

ALCOHOL STRESS-DAMPENING AND EMOTIONAL SELF-AWARENESS AS
MODERATORS OF NEGATIVE MOOD-RELATED DRINKING

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ABSTRACT

Maleeha Haroon: Alcohol Stress-Dampening and Emotional Self-Awareness as Moderators of Negative Mood-Related Drinking
(Under the direction of Andrea Hussong)

Studies examining motivations underlying alcohol use have regularly found that individuals differ in their reasons for alcohol use and that self-reported coping motivations for drinking are more strongly associated with alcohol problems compared to other motives for use. However, many of the studies examining this negative affect-drinking relation have relied on between-person, cross-sectional, retrospective reports, which casts doubt on the accuracy of these retrospective attributions regarding the “true” proximal determinants of alcohol consumption. The current study sought to examine whether previously untested constructs of theoretical relevance to negative affect-related drinking – specifically, stress-response dampening (SRD) to alcohol and emotional self-awareness – might identify those at risk for negative affect-related drinking in a sample of college students. Findings offered little support for the predicted moderating effects of SRD to alcohol or emotional self-awareness on the relation between negative affect and alcohol use. Models testing interactions between SRD and negative affect in predicting drinking yielded no significant results. Though significant moderating effects for a subset of emotional self-awareness variables was found across models, the direction of these interactions did not support a hypothesized mechanism whereby vulnerable individuals experiencing higher levels of stress and negative affect would increase their level of drinking. Potential implications of study findings as well as strengths and limitations are further discussed.

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INTRODUCTION

Alcohol use and alcohol use disorder (AUD) constitute a significant public health concern in the United States. Recent reports indicate that excessive alcohol use is the fourth leading preventable cause of death in the U.S. (Stahre, Roeber, Kanny, Brewer, & Zhang, 2014), contributing to liver disease, cancers, acute intoxication, and driving-related fatalities. The economic burden of drinking is also high; estimated costs of alcohol misuse in 2010 were almost \$250 billion (Sacks, Gonzales, Bouchery, Tomedi, & Brewer, 2015). Though alcohol use has the potential to become hazardous, it is clear that not everyone who uses will evidence problematic drinking behavior. In 2014, 71 percent of those aged 18 or older reported having drunk alcohol in the past year and 57 percent reported drinking in the past month, whereas only about 6.8 percent met criteria for an AUD and 24.7 percent reported having engaged in binge drinking in the past month (Substance Abuse and Mental Health Services Administration, 2014). Given the public health and economic impacts of alcohol misuse, research efforts aimed towards identification of mechanisms that contribute to the development and maintenance of problematic alcohol use are of significant public health importance.

Research has shown that alcoholism is a heterogeneous phenotype with multiple trajectories and “pathways” towards problem use (Zucker, 2006, 2008). Among various potential pathways, stress and negative affect emerge in previous studies as contributing to the development of alcohol use behaviors (Hussong, Jones, Stein, Baucom, & Boeding, 2011; Stice, Barrera, & Chassin, 1998; Wills, Sandy, Shinar, & Yaeger, 1999). Prior studies also suggest that negative affect-related drinking is a particularly problematic form of alcohol use, as evidenced

by the consistent finding that coping motives for drinking are more strongly associated with and more predictive of alcohol problems than are other motives for alcohol use (see Cooper, Kuntsche, Levitt, Barber, & Wolff, 2015, for a review). Research that investigates the mechanisms underlying negative affect-motivated drinking may therefore aid in identification of those at risk for developing an especially hazardous drinking pattern.

Though early theories of alcoholism suggested that stress- and negative affect-reduction motives were central to drinking for all individuals (e.g., Conger, 1956), evidence indicates that stress and negative affect increase risk for alcohol engagement only for some individuals and only in certain contexts (Greely & Oei, 1999; Sayette, 1999). Given these findings, researchers have attempted to identify individual difference variables that may moderate the relationship between stress-negative affect and drinking. Notably, the Stressor-Vulnerability Model (SVM; Cooper, Russell, Skinner, Frone, & Mudar, 1992) suggests that individuals with stronger beliefs concerning alcohol's ability to reduce distress (e.g., tension-reduction expectancies for use) and who use less adaptive coping skills (e.g., endorse more avoidant coping styles) may be more likely to drink in response to stressful situations. When these individuals experience stress-negative affect, they may also be those most likely to endorse drinking to cope as a motivation for their use.

Though many studies have found that tension-reduction expectancies and avoidant coping relate to drinking to cope, and that all three variables predict greater alcohol consumption and alcohol misuse (e.g., Cooper et al., 1992; Cooper, Russell, & George, 1988), these studies have largely relied on retrospective, cross-sectional, between-subject designs. These designs, however, do not directly address the question of whether any given individual drinks more *when he or she is stressed*. To address this question, researchers have used within-person methods that

focus on the daily associations among stress-negative affect and drinking. Findings from these studies have provided mixed results for the stressor vulnerability model and the role of coping motives as a moderator of the association between stress-negative affect and drinking (e.g., Armeli, Conner, Cullum, & Tennen, 2010; Armeli, Carney, Tennen, Affleck, & O'Neill, 2000; Hussong, 2007; Hussong, Galloway, & Feagans, 2005; Littlefield, Talley, & Jackson, 2012; Mohr, Armeli, Tennen, Temple, Todd, Clark, & Carney, 2005; Park, Armeli, & Tennen, 2005). The current study thus sought to investigate factors that might better capture within-person affect-drinking covariation in order to better identify individuals at risk for this drinking pattern. Specifically, I sought to examine individual differences in subjective response to alcohol and emotional self-awareness as moderators of the relation between stress-negative affect and drinking as a daily process. As I will further explicate, these constructs may be better able to capture individuals vulnerable to stress-negative affect drinking in a way that self-reported coping motivations do not.

Specifying Relations Between Stress/Negative Affect and Alcohol Use

In his foundational work, Conger (1956) formed the tension reduction hypothesis, positing that (1) alcohol consumption would reduce stress and negative affect under most conditions, and (2) that in times of stress or negative affective states, people will be motivated to drink. Later theories examining stress- and anxiety-reducing properties of alcohol largely attempted to reformulate and study broadly applied versions of this hypothesis (e.g., Wilson, 1988; Sayette, 1993). However, despite the intuitive appeal of such models of alcohol use, empirical support for the central tenants of the tension reduction hypothesis are weak and inconsistent. Rather, this body of work shows that the relationship between alcohol, stress, and negative affect is complex (Greely & Oei, 1999; Sayette, 1999). Alcohol appears to reduce stress

and negative affect only in some people under certain conditions; for this reason, attempts to find a main effect of the experience of stress and negative affect on subsequent drinking have shown inconsistent results, particularly when comparing individuals across different developmental periods. In addition, some researchers argue that the direction of effect is reversed such that negative affect results from, rather than leads to, problematic alcohol use, perhaps particularly in the presence of AUDs, when alcohol may be used to alleviate negative affect associated with withdrawal syndromes (Kushner, Abrams, & Borchardt, 2000). Due to such individual differences and potential reciprocal influences of stress-negative affect and alcohol use, cross-sectional, between-person studies that ignore individual differences in these associations may shed little light on the nature of stress-negative affect and drinking associations. Indeed, evidence suggests that this negative affect-motivated drinking may hold true for a subgroup of at-risk individuals and may vary depending on a variety of moderating factors (e.g., Cooper, Frone, Russel, & Mudar, 1995; Cooper et al., 1992; Hussong & Chassin, 1993; Hussong, Gould, & Hersh, 2008; Kushner, Sher, Wood, & Wood, 1994; Shadur, Hussong, & Haroon, 2015). As a result, researchers studying stress-negative affect-motivated drinking have moved towards identifying when, where, and for whom alcohol use is most likely to function as a coping strategy.

College Drinking

An important question to address when attempting to capture negative affect-related drinking on a within-person level is therefore what contexts may exacerbate risk for stress-negative-affect motivated drinking. College drinking may be a particularly important context for studying this mechanism for a number of reasons. First, college presents an opportunity for many patterns of drinking to emerge. Heavy drinking is common among college students, with studies showing that up to 84% of students report a binge drinking episode in the past 90 days

(Vik, Carrello, Tate, & Field, 2000). This is concerning, as heavy drinking has been associated with difficulties in several domains, including interpersonal problems (O'Hare, 1990), academic difficulties (Presley & Meilman, 1994; Wechsler, Isaac, Grodstein, & Sellers, 1994), and involvement in the legal system (Schuckit, Klein, Twitchell, & Springer, 1994). Further, drinking to cope is common among college students, with many endorsing drinking when under stress (Park & Levenson, 2002). As in the general population, these coping motivations for drinking remain linked to higher levels of alcohol-related problems than other forms of use among college students (e.g., Blevins, Abrantes, & Stephens, 2016; Martens, Neighbors, Lewis, Lee, Oster-Aaland, & Larmier, 2008), indicating that it remains an important intervention target for this group.

Second, college represents a time of significant time of life transition, as young adults in this context are handling both the developmental tasks associated with the transition into adulthood and college and academic-related obligations (e.g., Arnett, 2000; Roisman, Masten, Coatsworth, & Tellegen, 2004; Salmela-Aro, Aunola, & Nurmi, 2007). Given this constellation of stressors, college students have unsurprisingly evidenced heightened rates of self-reported stress, depression, and anxiety (e.g., Brougham, Zail, Mendoza, & Miller, 2009; Larose & Boivin, 1998; Piercall & Keim, 2007). The combination of increased independence, need to cope with stressors, and widespread access to and encouragement of alcohol use may make stress-negative affect motivated drinking more likely during this period (Schulenberg & Maggs, 2002). National survey data show that peak rates of alcohol involvement and the emergence of alcohol abuse often occur between the ages of 18 and 25 (Substance Abuse and Mental Health Services Administration (SAMHSA), 2016), and that college students have a higher unadjusted rate of AUDs than their non-college-attending peers (Blanco et al., 2008). Interestingly, though college

students were found to have higher risk of AUDs, they were significantly less likely to receive past-year treatment for AUDs than non-college peers (Blanco et al., 2008).

