1*, 159–199.

Mather, M., & Sutherland, M. R. (2011). Arousal-Biased Competition in Perception and Memory. *Perspectives on Psychological Science*, *6*(2), 114–133. https://doi.org/10.1177/1745691611400234

Mohr, C. D., Arpin, S., & Mccabe, C. T. (2015). Daily affect variability and context-specific alcohol consumption. *Drug and Alcohol Review*, *34*(6), 581–587. https://doi.org/10.1111/dar.12253

Morrongiello, B. A., Stewart, J., Pope, K., Pogrebtsova, E., & Boulay, K. J. (2015). Exploring relations between positive mood state and school-age children's risk taking. *Journal of Pediatric Psychology*, *40*(4), 406–418. https://doi.org/10.1093/jpepsy/jsu100

Nagoshi, C. T., Wilson, J. R., & Rodriguez, L. A. (1991). Impulsivity, Sensation Seeking, and Behavioral and Emotional Responses to Alcohol. *Alcoholism: Clinical and Experimental Research*, *15*(4), 661–667.

Nasky, K. M., Cowan, G. L., & Knittel, D. R. (2009). False-positive urine screening for benzodiazepines: An association with sertraline? A two-year retrospective chart analysis. *Psychiatry*, *6*(7), 36–39.

National Highway Traffic Safety Administration. (1994). *Computing a BAC Estimate*.

National Institute on Alcoholism and Alcohol Abuse. (n.d.). *What is a standard drink?* https://www.rethinkingdrinking.niaaa.nih.gov/How-much-is-too-much/What-counts-as-a-drink/Whats-A-Standard-Drink.aspx

Neal, D. J., & Carey, K. B. (2007). Association between alcohol intoxication and alcohol-related problems: an event-level analysis. *Psychology of Addictive Behaviors*, *21*(2), 194–204.

Neal, D. J., & Fromme, K. (2007). Event-Level Covariation of Alcohol Intoxication and Behavioral Risks During the First Year of College. *Journal of Consulting and Clinical Psychology*, *75*(2), 294–306. https://doi.org/10.1037/0022-006X.75.2.294

Newlin, D. B., & Thomson, J. B. (1990). Alcohol Challenge With Sons of Alcoholics: A Critical Review and Analysis. *Psychological Bulletin*, *108*(3), 383–402. https://doi.org/10.1037/0033-2909.108.3.383

Peacock, A., Bruno, R., Martin, F. H., & Carr, A. (2013). The impact of alcohol and energy drink consumption on intoxication and risk-taking behavior. *Alcoholism: Clinical and Experimental Research*, *37*(7), 1234–1242. https://doi.org/10.1111/acer.12086

Peacock, A., Cash, C., Bruno, R., & Ferguson, S. G. (2015). Day-by-day variation in affect, arousal and alcohol consumption in young adults. *Drug and Alcohol Review*, *34*(6), 588–594. https://doi.org/10.1111/dar.12238

Pearlstein, J. G., Johnson, S. L., Modavi, K., Peckham, A. D., & Carver, C. S. (2019). Neurocognitive mechanisms of emotion-related impulsivity: The role of arousal. *Psychophysiology*, *56*(2), 1–9. https://doi.org/10.1111/psyp.13293

Pedersen, S. L., King, K. M., Louie, K. A., Fournier, J. C., & Molina, B. S. G. (2019). Momentary fluctuations in impulsivity domains: Associations with a history of childhood ADHD, heavy alcohol use, and alcohol problems. *Drug and Alcohol Dependence*, *205*(September), 107683. https://doi.org/10.1016/j.drugalcdep.2019.107683

Pliner, P., & Cappell, H. (1974). Modification of affective consequences of alcohol: a comparison of social and solitary drinking. *Journal of Abnormal Psychology*, *83*(4), 418–425. https://doi.org/10.1037/h0036884

Pool, E., Brosch, T., Delplanque, S., & Sander, D. (2015). Attentional Bias for Positive Emotional Stimuli : A Meta-Analytic Investigation. *Psychological Bulletin*, *142*(1), 79–106. https://doi.org/10.1037/bul0000026

Post, R. E., & Kurlansik, S. L. (2012). Diagnosis and management of attention-deficit/Hyperactivity disorder in adults. *American Family Physician*, *85*(9), 890–896.