Third, though college students have evidenced higher risk of AUDs compared to their non-college peers, *withdrawal* in particular is one symptom of AUD that college students are significantly *less* likely to report than non-college peers. Relatedly, under DSM-IV AUD criteria, college students were found to be more likely to be diagnosed with alcohol *abuse* when compared to their non-college peers; however, they were not more likely to receive a diagnosis of DSM-IV alcohol *dependence* (Slutske, 2005). Dependence has been conceptualized as later stage of disorder than abuse that emerges after development of a physical withdrawal syndrome. Stress-negative affect and drinking associations among college students may thus be more likely to reflect the role of negative affect as a risk factor for drinking than vice-versa (i.e., are less likely to reflect a consequence of a withdrawal syndrome).

In sum, college is a time when drinking behavior becomes widespread and normative and may be more likely to occur in response to negative affect. College students thus may be a particularly appropriate sample when studying the emergence of stress-negative affect-motivated drinking behaviors. The prevalence and negative consequences of heavy drinking also compel efforts to further understand factors that contribute to alcohol use in the college population, making college students an important population to study in terms of public health. Better understanding of mechanisms underlying negative affect-motivated drinking in this population may help to advance development of interventions for this group.

Alcohol Expectancies and Drinking Motives as Predictors

Given that college students may be an appropriate population for the study of negative affect-motivated drinking, a second question is what individual difference factors among those in

the college context may be helpful in identifying those at risk for development of this pattern. Motivational models of alcohol use (e.g., Cox & Klinger, 1988; 1990; 2004) posit that the use of alcohol is a strategic decision targeted towards achieving anticipated effects. In this framework, individuals are motivated to drink in pursuit of expected affective changes, whether to increase positive feelings (a positive reinforcement mechanism) or reduce negative ones (a negative reinforcement mechanism). Decisions towards or away from use are theoretically influenced by several factors, including historical factors (e.g., an individual's biochemical reactivity to alcohol, personality characteristics, sociocultural influences, and past experiences with alcohol), current incentives (e.g., availability of more or less attractive alternatives to drinking), and situational factors (e.g., the setting, availability of the substance, whether alone or with others, and if others are approving or disapproving of use). These various factors are cognitively appraised and contribute to the formulation of cognitive expectancies or beliefs regarding the effects of drinking (Brown, Christiansen, & Goldman, 1987). The weighing of positive and negative expectations, or the weighing of the anticipated changes that would result from drinking versus not drinking or engaging in alternative behaviors, culminate in a decision to use or not use. If the decision is to use, relevant motives are activated, prompting use behavior. This decision-making process might not occur entirely consciously or within an individual's awareness.

In line with theory, negative affective and internalizing symptomatology have been associated with coping motives, and in between-person studies, coping motives have been found to mediate the relationship between these variables and alcohol use and problem outcomes cross-sectionally (e.g., Cooper et al., 1995; Cooper et al., 2000; Gonzalez, Collins, & Bradizza, 2009; Hussong, 2003; Kuntsche, von Fischer, & Gmel, 2008; Magid, MacLean, & Colder, 2007; Read

et al., 2003; Simons, Gaher, Correia, et al., 2005; Stewart, Zvolensky, & Eifert, 2001), though relatively fewer studies have tested such mediational models longitudinally (cf. Littlefield, Sher, & Wood, 2010; Tragesser, Sher, Trull, & Park, 2007; Tragesser, Trull, Sher, & Park, 2008). As such, there is evidence to suggest that the types of motivations individuals endorse for drinking are indeed proximal mechanisms through which individual dispositional factors operate to predict alcohol use.

However, though self-reported coping motives appear to capture the mechanism by which the experience of stress-negative affect activates drinking in these between-person studies, between-person designs do not accurately capture the hypothetical within-person process whereby one individual drinks to cope. As drinking to cope has been defined as “the tendency to use alcohol to escape, avoid, or otherwise regulate unpleasant emotion” (Cooper et al., 1988, p.218), researchers expect that negative affect and drinking are linked in time, such that those who drink to cope will drink more on days they experience stress-negative affect. Closer examination of the temporal relationship between negative affective states and drinking *within* an individual (i.e., using within-person designs) is thus more directly suited to studying this process. Daily diary or experience sampling designs allow for more proximal evaluation of these daily processes and are well-suited to the study of such phenomena (Tennen, Affleck, Armeli, & Carney, 2000).

As not all individuals are expected to drink in response to negative affect, even within-person designs would not necessarily be expected to yield findings suggestive of stress-negative affect motivated drinking in a general college student sample. Indeed, whereas some studies have found greater drinking on days characterized by greater negative affect (depression; Flynn, 2000), others have found no main effect of daily sadness on drinking (Hussong et al., 2005), or

even a negative association between daily mood and drinking (Stephoe & Wardle, 1999). As reformulations of the tension reduction hypothesis would suggest, such a pattern would likely only be found in a certain vulnerable subset of individuals. Given that coping motives purportedly measure an individual's predilection for drinking in response to stress and negative affect, those who self-report higher coping motives for drinking would seemingly be more likely to evidence this within-person process. As such, coping motivations for use represent an obvious candidate for a moderator in within-person studies of stress-negative affect motivated drinking.

A number of within-person studies have investigated coping motives as a moderator of such stress-negative affect drinking relationships. However, studies that have examined this in young adult samples have not consistently found the expected relation (e.g., Armeli et al., 2010; Armeli, Todd, Conner, & Tennen, 2008; Grant, Stewart, & Mohr, 2009; Hussong, 2007; Hussong et al., 2005; Littlefield et al., 2012; Mohr et al., 2005; Park et al., 2005). Though these studies vary in terms of how they measured stress, negative affect, and coping motives, as well as the timing and number of daily assessments, the weak, inconsistent, and sometimes contradictory findings of these studies make it difficult to conclude that broadly defined, self-endorsed coping motives are useful in identifying those individuals who are vulnerable to stress-negative affect drinking patterns.

Most notably, while a few single studies suggested that different analytic modeling strategies – for example, utilizing time-to-drink models as opposed to hierarchical linear models – may be the key to finding results more consistent with theory (e.g., Armeli et al., 2008; Hussong, 2007), Littlefield and colleagues (2012) conducted a lengthy, 8-week daily diary study among 115 college students in order to compare these two analytic approaches and clarify whether time-to-drink models consistently support the hypothesized relations between negative

mood states, coping motives, and drinking. However, the study revealed no support for the utility of coping motives as a moderator in either time-to-drink or hierarchical linear models. The authors therefore posited that self-reported coping motives may not reflect the actual relations between mood and alcohol use.

As a whole, such findings suggest that though the theoretical basis for the use of coping motives as a moderator is sound, the current operationalization of this construct (i.e., self-reported dispositional coping motives) may be flawed. One possibility is that individuals are poor prospective reporters of their drinking motivations. A theoretical assumption behind Cox and Klinger's (1988) motivational model is that while decisions to drink are voluntary, they may be made without conscious awareness. A challenge then lies in identification of motives that may be engaged in relatively unconsciously. Some evidence suggests that affect-related drinking processes become more habitual, they may become more conditioned and subconscious (Baker, Piper, McCarthy, Majeskie, & Fiore, 2004), making accurate reporting a challenge. Further, reporting on overall dispositional motivations for drinking requires individuals to retrospect over a non-specific period of time and consider how their emotions, thoughts, and behaviors are related. Accurate reporting of such motivations may require a degree of self-awareness and psychological insight that may be lacking in many individuals. Though self-report in and of itself can be a valid and useful way of measuring a construct, in general, the less self-awareness or insight required to respond to a measure, the better it performs as a predictor (Haefel & Howard, 2010). Given the complexity inherent in labeling the cognitive process of "drinking to cope," measurements that either rely less on self-report or break self-report down into less complex parts may be better at fully capturing this process.

In sum, there exists evidence from between-person studies supporting the predictive utility of coping motives and the theoretical perspective of drinking motives as a final mediator linking more distal risk factors to drinking behaviors. However, despite this, the inconsistent results from within-person studies and the fact that current measures of motives rely on potentially problematic self-reporting may point towards the need for other measures that can capture who is vulnerable to drinking in response to stress-negative affect, particularly if not all individuals can accurately identify this use pattern in themselves.

In considering how one might capture such a process without asking an individual to report whether they “drink to cope,” two factors are important to consider: (1) if alcohol is effective in reducing distress for an individual, and (2) if the individual is able to recognize and regulate their emotion well without needing to use alcohol as a coping strategy. To this end, I sought to examine two constructs that assess individual variability in these factors: subjective response to alcohol and emotional self-awareness. I hypothesized that measurement of these variables might be used as moderators in within-personal analyses and might identify vulnerable individuals without necessitating awareness of one’s own coping-related motivations for drinking.

Individual Differences in Subjective Response to Alcohol as a Moderator

As noted, the theoretical underpinnings of Cox and Klinger’s (1988) motivational model of alcohol use suggest that individual differences in biochemical reactivity to alcohol are one factor contributing to the formation of positive or negative drinking expectancies and, eventually, moment-specific motivations for drinking. Researchers have posited that subjective response to alcohol may be an important endophenotype of alcoholism, as it reflects individual differences in sensitivity to the pharmacological effects of alcohol and is associated with mechanisms

underlying genetic loci for alcoholism (Hines, Ray, Hutchinson, & Tabakoff, 2005; Ray, Bujarski, & Roche, 2016; Schuckit, 2009). Since individual differences in subjective response to alcohol have been discovered as a putative risk factor for development of AUDs, research in this field has proliferated. The study of subjective response to alcohol have generally been tested via three frameworks: the Lower Level of Response Model (Schuckit, 1984, 1994; Schuckit & Smith, 1996), the Differentiator Model (Newlin and Thomson, 1990; Martin, Earleywine, Musty, Perrine, & Swift, 1993), and the Tension Reduction or Stress-Response Dampening (SRD) Model (Levenson et al., 1980; Sher & Levenson, 1982).

Briefly, the Lower Level of Response Model emerged as the first framework for understanding differences in subjective responses to alcohol and posits that those at highest risk for alcoholism evidence lower subjective responses to alcohol, thus prompting them to drink more heavily. Evidence for this difference emerged when Shuckit and colleagues (1984) assessed subjective effects in response to oral alcohol challenge in the laboratory using both physiological and subjective, self-report assessments. His self-report instrument, the Subjective High Assessment Scale (Judd et al., 1977; Schuckit, 1984) emerged as a strong predictor of alcoholism. This theory focuses specifically on the sedative or unpleasant components of alcohol, and thus examines response to alcohol as a unidimensional construct.

Though the Lower Level of Response Model has been strongly related to family history status and is a robust predictor of behavioral outcomes (see Morean & Corbin, 2010, for a review), the Differentiator Model attempted to take into account a more multidimensional view of alcohol's effects, arguing that those at high risk for alcoholism (such as children of alcoholics) are more sensitive to the rewarding and stimulating effects of alcohol on the rising limb of the BAC curve, as well as less sensitive to the sedative or unpleasant effects when BAC is declining

(Newlin & Thomson, 1990). The Differentiator Model is thus in broad agreement with the Lower Level of Response model but attempts to take limb of the BAC into account.

The Tension-Reduction or Stress-Response Dampening (SRD) Model is the third major model found in the subjective effects literature, though it is possibly the least well-characterized and studied of the three. However, of the three, it is the most theoretically relevant to stress-negative affect motivated drinking, and thus to the current proposal. The SRD Model is the more current term used to describe these subjective effects of alcohol as it attempts to reformulate the older tension reduction hypothesis (Conger, 1956) into a more focused and accurate model (e.g., Greeley & Oei, 1999). The SRD Model implicates alcohol's ability to reduce tension and stress reactivity in certain individuals as central to the motivation to drink and the development of alcohol-related problems. Investigators of the SRD model focus on refining the operational definition and laboratory manipulation of stressors (e.g., electric shock, public speaking task) and examining individual differences in the SRD effects of alcohol to identify for whom it is relevant.

Most studies that have attempted to capture SRD have utilized laboratory-based experimental designs in which individuals consume alcohol or placebo beverages prior to engaging in a stressful task. A number of these studies provide evidence for individual differences in SRD effects of alcohol through testing group differences in SRD between a hypothesized at-risk group versus a control group. Such risk groups have included individuals with impulsive, outgoing, antisocial, aggressive, and sensation seeking personality traits (Levenson, Oyama, & Meek, 1987; Sher & Levenson, 1982; Sher & Walitzer, 1986), as well as those with a family history of alcoholism (Dai, Thavundayil, Santella, & Gianoulakis, 2007; Levenson et al., 1987; Sayette, 1999; Sinha, Robinson, & O'Malley, 2009). Importantly, the

high-risk groups have been made up of individuals who do not themselves have an AUD at the time of the study; rather, they have been subjects without AUD who had risk factors thought to be associated with development of AUD. In general, the consumption of alcoholic beverages prior to a stress task appeared to attenuate physiological and subjective stress responses to a greater degree in subjects with “higher risk” for alcoholism compared to those with lower risk; the most consistent risk factor across studies has been family history of alcoholism.

Though relatively fewer studies have attempted to measure SRD outside of the laboratory, Armeli and colleagues (2003) used a daily process design to assess SRD effects. They found that SRD could be measured via a daily process design by assessing daily negative events and mood states each morning, afternoon, and evening, as well as in vivo reports of alcohol consumption. They found that the effects of negative events on mood were weaker on days when individuals consumed alcohol. They also found that SRD varied as a function of a number of between-person risk factors.

In sum, a wealth of literature has shown that different groups vary in their physiological and subjective stress-response dampening to alcohol, and further, it is those thought to be at risk for AUD who experience stronger stress-response dampening effects of alcohol. Individual differences are therefore interesting to consider when conceptualizing the hypothetical process by which at-risk adolescents develop and strengthen negative affect-motivated drinking. Though not yet explicitly tested, individuals who experience stronger SRD effects of alcohol may be more likely to drink to cope, as they are more likely to experience desired stress relief. Studies have demonstrated that level of SRD may vary based on individual differences; however, SRD has not been widely used as an individual difference factor to differentially predict alcohol use behaviors.

As differences in stress-response dampening to alcohol are theoretically a significant contributing factor to the development of drinking motives, are associated with alcohol risk status, and may not be subject to the same measurement pitfalls as self-reported coping measures with regards to self-awareness and item interpretation, they represent a good candidate for a novel moderator in within-person analyses that have failed to find consistent moderating effects of drinking to cope on the relationship between negative affective states and drinking.

Therefore, a first aim of the proposed study was to assess whether subjective stress-response dampening to alcohol moderates the relationship between negative affective states and drinking, such that those who experience greater stress-response dampening drink more following negative affective states. I hypothesized that the within-person relationship between negative affect and alcohol use would be stronger for those who experienced greater subjective stress response dampening after drinking.

Emotional Self-Awareness as a Moderator

As previously noted, extant studies utilizing the stressor-vulnerability model framework have assessed the importance of coping processes and their interactions with alcohol expectancies in contributing to negative affect-related alcohol use. The ability to effectively cope with negative emotional states (e.g., effective emotion regulation) would likely serve as a protective factor against engaging in drinking to cope, as they may utilize other, less harmful coping strategies to regulate their negative affective states. In contrast, those who lack the skills to effectively cope with stress and negative affective states may be more likely to use maladaptive coping mechanisms such as alcohol use.

The ability to effectively regulate one's emotional states is conceptualized as a complex process involving various dimensions and skills. More specifically, effective emotion regulation

skills include awareness of emotion, the ability to identify and label emotions, correct interpretation of emotion-related bodily sensations, and acceptance and tolerance of negative emotions (Berking, Margrad, Ebert, Wupperman, Hofmann, & Junghanns, 2011; Gratz & Roemer, 2004). Given this definition, it is important to note that effective emotion regulation does not only involve control or modulation of affective states; rather, it involves monitoring and evaluating emotional experiences in order to experience and differentiate the full range of emotions and respond appropriately (Gratz & Roemer, 2004).

A construct that might be termed “emotional self-awareness” is thus a hypothetical variable of interest in considering which individuals may be vulnerable to negative affect driven alcohol use. The broad construct of emotion regulation has been implicated in alcohol use both before and after treatment, such that those termed to have poorer emotion regulatory skills are more likely to use and abuse alcohol (Berking et al., 2011). Poorer emotion regulation has also been implicated in risk for relapse in situations involving negative emotion (Bandura, Caprara, Barbaranelli, Gerbino, & Pastorelli, 2003). Given what is known about the processes underlying emotion regulatory skills, those who are less aware of emotional states and are unable to identify, describe, differentiate, and interpret various emotional or bodily states may therefore be those most likely to engage in drinking behavior when faced with stressful situations.

The hypothetical construct of emotional self-awareness has been conceptualized and measured in different ways in the literature. An individual-level characteristic that encapsulates deficits in emotional self-awareness is alexithymia. Alexithymia is a condition characterized by difficulties identifying and describing feelings, distinguishing between feelings and bodily sensations of emotional arousal, and an externally oriented style of thinking (Sifneos, 1973). A number of studies have found a relationship between alexithymia and substance abuse (Cleland,

Magura, Foote, Rosenblum, & Kosanke, 2005; De Rick & Vanheule, 2006). Rates of alexithymia among alcohol-dependent inpatient populations are generally found to be 50% or higher (Evren et al., 2008; Loas, Fremaux, Otmani, Lecercle, & Delahousse, 1997; Sauvage & Loas, 2006). Some researchers have therefore conceptualized alexithymia as a personality trait that places individuals at greater risk for development of AUD (Uzun et al., 2003; Ziółkowski, Gruss, & Rybakowski., 1995).

It must be noted, however, that it is difficult to determine the directionality of the relationship between alexithymia and AUD in such studies, as there are few prospective studies examining whether alexithymia is a predictor of AUD rather than a result of alcohol abuse. However, investigators studying this relationship have largely been guided by the theory that alexithymic individuals have difficulty regulating their emotions and consume alcohol in an effort to cope with these negative emotional states (e.g., Stasiewicz et al., 2012; Thorberg, Young, Sullivan, & Lyvers, 2009; Thorberg, Young, Sullivan, Lyvers, Hurst, Conner, & Feeney, 2011). One study found that the relationship between alexithymia and alcohol dependence was partially mediated by expectancies of affective change following alcohol use (Thorberg et al., 2011), suggesting that alexithymic individuals do pursue alcohol use with the goal of affective change, as would be predicted by theory. Though more prospective studies are needed, such results provide evidence that alexithymia is a variable that may be related to initiation of alcohol use for purposes of negative emotion regulation, and that this may lead to disordered patterns of use.

In the past, alexithymia was sometimes characterized as a categorical disorder; however, recent studies have found evidence for examining alexithymia as a normally distributed continuous personality trait (Zackheim, 2007). A study by Coriale and colleagues (2012) found

that both alexithymic and “borderline” alexithymic individuals showed similar rates of alcohol consumption, providing further evidence that alexithymia may be a continuous trait in relation to alcohol use, rather than a clinical syndrome defined by a specific cut-point on a scale. As such, continuous level of alexithymia, rather than categorization of an individual as “alexithymic” or “not alexithymic” may still be useful in predicting outcomes such as alcohol use.