Quinn, P. D., & Fromme, K. (2011). Predictors and Outcomes of Variability in Subjective Alcohol Intoxication Among College Students: An Event-Level Analysis Across 4 Years. *Alcoholism: Clinical and Experimental Research*, *35*(3), 484–495. https://doi.org/10.1111/j.1530-0277.2010.01365.x

Rankin, L. A., & Maggs, J. L. (2006). First-year college student affect and alcohol use: Paradoxical within- and between-person associations. *Journal of Youth and Adolescence*, *35*(6), 925–937. https://doi.org/10.1007/s10964-006-9073-2

Reed, S. C., Levin, F. R., & Evans, S. M. (2012). Alcohol increases impulsivity and abuse liability in heavy drinking women. *Experimental and Clinical Psychopharmacology*, *20*(6), 454–465. https://doi.org/10.1037/a0029087.Alcohol

Rehm, J., Shield, K. D., Joharchi, N., & Shuper, P. A. (2012). Alcohol consumption and the intention to engage in unprotected sex: Systematic review and meta-analysis of experimental studies. *Addiction*, *107*(1), 51–59. https://doi.org/10.1111/j.1360-0443.2011.03621.x

Reynolds, B., Richards, J. B., & de Wit, H. (2006). Acute-alcohol effects on the Experiential Discounting Task (EDT) and a question-based measure of delay discounting. *Pharmacology Biochemistry and Behavior*, *83*(2), 194–202. https://doi.org/10.1016/j.pbb.2006.01.007

Richards, J. B., Zhang, L., Mitchell, S. H., & de Wit, H. (1999). Delay or probability discounting in a model of impulsive behavior: effect of alcohol. *Journal of the Experimental Analysis of Behavior*, *71*(2), 121–143.

Ritz, T., Wilhelm, F. H., Gerlach, A. L., Kullowatz, A., & Roth, W. T. (2005). End-tidal pCO2 in blood phobics during viewing of emotion- and disease-related films. *Psychosomatic Medicine*, *67*(4), 661–668. https://doi.org/10.1097/01.psy.0000170339.06281.07

Roberts, K. R., Dimsdale, J., East, P., & Friedman, L. (1998). Adolescent emotional response to music and its relationship to risk- taking behaviors. *Journal of Adolescent Health*, *23*(1), 49–54. https://doi.org/10.1016/S1054-139X(97)00267-X

Rueger, S. Y., Trela, C. J., Palmeri, M., & King, A. C. (2012). Self-administered web-based timeline followback procedure for drinking and smoking behaviors in young adults. *Journal of Studies on Alcohol and Drugs*, *73*(5), 829–833.

Russell, J. A. (1980). A circumplex model of affect. *Journal of Personality and Social Psychology*, *39*(6), 1161–1178.

Salvatore, J. E., Thomas, N. S., Cho, S. Bin, Adkins, A., Kendler, K. S., & Dick, D. M. (2016). The role of romantic relationship status in pathways of risk for emerging adult alcohol use. *Psychology of Addictive Behaviors*, *30*(3), 335–344. https://doi.org/10.1037/adb0000145

Saunders, J. B., Aasland, O. G., Babor, T. F., de la Fuente, J. R., & Grant, M. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption--II. *Addiction*, *88*, 791–804. https://doi.org/10.1111/j.1360-0443.1993.tb02093.x

Schroder, K. E. E., Johnson, C. J., & Wiebe, J. S. (2009). An event-level analysis of condom use as a function of mood, alcohol use, and safer sex negotiations. *Archives of Sexual Behavior*, *38*(2), 283–289. https://doi.org/10.1007/s10508-007-9278-9

Scott-Sheldon, L. A. J., Carey, K. B., Cunningham, K., Johnson, B. T., & Carey, M. P. (2016). Alcohol Use Predicts Sexual Decision-Making: A Systematic Review and Meta-Analysis of the Experimental Literature. *AIDS and Behavior*, *20*(1), 19–39. https://doi.org/10.1007/s10461-015-1108-9

Settles, R. F., Cyders, M. A., & Smith, G. T. (2010). Longitudinal validation of the acquired preparedness model of drinking risk. *Psychology of Addictive Behaviors*, *24*(2), 198–208. https://doi.org/10.1037/a0017631