In more recent years, the somewhat vague and subjective nature of the construct of alexithymia has been criticized, and it has been suggested that the measurement of the construct may not be specific enough to be useful in predicting outcomes of substance users (Parolin, Miscioscia, De Carli, Cristofalo, Gatta, & Simonelli, 2018). More recent attempts to capture difficulties with identifying and describing emotions have moved beyond self-report and have attempted to capture variability in individual reports of affective states. Researchers of emotion have sometimes made a distinction between the terms “affect” and “emotion,” with affect referring to a mental state that can be described as pleasant/positive or unpleasant/negative with some degree of arousal, whereas “emotion” refers to a specific, labelled state, such as anger, sadness, fear, disgust, or happiness. Individuals invoke their emotion knowledge to meaningfully interpret their affective state and apply it to a situation (Barret & Bliss-Moreau, 2009; Quigley, Lindquist, & Barrett, 2014), and individuals differ in the extent to which they are able to label their affective states with specific emotional terms. This is often referred to as “emotional granularity” or “emotion differentiation” (Barrett, 2004). Those with difficulties differentiating their emotions may be able to label their broad affective state (e.g., “feeling bad” or “feeling good”) but have difficulty generating more specifics beyond this. Their inability to meaningfully differentiate and label these experiences with a specific emotion has implications for their ability to self-regulate: they demonstrate more limited regulation strategies and are less successful in

efforts to manage negative emotions (Barrett, Gross, Christensen, & Benvenuto, 2001; Kang & Shaver, 2004).

Should an individual have difficulty identifying their emotional states, they may be less able to identify effective strategies for managing emotions and turn to maladaptive regulatory strategies such as alcohol use. One experience sampling study that examined the relationship between negative affect, emotion differentiation, and daily alcohol use found that negative-emotion differentiation moderated the relationship between predrinking negative emotion and alcohol intake, such that those who showed greater ability to differentiate emotions drank less when experiencing intense predrinking negative emotions (Kashdan, Ferssizidis, Collins, & Muraven, 2010). Another study found that emotion differentiation was linked with lower risk for relapse following substance use treatment (Anand, Chen, Lindquist, & Daughters, 2017). Such results suggest that the construct of emotion differentiation reliably predicts substance use behavior and has served as a useful moderator of mood-drinking relations in at least one prospective, within-person study. Further attempts to replicate and extend such findings are therefore warranted.

In sum, the trait of emotional self-awareness is a potential vulnerability factor for negative-affect motivated substance use that is a promising but relatively understudied individual difference factor, particularly as prospective predictor of alcohol use. As such, a second aim of the proposed study was to assess whether level of emotional awareness is a moderator of the within-person relationship between stress/negative affect and alcohol use. I also aimed to examine different methods of assessing this construct, including measures of alexithymia, emotion differentiation, and open-ended reports of emotional experience. I hypothesized that

those with lower levels of emotional self-awareness would be more likely to drink in response to experiences of stress and negative affect.

Specificity of Emotion in Predicting Alcohol Use

A point that has been discussed thus far is that individuals who drink to cope might be unable to accurately report on this process, which may be a reason why drinking motives measures have failed to emerge as a consistent moderator of affect-drinking associations in within-person studies. It has also been noted that self-awareness of emotion is a trait that is likely to be related to better emotion regulation and would therefore likely predict less use of alcohol to cope with stress and negative affect. Given this, it seems worthy to note that those at most risk of drinking to cope may not be captured by within-person studies because they may not be able to accurately report on their emotions and affect. Therefore, a relationship between negative affective states and alcohol use would not emerge, because these individuals may not report much affect in the first place.

As such, a way to account for this potential problem with accurate reporting should be taken into consideration. It may be useful to examine differences in relationships between affect and drinking when using broadly valenced affective labels (such as “feeling negative” and “feeling positive”) versus specific emotional states (such as “anger” or “sadness”). Individuals who are lower on emotional self-awareness may be able to report on the former, but not the latter, with implications for observed covariation between self-reported affect and drinking using these two different methods. Individuals who are more emotionally self-aware may be able to report on their affect using both types of labels; however, they will be less likely to show a correspondence between negative affective states and drinking behavior, as they may

hypothetically have greater emotion regulation capacity and would be less likely to use alcohol as a method of coping.

As such, a third aim of the proposed study was to examine the effect of emotional specificity on the processes explicated in aims one and two. Specifically, I proposed to examine the moderating effects of alcohol stress-response dampening and emotional self-awareness in two different ways: first in models with broad negative affect predicting drinking, and second in models with specific negative emotion terms predicting drinking. I hypothesized that stress-response dampening and emotional self-awareness would moderate the relationship between broad negative affect and drinking, but not specific negative emotion terms and drinking.

The Current Study

In summary, the current study sought to further examine the relationship between negative affect and alcohol use, with an eye on specific vulnerability factors that have not yet been widely studied. Specifically, I aimed to study the moderating effects of subjective alcohol stress-response dampening and emotional self-awareness on the relationship between negative affective states and drinking on the within-person level. I also sought to examine whether these moderating effects differed in models using broader affective states to characterize negative affect versus models using specific emotion terms to characterize negative affective states.

Hypothesis 1: As there are individual differences in the extent to which alcohol functions in reducing stress, I hypothesized that individual differences in the stress-response dampening effects of alcohol would moderate the relationship between negative affect and alcohol use. Specifically, I hypothesized that individuals who reported higher levels of stress-response dampening following alcohol use would be more likely to drink in response to stress and negative affect.

Hypothesis 2: Individuals differ in the extent to which they are able to regulate their negative affective states. Individuals with higher levels of emotional self-awareness may be able to utilize adaptive coping strategies to deal with their negative affective states that do not involve alcohol use. Emotional self-awareness (the ability to identify and label one's own emotions) is an important aspect in emotional self-regulation. As such, I hypothesized that level of emotional self-awareness would moderate the relationship between negative affect and alcohol use, such that those with lower levels of emotional self-awareness would be more likely to drink during periods characterized by negative affect.

Hypothesis 3a: Individuals who are able to accurately report on their specific emotions during daily surveys may be adept at identifying and regulating their emotions. As such, even if they experience stress-response dampening to alcohol, they may not turn to drinking to cope with negative emotions. Individuals who are less adept emotion regulators may endorse high levels of negative affect on broad negative affective measures but not on scales where they must report on specific negative affective states. As such, similar to hypothesis 1, I posited that level of stress-response dampening to alcohol would be a significant moderator of negative affect and drinking. However, I hypothesized that this moderation effect would only be evident in models with broad negative affect predicting drinking and not in models with specific negative emotion terms predicting drinking.

Hypothesis 3b: Because individuals differ in the extent to which they are able to differentiate between negative affective states and label specific emotions, individuals who are less able to differentiate between emotional states may be less able to report on specific instances of emotion (e.g., "angry," "sad"), instead preferring to refer to broader affective states (e.g., "feeling negative," "feeling positive"). Further, individuals who are less able to label specific

emotional states are likely the ones who have less effective emotion regulation skills and may be more likely to drink to cope. Therefore, similar to hypothesis 2, I hypothesized that level of emotional self-awareness would be a significant moderator of negative affect and drinking. However, I hypothesized that this moderation effect would only be significant in models with broad negative affect predicting drinking and not in models with specific negative emotion terms predicting drinking.

METHOD

Participants

Participants were full time college students aged 18-24 attending UNC-Chapel Hill. They were recruited to participate in a study regarding Emotions and Alcohol Use either in partial or full completion of a course requirement for participation in studies conducted in the Psychology Department or for monetary compensation. The inclusion criterion for the study was having drunk alcohol on at least four occasions in the past month. The exclusion criterion included engaging in regular use of any other illicit drug (defined as greater than monthly use; does not include nicotine use or prescription medications), as this was thought to possibly belie use of other drugs for emotional regulation and confound results involving alcohol use. Students were also excluded if they were not native English speakers. This was utilized as an exclusion criterion in order to control for variance in English verbal ability and the possibility that non-native speaking participants are less able to label their emotions in English (which would affect tasks intended to measure emotional self-awareness).

A total of 116 students enrolled and completed at least the first session of the study; however, the final analysis sample was comprised of 106 participants, as participants who did not drink throughout the study period or did not respond to enough daily surveys in the second phase of the study were dropped in final analyses. The sample of 106 students included in the analyses were 60% female; in terms of race/ethnicity, 80% identified as White/Caucasian, 3% Black/African American, 8% Asian (East, South, or Southeast Asian), 5% mixed race, and 4% other. Additionally, 6% of the sample identified as Hispanic. Approximately 72% of the sample

was between 18-20 and 96% of the students had at least one parent who graduated college. 23% of the sample reported paternal history of alcoholism and 12% of the sample reported maternal history of alcoholism.

Procedures

The current study was conducted in three phases: 1) pre-screening, 2) initial visit and orientation, and 3) online daily diary.

Phase I

In the first phase, participants were recruited to complete a brief, anonymous pre-screening measure on SONA (Psychology 101 Participant Pool) or Qualtrics (if recruited via flyers to participate for compensation) in order to determine their eligibility for the study (based on aforementioned inclusion/exclusion criteria). Those recruited from the Psychology 101 participant pool completed a pre-screen measure that included the measures for this study as well as screening criteria for other studies that were ongoing in the psychology department. Based on their responses, students saw all studies for which they were currently eligible. If their responses to the pre-screen measures indicated that they were eligible for this study, they were able to view a brief study description and were able to sign up for an initial study visit via SONA if interested.

For participants who were recruited for compensation and completed the anonymous Qualtrics survey, non-eligible participants were taken to an ineligibility script in the questionnaire and were informed that they did not qualify at this time. If participants were eligible, the final page of the pre-screen survey contained a link to another, separate Qualtrics survey that provided more detailed information about the study procedures. If they were interested in participating, they were asked to provide their email address for the study team to

reach them to schedule a first visit. If they were not interested, they could choose not to provide their contact information. This second Qualtrics survey was not linked to the pre-screen survey responses and their pre-screen survey responses therefore remained anonymous.

Phase II

In the second phase of the study, eligible participants attended an initial laboratory visit. During the initial visit, the participants arrived for individual appointments (staggered by at least 15 minutes between participants). The study area involved two connected rooms: a smaller room that were for study research assistants and a larger testing area with computers to complete the electronic questionnaires. Upon arrival, the participant was seated in the smaller room with closed doors and was given additional information about the study. They provided informed consent for the full study protocol. They were then administered a vocabulary test. Other participants who arrived while these procedures were being conducted were instructed to wait in the larger testing area until procedures with the prior participant was completed.

After completing the vocabulary task, participants were moved to the larger lab area and seated at a carrel with a laptop and complete electronic tasks and questionnaires on Qualtrics. They provided demographic information and completed brief survey measures regarding their alcohol use, drinking motivations, subjective effects of alcohol, moods, and an alexithymia scale. They also completed an emotion induction task and reported their emotional experiences. The staggered arrival of participants allowed consent and vocabulary task administration to occur privately and individually, whereas participants were able complete the electronic portions of the initial laboratory visit in a group setting (though on their own timeline). After completion of questionnaire measures, participants were given an individual orientation to the daily surveys and received an explanation as to how they were to complete the survey each day and the

incentives for completion. They were given their credit or monetary compensation for completion of their initial visit at this time (either 1 credit hour or a \$10 electronic Amazon giftcard if they were participating for compensation).

Phase III

In the third phase of the study, the online daily diary phase, participants were prompted via text message and email to access and complete a daily diary once a day between 12pm and 5pm for 15 days. Participants accessed the survey by clicking a Qualtrics survey link. Responses were considered valid for mood data if completed between 12pm and 7pm. If a participant forgot to complete a daily survey by 5pm, a member of the study team followed up via text and email to remind them to continue their participation and complete a daily survey by 7pm if possible. At the end of the daily diary period of the study, participants were granted their credit hours or compensation based on the number of daily diaries completed. The maximum amount provided was 3 credit hours or \$15 dollars. Participants who completed at least 80% of the daily diary surveys were given full credit and compensation; otherwise, they were given 0.2 credit hours or \$1 per day completed. Additionally, participants who completed 100% of the daily diary surveys were entered into a \$50 amazon giftcard drawing. Those who participated for credit were informed that this drawing was separate from their earned study credits and they will earn all credit regardless.

After the 15-day daily diary period was over, participants were electronically thanked for their participation in the study and given information about the incentives they earned. They were invited to email the study team with any questions or concerns they had about the study following completion of participation.

Materials and Measures

All questionnaire measures included in this study can be found in Appendix A. Key variables related to study hypotheses were measured either at one time point during the initial laboratory visit or once a day in the daily diary portion of the study.

Key Variables from Initial Visit Measures

Expected Stress Response Dampening (SRD) to Alcohol. Participants completed a modified version of the Subjective Effects of Alcohol Scale (SEAS; Morean, Corbin, & Treat, 2013), a 14-item measure of subjective response to acute alcohol effects. This measure has been shown to be psychometrically valid across ascending and descending limbs of the BAC curve ($\alpha=.85-.88$ in prior studies). The SEAS measures four factors of alcohol effects, categorizing effects into affective quadrants (high/low arousal positive and high/low arousal negative). Unlike other measures of subjective effects of alcohol, the SEAS measures “low arousal positive” effects, representing effects such as “mellow,” “secure,” “relaxed,” and “calm.” This factor of the scale most closely resembles the stress-response dampening effect of alcohol that is of interest in the present investigation. This subscale was therefore used as a measurement of subjective stress-response dampening (SRD) to alcohol in the daily mood-drinking models. At this initial laboratory visit, participants reported on overall *expected* SRD to alcohol using this measure.

At the initial laboratory visit, participants completed the scale with the prompt "The following is a list of feelings that people may experience after drinking alcohol. Because alcohol affects people in different ways, we would like to know which of these effects you experience when you drink alcohol. Based on your own drinking experience, on a scale of 0-10, please rate the extent to which you believe you would experience each of the feelings after drinking

alcohol." For each item, participants rated how much they expected to experience each effect on a 0-10 scale, ranging from "Not at all" to Extremely." The four low arousal positive items on the scale are summed to create a low arousal positive subscale score. The average score in the study sample was 17.42 ($SD = 7.15$) and ranged from 0 to 34. This subscale had adequate reliability in its modified form at the initial session ($\alpha = 0.71$). This measure was used in hypotheses regarding moderating effects of SRD on mood to predict drinking in order to examine whether expected SRD functioned differentially as a predictor as compared to actual SRD as measured in daily diary questionnaires.

Emotional Self-Awareness. Participants completed multiple tasks in the initial laboratory visit that were intended to capture the construct of emotional awareness. Across all tasks, four different measures were constructed in order to measure the emotional self-awareness construct.

Alexithymia measure of emotional self-awareness. The total score of the Toronto Alexithymia Scale (TAS-20; Bagby, Taylor, & Parker, 1994), a 20-item self-report instrument, was used as the first emotional self-awareness variable in the present study. The TAS-20 asks questions in three subscale domains: (1) difficulty identifying feelings (7 items; e.g., "I am often confused about what emotion I am feeling"); (2) difficulty describing feelings (5 items; e.g., "It is difficult for me to reveal my innermost feelings, even to close friends); and (3) externally oriented thinking (8 items-e.g., "I prefer to analyze problems rather than just describe them). Each item is scored on a five-point Likert scale ranging from (1) strongly disagree to (5) strongly agree. Five of the items are reverse scored. Higher scores suggest higher levels of alexithymia, or greater impairment. The mean total TAS-20 score in the current sample was 47.11 ($SD = 9.78$),

with scores ranging from 22 to 76. The TAS-20 demonstrated acceptable reliability in the current study ($\alpha=0.81$).

Open- and closed-ended responses to affect induction as measures of emotional self-awareness. Two emotional self-awareness variables were created through coding of open-ended responses to an affect induction procedure and one emotional self-awareness variable was created by coding of closed-ended responses. Thus, in total, three different variables measuring the construct of emotional self-awareness were generated from responses to the affect induction procedure.

Participants underwent an affect induction procedure in the initial laboratory session. This involved viewing movies that consisted of pictures (collected online or from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 1999) paired with music (following Zhang, Yu, & Barrett, 2014). Participants viewed pleasant, unpleasant, and neutral movies. Following each of these movies, they reported on their emotional experiences using both open-ended responses and the PANAS (Watson, Clark, & Tellegen, 1988). For the open response, they were asked, “How are you feeling right now?” For the closed ended response, they were asked to “Indicate to what extent they feel this way right now, that is, at the present moment.” Responses were coded on a (1) to (5) Likert scale, from “Very Slightly or Not at All” to “Extremely.”

Open-ended responses to the negative affect induction were coded for negative affect using the Linguistic Inquiry and Word Count (LIWC) dictionary, 2015 version (Pennebaker, Boyd, Jordan, & Blackburn, 2015). The LIWC2015 Dictionary is composed approximately 6,400 words, word stems, and select emoticons. Each dictionary entry defines one or more word categories or sub-dictionaries. The categories include general descriptors (e.g., word count,

words per sentence), linguistic components (e.g., adverbs, conjunctions), psychological processes (e.g., social and cognitive processes), and non-psychological processes (e.g., work). For example, the word cried is part of five word categories: sadness, negative emotion, overall affect, verbs, and past focus. LIWC variables are organized hierarchically such that summary-level LIWC variables contain sets of individual-level LIWC variables. As such, if the word cried is found in the target text, each of the aforementioned five sub-dictionary scale scores will be incremented.

To create two emotional self-awareness variables from the open-ended responses, the “Negative Emotion” LIWC sub-dictionary category was used to analyze open-ended responses made by each participant. The “Negative Emotion” sub-dictionary is able to create a total “Negative Emotion” score, which represents percentage of total words in the response text that match words in the negative emotion sub-dictionary. Additionally, sub-categories exist within the negative emotion category, which categorize negative emotions into Anxiety, Anger, and Sadness sub-categories. These sub-categories within the broader “Negative Emotion” category were also used to generate an emotional self-awareness variable.

First, an overall “Negative Emotion” score was generated for each participant by running each participant’s open-ended response to the negative affect induction through the LIWC program. This variable was selected in order to represent the amount of emotion-related words used by participants in their open-ended responses. The higher the proportion of emotion-related vocabulary used, the higher their emotional self-awareness was expected to be, as this was conceptualized to reflect the recognition of emotions in response to the affect induction.

Second, a variability score among the three negative affect sub-categories (anxiety, anger, and sadness) was generated by taking the standard deviation of the scores for the three sub-

categories. This score was intended to capture variability among different types of negative affect. A lower standard deviation would represent low emotion differentiation, as scores for all three types of negative affect would not be very different from one another. A higher standard deviation would represent higher emotion differentiation, as the participant's response would evidence a distinction between types of negative affect. As such, lower standard deviations would represent lower emotional self-awareness, and higher standard deviations would represent higher emotional self-awareness.

To create a third emotional self-awareness variable from the closed-ended PANAS NA responses to the affect induction, a variability score among the PANAS NA items was generated by taking the standard deviation of the PANAS NA items that were endorsed following the negative affect induction video. A lower standard deviation would represent low emotion differentiation, as scores the different types of NA measured by the PANAS items would not vary a great deal from the mean (suggesting a lack of differentiation among different types of negative affect). A higher standard deviation would represent higher emotion differentiation, as the participant's response would evidence a distinction between types of negative affect. As such, lower standard deviations would represent lower emotional self-awareness, and higher standard deviations would represent higher emotional self-awareness.