Simons, J S, Dvorak, R. D., Batien, B. D., & Wray, T. B. (2010). Event-level associations between affect, alcohol intoxication, and acute dependence symptoms: Effects of urgency, self-control, and drinking experience. *Addictive Behaviors*, *35*(12), 1045–1053. https://doi.org/10.1016/j.addbeh/2010.07.001

Simons, Jeffrey S., Gaher, R. M., Oliver, M. N. I., Bush, J. A., & Palmer, M. A. (2005). An experience sampling study of associations between affect and alcohol use and problems among college students. *Journal of Studies on Alcohol*, *66*(4), 459–469. https://doi.org/10.15288/jsa.2005.66.459

Smith, G. T., & Cyders, M. A. (2016). Integrating affect and impulsivity: The role of positive and negative urgency in substance use risk. *Drug and Alcohol Dependence*, *163*, S3–S12. https://doi.org/10.1016/j.drugalcdep.2015.08.038

Sobell, L. C., & Sobell, M. B. (1992). Timeline Follow-back: A technique for assessing self-reported alcohol consumption. In J. Allen & R. Z. Litten (Eds.), *Measuring Alcohol Consumption: Psychosocial and biological methods* (pp. 41–72). Humana Press.

Spitzer, R. L., Kroenke, K., Williams, J. B., & Lowe, B. (2006). A brief measure for assessing generalized anxiety disorder: the GAD-7. *Archives of Internal Medicine*, *166*(10), 1092–1097.

Stautz, K., & Cooper, A. (2014). Brief report: Personality correlates of susceptibility to peer influence in adolescence. *Journal of Adolescence*, *37*(4), 401–405. https://doi.org/10.1016/j.adolescence.2014.03.006

Steptoe, A., & Wardle, J. (1999). Mood and drinking: A naturalistic diary study of alcohol, coffee and tea. *Psychopharmacology*, *141*(3), 315–321. https://doi.org/10.1007/s002130050839

Sutherland, M. R., & Mather, M. (2018). Arousal (but not valence) amplifies the impact of salience. *Cognition and Emotion*, *32*(3), 616–622. https://doi.org/10.1080/02699931.2017.1330189

Sutker, P. B., Tabakoff, B., Goist, K. C., & Randall, C. L. (1983). Acute alcohol intoxication, mood states and alcohol metabolism in women and men. *Pharmacology, Biochemistry, & Behavior*, *18 Suppl 1*, 349–354. http://www.ncbi.nlm.nih.gov/pubmed/6634848

Treloar, H. R., & McCarthy, D. M. (2012). Effects of mood and urgency on activation of general and specific alcohol expectancies. *Addictive Behaviors*, *37*(1), 115–118. https://doi.org/10.1016/j.addbeh.2011.07.006

Um, M., & Cyders, M. A. (2019). Positive emotion-based impulsivity as a transdiagnostic endophenotype. In J. Gruber (Ed.), *Oxford handbook of positive emotion and psychopathology* (pp. 197–222). Oxford University Press.

Um, M., Hershberger, A. R., & Cyders, M. A. (2019). The relationship among depressive symptoms, urgency, and problematic alcohol and cannabis use in community adults. *Addictive Behaviors*, *88*(August 2018), 36–42. https://doi.org/10.1016/j.addbeh.2018.08.009

Um, M., Revilla, R., & Cyders, M. A. (Under Review). A meta-analytic review of the effectiveness of mood inductions in eliciting emotion-based behavioral risk-taking and craving in the laboratory. *Emotion*.

Um, M., Revilla, R., Oglesby, L., & Cyders, M. A. (Unpublished data). A meta-analytic review of the effectiveness of mood inductions in inducing emotional arousal.

Vakili, S., Carter, L., Sobell, M. B., Simco, E. R., & Agrawal, S. (2008). Using the Timeline Followback to determine time windows representative of annual alcohol consumption with problem drinkers. *Addictive Behaviors*, *33*, 1123–1130. https://doi.org/10.1016/j.addbeh.2008.03.009

van Ginkel, J.R., & van der Ark, L. A. (2010). *SPSS syntax for two-way imputation of missing test data*.