The average score for overall LIWC negative emotion in the sample was 16.08 ($SD = 20.14$), with a range from 0 - 100. The average standard deviation among subtypes of LIWC negative affect was 6.00 ($SD = 9.28$), with a range from 0 - 57.74. The average standard deviation among PANAS NA items in response to the negative affect induction was 0.78 ($SD = 0.35$) with a range from 0 – 1.89.

Key Variables from Daily Diary Measures

Alcohol use. Daily alcohol consumption was assessed by asking participants to report the number of standard drinks of alcohol consumed the previous night, starting either after they completed their diary entry, or after 5:00pm if they did not complete a diary on the previous day. Standard drink sizes were defined as a 12-oz can or bottle of beer, a 4-oz glass of wine, a 12-oz bottle of wine Cooler, or a 1-oz (“shot”) of liquor straight or in a mixed drink (based on Park, et al., 2004). Participants were provided with a picture representing the size of a standard drink. The average number of drinks consumed across all survey days was 1.28 ($SD = 2.55$), with a range from 0 to 15. Alcohol use as an outcome was transformed into a binary variable for the purposes of analyses, such that 0=did not drink and 1=drank.

Daily Specific Emotion and Broad Affect Variables. Participants reported on their mood on a daily basis (i.e., one time per day). Participants were asked to report on their mood “right now” (in this present moment) as well as their mood across the whole day so far. As noted in my hypotheses, I sought to measure daily mood in two ways in this study: using a mood specific measure (i.e., with specific emotion terms) and a broader measure that asks participants to characterize their broad affective state.

Emotion specific daily measurement. The emotion-specific measure used was the 20-item positive and negative affect scale (PANAS; Watson, Clark, & Tellegen, 1988). For each of the 20 items, participants indicated to what extent they felt this way right now (in the present moment) on a five-point Likert Scale ranging from “very slightly or not at all” (1) to “very much or extremely” (5). In addition to these items, a single item asking to what extent they felt “stressed” right now on a five-point Likert scale was included; this was added to the negative

affect subscale and resulted in a total of 21 emotion-specific mood items. Participants also responded to the same 21 items to denote their mood across the whole day so far.

The standard 20-item PANAS has shown good consistency when used for moment or “today” measures and in daily diary studies (e.g., Watson et al., 1988; Merz & Roesch, 2011). In their five-day daily diary study, Merz and Roesch (2011) found Cronbach’s α values of .92 for the PA scale and .88 for the NA scale, aggregated across days. They also found intraclass correlation coefficients (ICCs) for the individual items on the PANAS in the range of .3-.5 and ICCs of approximately .5 for the PA and NA scales, indicating that both state (i.e., within-person) and trait (i.e., between person) variability played a role in daily affect ratings. Therefore, I anticipated that individuals would differ enough in their reported affective states over days to capture meaningful within-person changes in NA over the study period using the PANAS.

In the current study, the negative affect subscale of the PANAS was used as a measure of daily negative affect. The ten PANAS items plus an additional item (“stressed”) were summed to create a negative affect score for each individual for each survey day. Two daily negative affect scores from the PANAS were therefore created: a negative affect score for mood across the whole day so far and a negative affect score for how participants felt right now. The affect score across the whole day was used in primary analyses, whereas the “right now” score was used to compute a max negative affect score (i.e., the max negative affect score between the “right now” and “whole day” negative affect scores). This max negative affect score was used in follow-up sensitivity analyses to examine whether there was a substantive difference in results when using all day vs. peak negative affect.

The “whole day” negative affect scale with the addition of the “stressed” item demonstrated good reliability in the daily diary data (ranging from $\alpha=.83$ to $\alpha=.90$ across survey

days). An average of NA subscale scores for each person across all of their study days was created. The average of this person NA aggregate variable in the study was 16.74 ($SD = 4.13$), with a range from 11.08 to 29.75. An average of the max NA subscale scores for each person across all of their study days was also created. The average of this person maximum NA aggregate variable in the study was 17.40 ($SD = 4.19$), with a range from 11.15 to 31.08.

Broad affect daily measurement. In order to measure broad affect, participants also responded to a brief six-item scale based on the Multidimensional Mood State Questionnaire (MDMQ; Steyer, Schwenkmezger, Notz, & Eid, 1997) and developed into a six-item short scale by Wilhelm and Schoebi (2007). The questionnaire is based on Russell's circumplex model of affect (Russell, 1980). These six items comprise bipolar mood categories; specific bipolar items that comprise the scale are tired – awake, content – discontent, agitated – calm, full of energy – without energy, unwell – well, relaxed – tense. On the scale, two items each correspond to valence, calmness, and energetic arousal scales; however, the six items can be summed to create a total score that represents broad affect. The scale endpoints range from (0) to (6) and are associated with the label “very.” Items two, four, and six are reverse scored, such that lower scores on the scale represent negative mood states and higher scores represent a positive mood state.

In a study which asked 187 participants to report on their moods using these two-item scales four times a day for one week, between-person reliabilities were .92 for valence items and .90 for calmness and energetic arousal items. In decomposing within and between-person variance, study authors found that a relatively larger portion of the variance was the result of variation within persons; however, this was primarily driven by the within-person changes between observations within the same day rather than between days. There was greater error

associated with the variance estimates between observations within the same day for a single person. Thus, reliability of the within-person variance was better between days than within days (0.88 for valence items, 0.91 for calmness items, and 0.81 for energetic arousal items). Though ICCs were not reported, examination of the within and between-person variance components suggested that there was adequate variability within a single person over different days for the measure to be useful in a daily diary study.

Wilhelm and Schoebi (2007) note that in prior studies (e.g., Steyer and Riedl, 2004), the bipolarity assumption of the items on this scale were confirmed, as corresponding unipolar items were almost perfectly correlated. This was in accordance with Russel and Carroll (1999). However, the authors note that whether affect dimensions are uni- or bipolar continues to be debated in the literature (e.g., Russel & Carroll, 1999a, 1999b; Watson & Tellegen, 1999; Schimmack, 2005). In the current study, the aforementioned negative affect subscale of the PANAS represents a unipolar measurement of daily negative affect, whereas the total score for this short version of the MDMQ represented a bipolar measurement of broad affect.

In the current study, the summed score across all six bipolar MDMQ-SF items was used as a measure of daily nonspecific affect. As with the PANAS, participants used this scale to report on their mood “right now” and across the whole day so far. Two daily scores were therefore created: a score for mood across the whole day so far and a score for how participants felt right now. The affect score across the whole day was used in primary analyses, whereas the “right now” score was used to compute a minimum score (i.e., the minimum score between the “right now” and “whole day” scores), as this score represented the most negative mood state across the day on this scale. This minimum mood score was used in follow-up sensitivity

analyses to examine whether there was a substantive difference in results when using all day vs. peak negative affect.

The full six-item scale provided good reliability (ranging from $\alpha=.80$ to $\alpha=.88$ across survey days). As with the negative affect subscale of the PANAS, an average of the MDMQ-SF scores for each person across all of their study days was created; an average score for each person was also calculated for the minimum MDMQ-SF score. The average of this person MDMQ-SF aggregate variable in the study was 20.69 ($SD = 3.98$) with a range from 12.36 to 33.86. The average of the minimum MDMQ-SF aggregate score variable in the study was 19.64 ($SD = 3.91$) with a range from 11.50 to 31.93.

As evidenced by the range of these aggregate scores, participants generally reported their moods as being more positive than negative. Examination of scores across days showed that only 37% of study days were characterized MDMQ scores of 18 or below (representing neutral to negative affect), with a sizeable cluster of days at a score of 18. Though collapsing scores at this midpoint to create a “negative affect” only scale was considered, the range of scores would be very restricted by this score transformation, and ceiling effects would ensue. Therefore, the full range of scores, encompassing both positive and negative affect, were used for analyses.

Stress-Response Dampening (SRD) to Alcohol. If participants reported having used alcohol the previous evening, they completed a modified version of the Subjective Effects of Alcohol Scale (SEAS; Morean et al., 2013), similar to what they completed during their initial visit. They were asked, "Did you experience a change in any of these moods after drinking?" and responded yes or no to each of the 14 scale items. For each item, they were asked the extent and direction of the change (i.e., positive or negative change in that affective state) on a -5 to +5 scale, with 0 representing no change. The “low arousal positive” subscale of the SEAS,

representing effects such as “mellow,” “secure,” “relaxed,” and “calm,” were of particular interest in this study, as they closely resemble the stress-response dampening (SRD) effect of alcohol that is of interest. The scores for the four items on this subscale on each survey day were summed to create the SRD score. An average of this subscale score across days was calculated for each individual participant and used as a between-person measurement of subjective stress-response dampening effects of alcohol in the daily mood-drinking models. The average SRD score in the sample was 4.25 ($SD = 3.14$) with a range from -2 to 14. As only a small number of participants (e.g., often < 30) typically drank on any given drinking day, Cronbach’s alpha estimates for the low-arousal positive subscale were likely unreliable across days and are therefore not reported by day here. However, an average of each of the four items was calculated for each participant in order to generate a reliability score for the subscale in the full sample. The reliability of the scale using these person averages across days was marginal ($\alpha=.62$).

Emotional Self-Awareness – ICC Measure from Daily Reports. Along with the three scores created to measure emotional self-awareness from the initial visit, a fourth and final measure intended to capture the construct of emotional awareness was created using participants’ daily diary data. This measure was included for comparison of convergent validity, as it is somewhat more standard in previous literature compared to the more novel affect induction and free-response task included at the initial visit.