Van Ginkel, Joost R., Van Der Ark, L. A., & Sijtsma, K. (2007). Multiple imputation of item scores in test and questionnaire data, and influence on psychometric results. *Multivariate Behavioral Research*, *42*(2), 387–414. https://doi.org/10.1080/00273170701360803

Vaughan, C. L., Stangl, B. L., Schwandt, M. L., Corey, K. M., Hendershot, C. S., & Ramchandani, V. A. (2019). The Relationship Between Impaired Control, Impulsivity, and Alcohol Self-Administration in Nondependent Drinkers. *Experimental and Clinical Psychopharmacology*, *27*(3), 236–246. https://doi.org/10.1037/pha0000247

Velten, E. (1968). A laboratory task for induction of mood states. *Behaviour Research and Therapy*, *6*(4), 473–482. https://doi.org/10.1016/0005-7967(68)90028-4

Wardell, J. D., Quilty, L. C., & Hendershot, C. S. (2015). Alcohol sensitivity moderates the indirect associations between impulsive traits, impaired control over drinking, and drinking outcomes. *Journal of Studies on Alcohol and Drugs*, *76*(2), 278–286. http://www.scopus.com/inward/record.url?eid=2-s2.0-84926162710&partnerID=tZOtx3y1

Wardell, J. D., Read, J. P., Curtin, J. J., & Merrill, J. E. (2012). Mood and Implicit Alcohol Expectancy Processes: Predicting Alcohol Consumption in the Laboratory. *Alcoholism: Clinical and Experimental Research*, *36*(1), 119–129. https://doi.org/10.1111/j.1530-0277.2011.01589.x

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and Validation of Brief Measures of Positive and Negative Affect: The PANAS Scales. *Journal of Personality and Social Psychology*, *54*(6), 1063–1070. https://doi.org/10.1037/0022-3514.54.6.1063

Weafer, J, & Fillmore, M. T. (2016). Low-dose alcohol effects on measures of inhibitory control, delay discounting, and risk-taking. *Current Addiction Report*, *3*, 75–84. https://doi.org/10.1007/s40429-016-0086-y

Weafer, Jessica, & Fillmore, M. T. (2008). Individual differences in acute alcohol impairment of inhibitory control predict ad libitum alcohol consumption. *Psychopharmacology*, *201*, 315–324. https://doi.org/10.1007/s00213-008-1284-7

Weiss, N. H., Tull, M. T., Davis, L. T., Searcy, J., Williams, I., & Gratz, K. L. (2015). A preliminary experimental investigation of emotion dysregulation and impulsivity in risky behaviours. *Behaviour Change*, *32*(2), 127–142. https://doi.org/10.1017/bec.2015.5

Weissenborn, R., & Duka, T. (2003). Acute alcohol effects on cognitive function in social drinkers : their relationship to drinking habits. *Psychopharmacology*, *165*, 306–312. https://doi.org/10.1007/s00213-002-1281-1

Westman, J. G., Bujarski, S., & Ray, L. A. (2017). Impulsivity Moderates Subjective Responses to Alcohol in Alcohol-Dependent Individuals. *Alcohol and Alcoholism*, *52*(2), 249–255. https://doi.org/10.1093/alcalc/agw096

Williams, S., & Voon, Y. W. W. (1999). The effects of mood on managerial risk perceptions: Exploring affect and the dimensions of risk. *Journal of Social Psychology*, *139*(3), 268–287. https://doi.org/10.1080/00224549909598384

Zapolski, T. C. B., Cyders, M. A., & Smith, G. T. (2009). Positive urgency predicts illegal drug use and risky sexual behavior. *Psychology of Addictive Behaviors*, *23*(2), 348–354. https://doi.org/10.1037/a0014684

Zapolski, T. C., Settles, R. F., Cyders, M. A., & Smith, G. T. (2010). Borderline personality disorder, bulimia nervosa, antisocial personality disorder, ADHD, substance use: Common threads, common treatment Needs, and the nature of impulsivity. *Independent Practitioner*, *30*(1), 20–23. http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3022439&tool=pmcentrez&rendertype=abstract

Zaso, M. J., Hendershot, C. S., Wardell, J. D., Bagby, R. M., Pollock, B. G., & Quilty, L. C. (2021). Characterizing the role of impaired control over alcohol in associations of impulsive personality traits with alcohol use as a function of depressive disorder. *Addictive Behaviors*, *112*(August 2020), 106633. https://doi.org/10.1016/j.addbeh.2020.106633