Following Anand et al. (2017) and Kashdan et al. (2010), PANAS responses were coded for level of emotion differentiation by calculating the intraclass correlation coefficient (ICC) for the 11 negative affect PANAS items across all diary days. Though the ICC with absolute agreement was computed in many prior studies (e.g., Anand et al., 2017; Kashdan et al., 2010, Kashdan & Farmer, 2014), other studies that have used this measure of emotion differentiation

have used the ICC with consistency (e.g., Erbas, Cuelemans, Lee Pe, Koval, & Kuppens, 2014; Ottenstein & Lischetzke, 2019), a slightly different form of the ICC. It has been argued that the ICC with consistency is a better theoretical measure of emotion differentiation, as it only takes into account the correlation among experienced emotions within days, whereas the ICC with absolute agreement is also affected by the mean level or intensity of experienced emotions between days. As the theory behind emotion differentiation for the current study was more in accordance with the consistency ICC, the ICC with consistency was used in the current study. However, correlations between the absolute and consistency measures tend to be high (in the current study, $r = .97, p < .0001$).

The ICC for each participant was computed using reliability analysis in SPSS; the two-way mixed with consistency definition was used. In the nomenclature of Shrout and Fleiss (1979), this corresponds to the ICC(3, k) with consistency. A higher ICC would represent poor emotion differentiation and therefore poorer emotional self-awareness. Following previous literature (e.g., Anand et al., 2017; Pond, Kashdan, DeWall, Savostyanova, Labert, & Fincham, 2012), a Fisher r to z transformation was computed on all ICCs in order to fit the variable to a normal probability distribution and reduce collinearity with the PANAS NA measure of daily mood from which it was derived. Again, following prior literature, this value was then multiplied by -1 to aid with ease of interpretation, such that higher values represented higher emotional self-awareness.

As reported by Anand et al. (2017) and Ottenstein and Lischetzke (2019), in a few cases in this sample, a negative ICC was returned, which is considered outside of what is considered reliable in typical calculations, though it is mathematically possible. Although Anand et al. (2017) and Ottenstein and Lischetzke (2019) interpreted negative ICCs as constituting poor

agreement and therefore high emotion differentiation, it is also the case that the ICC cannot be computed accurately when there is little to no variance in the sample. Examination of the cases in which a negative ICC was returned in the current study suggested that there were often very high levels of consistency between days, such that there was no variability; typically, these participants gave responses of “1” to most PANAS NA items across days. In contrast to the approach by previous authors, who coded subjects with negative ICC values as having high emotion differentiation, it appeared that these individuals in the current study could be considered to have low emotion differentiation, given the lack of variation in their mood data. However, if these individuals simply had not experienced much negative affect over the course of the study period, these reports could also be reliable and accurate; i.e., they may not represent true poor emotion differentiation. Given that these cases were difficult to interpret with regards to what they meant about an individual’s level of emotional self-awareness, I opted to code these cases as missing on this variable, and participants with missingness on this variable were excluded from models in which this measure was used. A total of $n=3$ individuals had missing data on this measure. The average consistency ICC for the PANAS NA items (prior to transforming to the emotion differentiation variable) was .66 ($SD=.22$); ICCs ranged from 0 to .97, demonstrating that there was variability in these scores across this sample. The average transformed negative Emotion Differentiation score in the sample was -0.90 ($SD = 0.41$), with a range from -2.16 to 0.

Demographic and Control Variables

Demographics. Demographic measures were collected at the initial laboratory visit and included age, gender (females coded 0; males coded 1), race/ethnicity (not included in analyses

due small number of non-white participants), level of parent education, and current year in college.

Verbal Ability. In order to control for the possibility that the variance in participants' emotion vocabulary was simply a function of verbal ability, participants were administered the Vocabulary subtest of the Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) at the initial laboratory visit. This measure consists of up to 42 words to be defined orally. Respondents are given a score of 0, 1, or 2 for each vocabulary item, depending on the accuracy of their response. Scores for all items are summed and then converted to a t-score based on age norms in the broader population. The average t-score in the same was 62.67 ($SD = 6.18$) with a range from 46 to 74.

Measures of Convergent and Concurrent Validity

Convergent Validity. The three measures of emotional self-awareness that were created from open- and closed-ended responses to the video affect induction task were novel instruments. In contrast, the TAS-20 and Emotion Differentiation as measured by the ICC(3,k) to daily diary PANAS reports represented measures that had been used in numerous studies in the past. In order to assess whether novel emotional self-awareness variables measured a similar construct to these extant measures, bivariate correlations between the three novel emotional self-awareness measures and the two pre-existing measures were examined. It was expected that the three novel emotional self-awareness measurements would correlate negatively with total TAS-20 score and positively with the Emotion Differentiation ICC(3,k) variable.

Concurrent Validity. Two measures were collected at the initial laboratory visit in order to measure concurrent validity of novel SRD and emotional self-awareness measures with extant measures that are relevant to said constructs.

Coping Motives for Drinking. Participants completed the Drinking Motives Questionnaire – Revised (DMQ-R; Cooper, 1994). Participants rated how often they drink for each reason using a five-point response scale ranging from (1) almost never or never to (5) almost always or always. For the purposes of this study, particular interest was given to the five-item coping motives subscale. Items include “To forget my worries,” “Because it helps me when I feel depressed or nervous,” “To cheer me up when I am in a bad mood,” “Because it helps me feel more self-confident and sure of myself,” and “To forget about my problems.” Items are summed to create a subscale Coping Motives score. In previous studies of college students, our lab has found adequate to strong reliability for this subscale in college students ($\alpha=0.83$ by Hussong et al., 2005); an α of 0.85 was found for this subscale in the current sample. The average score on the coping motives subscale in the sample was 10.02 ($SD = 3.99$). Coping motives were examined in order to examine correlations between self-reported coping motives and other measures hypothesized to relate to negative affect-drinking covariation. Specifically, it was hypothesized that drinking to cope would positively correlate with high SRD to alcohol and low emotional self-awareness.

Family History of AUDs. Family history of AUDs was measured using the adapted Short Michigan Alcohol Screening Test (SMAST) for assessing parental alcoholism (Crews & Sher, 1992). Participants were asked to report on the drinking histories of their biological father and biological mother, if known. The SMAST is a 13-item questionnaire in which participants answer “yes” or “no” to questions regarding parent drinking. The 13 items are asked separately for fathers (F-SMAST) and mother (M-SMAST). Each “yes” response equals one point (though two items are reverse scored); responses to all items are summed. A score of 0-2 suggests no alcohol problems, a score of 3 indicates borderline alcohol problems, and a score of 4 or more

indicates potential parental alcohol abuse. The mean SMAST score for biological fathers was 2.68 ($SD=2.30$) with a range from 1-10. The mean SMAST score for biological mothers was 2.01 ($SD =1.91$) with a range from 0-12.

Previous literature examining physiological SRD to alcohol has implicated family history of alcoholism as a contributor to high SRD (Dai et al., 2007; Levenson et al., 1987; Sayette, 1999; Sinha, Robinson, & O'Malley, 2009). In order to examine whether self-reported SRD to alcohol was similarly related to family history of AUDs, bivariate correlations between SRD measures and SMAST scores (for both fathers and mothers) were examined. It expected that SRD scores would correlate positively with SMAST scores.

RESULTS

Participants were asked to fill out daily online diary surveys for 15 consecutive days. However, whereas participants reported on their mood for the current day in each daily survey, they reported on their alcohol use for the previous evening. In order to allow for the proper temporal sequencing of mood and alcohol use reports, the alcohol variables from each daily survey were moved back one day. This leaves a potential maximum of 14 days of valid data for each participant. Any surveys that were answered outside of the established time frame (e.g., outside of the response period on each day, or outside of the 15-day study period) were dropped from the analysis sample.

Due to the one-day lag between mood and alcohol reports, missing one survey day resulted in missing data on two days. Though a total of 116 participants enrolled in the study and completed at least some survey days, after aligning alcohol and mood reports, participants who did not have at least five days of valid survey data were dropped from the sample. In addition, participants who did not drink on any of their valid (i.e., complete with both mood and alcohol data) survey days were dropped from the analysis sample, as they did not have variance in their drinking behavior and may have skewed analysis results for the remaining sample. After these participants were dropped from the sample, a total of $N=106$ participants remained.

Across the total possible 1,484 person days of possible responses (106 participants x 14 days), participants had valid mood and alcohol data for 1,339 of these days. The number of missing survey days varied across participants, ranging from 0 ($n=64$) to 9 ($n=1$) days. Approximately 91% of the sample had valid data for 10 or more survey days. Overall

participants reported drinking on 380 of the 1,339 survey days. *Table 1* shows the mean number of drinks consumed, range of drinks consumed, and percent of participants who drank across each of the 14 survey days.

Pearson correlations among all variables used in models to test the study hypotheses are shown in *Table 2*.

Convergent and Concurrent Validity Analyses

Prior to running multilevel models to test study hypotheses, bivariate correlations between novel variables of interest were estimated to examine the convergent validity of measures used to examine SRD (i.e., expected SRD and daily diary measure of SRD) and Emotional Self-Awareness (i.e., TAS-20, ICC Emotion Differentiation, open- and closed-ended responses to affect induction). Concurrent validity was also tested for the two SRD variables and the novel Emotional Self-Awareness variables.

Validity of Stress-Response Dampening Variable

The self-reported daily diary measure of SRD, taken by averaging scores for each person across drinking days, showed a significant positive correlation with self-reported expected SRD at the initial laboratory visit ($r=.50, p<.001$; this correlation can also be seen in *Table 2*, where correlations among all study measures are shown). As such, it appears that participants' experienced SRD effects as reported in daily diaries are consistent with their expected SRD effects. However, as this was not a perfect correlation, the two variables were not considered equivalent and were tested in different models for main hypotheses involving SRD to examine whether they had differential predictive validity in terms of daily drinking outcomes.

As expected by theory, both daily and expected SRD measures were significantly and positively associated with Coping Motives for drinking ($r=.19, p < .05$; $r =.23, p<.05$). Daily

SRD and Expected SRD measures showed no significant correlation with either paternal or maternal family history of alcoholism as measured by the S-MAST. As prior research on physiological SRD has largely focused on male samples and alcoholic fathers, these correlations were also examined among only male participants from the sample; however, daily SRD and expected SRD measures among male participants still did not show a significant correlation with self-reported paternal or maternal family history of alcoholism. As such, self-reported level of SRD to alcohol did not evidence any relationship with family history of alcoholism in the current college student sample.

Validity of Emotional Self-Awareness Variables

Two extant measures of emotional self-awareness, the TAS-20 total score and the ICC measure of Emotion Differentiation, were significantly and negatively correlated with one another in the sample ($r = -.19, p < .05$; also seen in *Table 2*). This correlation represented appropriate convergent validity between these two measures, as higher TAS-20 scores, which represents greater alexithymia and therefore lower self-awareness, would theoretically be associated with lower levels of Emotion Differentiation. However, the three novel measures of emotional self-awareness in the study were not significantly correlated with either the TAS-20 total score or the ICC Emotion Differentiation variable in the sample, suggesting questionable convergent validity of these theoretical constructs.

There were significant correlations among the three novel measures of emotional self-awareness. The LIWC “Negative Emotion” score from participant open responses to the laboratory negative affect indication was significantly and positively correlated with the standard deviation of LIWC anxious, angry, and sad emotion scores computed from these same open responses ($r = .91, p < .001$; also seen in *Table 2*). The standard deviation of the PANAS NA

items in response to the laboratory negative affect induction was significantly and positively correlated with the standard deviation of LIWC anxious, angry, and sad emotion scores computed from the open-ended task responses ($r=.24, p<.05$; also seen in *Table 2*). As such, it appeared that participants who showed greater variability among their emotional responses in open-ended responses also tended to show greater variability in their closed-ended emotional responses.

In terms of concurrent validity, the three novel emotional self-awareness variables did not show expected correlations with Coping Motives for Drinking. The standard deviation of LIWC anxious, angry, and sad emotion scores was significantly and positively associated with Coping Motives for drinking ($r =.21, p<.05$). As it was expected that a higher standard deviation would suggest higher emotion differentiation emotion and higher emotional self-awareness, which would theoretically be associated with lower levels of Coping Motives, this correlation was not in the expected direction. The LIWC Negative Emotion variable and the Standard Deviation of PANAS NA variable did not show significant correlations with Coping Motives for drinking; additionally, though not significant, correlation coefficients were in the positive direction, which again ran contrary to the expected direction.

In sum, as higher scores on these three novel measures would theoretically suggest higher levels of emotional self-awareness, significant positive correlations between these measures showed some degree of convergence in this construct in the expected direction. However, the lack of significant correlations between these three measures and extant measures of emotional self-awareness that have demonstrated predictive validity in prior studies was somewhat concerning and leaves some question about the degree to which they are measuring what was intended as moderators in study models. Additionally, these measures did not correlate in the

expected direction with Coping Motives for drinking. However, given that the three novel measures correlated with one another and these responses to the affect induction task were of significant theoretical interest, these measures were retained for main study analyses. Attention was given to possible discrepancies in results with extant vs. novel emotional self-awareness variables when interpreting results.

Model Building Approach to Main Study Hypotheses

To test study hypotheses, a series of multilevel models (e.g., Raudenbush & Bryk, 2002) were run for each set of analyses. In a multilevel framework, analyses may be conceptualized by level of nestedness in the data. In the current study, days (Level 1) were nested within individual participants (Level 2). It was expected that responses in the data would not be independent because repeated measures collected on the same individual would tend to be correlated. In the case of this study, it was expected that some participants might consistently drink more or less than other participants. As such, a multilevel approach was needed to account for this dependence in the data.

Alcohol use on any given survey day was the outcome of interest in all models. Given that my research question of interest was not substantively concerned with *how much* individuals drink in response to negative affect as much as *whether* they drink in response to negative affect, I chose to conduct analyses for all hypotheses after transforming the daily alcohol variable to a binary outcome (i.e., 0=did not drink and 1=drank). The final models run to test study hypotheses were therefore multilevel logistic regression models. PROC GLIMMIX in SAS 9.4 (SAS Institute, 2015) allows for estimation of nested longitudinal data in estimating binary outcomes using a binary distribution with a link-logit function and Laplace approximation. This procedure was used to run all models.

In the multilevel framework, random intercepts and random slopes can be included in models as guided by theory. In the case of models in the current study, random intercepts would imply that individuals have significant differences in the intercepts of their regression lines in predicting the outcome of drinking, and that this variability in intercepts should be accounted for by allowing the intercept term in the model to be random instead of fixed. Random slopes would imply that the extent to which Level 1 predictors affect the drinking outcome varies by individual such that each individual may have a different slope to their regression line, and that this variability in slopes should be accounted for by allowing the Level 1 predictors to have random rather than fixed slopes. Both these assumptions can be tested by adding these random terms to the model in a stepwise model building approach prior to adding all predictors. If the random terms are significant, they may then be carried through to final models.

In order to determine whether random intercepts and slopes as well as covariates of interest should be included in final models, a model building approach in which models were estimated with (1) no predictors but a random intercept term (unconditional model), (2) Level 1 predictors only with a Level 1 random slope, and (3) covariates only, and then (4) all key variables of interest for each hypothesis. Whether random intercepts, random slopes, and covariates were included in final models was guided by results from these prior models.

Model 1: Unconditional Model (Random Intercepts Model)

The unconditional model is specified as follows:

$$\text{AlcoholUse}_{ij} | \mu_{ij} \sim \text{BER}(\mu_{ij})$$

Linear Predictor:

$$\text{Level 1: } \eta_{ij} = \beta_0j$$

$$\text{Level 2: } \beta_0j = \gamma_{00} + \mu_{0j} \qquad \mu_{0j} \sim N(0, \tau_{00})$$

Link Function:

$$\eta_{ij} = \text{logit}(\mu_{ij}) = \ln(\mu_{ij} / 1 - \mu_{ij})$$

Results from the unconditional model suggested that the random intercept term was significant in the model ($p < .05$), such that individuals varied on their overall levels of drinking. A likelihood ratio test also suggested that the random intercept was indeed necessary for the model, $\chi^2(1)=5.24, p < .05$. The random intercept term was therefore retained in all models moving forward.

The unconditional model also allows for calculation of the ICC (intraclass correlation coefficient) to quantify the degree of homogeneity of the outcome within people. In this case, the ICC represents the proportion of variability in the odds of drinking vs. not drinking that lies between individuals, rather than within individuals. The formula for calculation of the ICC in a binary model is given by the formula:

$$\tau_{00} / \tau_{00} + (\pi^2 / 3)$$

where τ_{00} is the Level 2 variance component (i.e., between-person variance) and $(\pi^2 / 3)$ is the assumed Level 1 variance component (i.e., within-person variance) for a logistic regression model. The ICC for the model was 0.04. This suggested that 4% of the variance in underlying levels of alcohol use was accounted for by between-person differences in drinking. In turn, 96% of the variance in alcohol use could be assumed to differ within-person in the sample.

Model 2: Random Slopes Models

This model included Level 1 repeated observations of alcohol use as the outcome variable and Level 1 repeated observations in mood over the two-week daily diary period as a predictor variable. Two different random slopes models were tested, as there were two different

mood predictors for study hypotheses. One model tested the PANAS NA mood predictor (specific emotions). A second tested the MDMQ-SF mood predictor (broad affect).

The Level 1 measures of mood were person-centered such that variation in Level 1 mood represented a change from that individual's average level of mood when predicting the outcome of drinking. The mood measures were tested as both fixed and random predictors of alcohol. For the model using the PANAS NA predictor of mood, the random term was not significant ($p > .05$), suggesting that individuals did not differ in the extent to which daily fluctuations in negative mood (as measured by the PANAS NA) changed their odds of drinking vs. not drinking. Further models using the PANAS NA mood predictor therefore did not include the random slope term. For the model using the MDMQ-SF predictor of mood, the random slope term was significant ($p < .05$), suggesting that individuals varied in the extent to which daily fluctuations in overall broad affect (as measured by the MDMQ-SF) influenced their odds of drinking. Further models using the MDMQ-SF mood predictor therefore retained the random slope term.

Model 3: Covariates Only Model

This model included Level 1 repeated observations of alcohol use as the outcome variable and three different control variables. A "weekend" variable indicating whether an observed survey was answered on a weekday (Sunday-Wednesday) or weekend (Thursday-Saturday) was added at Level 1. This was included as a control variable because weekend status is a significant predictor of drinking among college students. Two control variables, gender and WASI Vocabulary T-Score, were included at Level 2. Based on past research, women were expected to consume less alcohol than men. WASI Vocabulary T-Scores were included in order to control for the possibility that differences in emotional self-awareness were not simply a facet

of varying overall vocabulary skill. All control variables were included only as fixed effects in this model and all future models.

Weekend status was a significant predictor of drinking, $OR=5.35$ [4.08, 7.03], $p < .0001$. Students were over five times more likely to drink on weekend day (holding effects of gender and WASI Vocabulary T-scores constant). Gender was not a significant predictor of drinking ($p=.75$, *ns*). The WASI Vocabulary T-Score also did not meet a $p=.05$ threshold for significance ($p=.057$). Given these results, weekend was retained across models as a control variable, and gender was dropped. Though the WASI Vocabulary T-Score did not quite meet the threshold for statistical significance, because the p -value was less than .1 and it was of theoretical significance as a control variable, it was retained across models.

Hypothesis 1 (Specific Emotion/PANAS NA Model): Individual Differences in Alcohol Stress-Response Dampening (SRD) as a Moderator of Negative Mood-Drinking Covariation

In the first hypothesis, I tested whether the relationship between daily specific negative affect (as measured by the PANAS NA) and evening drinking was moderated by individual differences in alcohol stress response dampening (i.e., daily SRD measure; a two-way interaction). At Level 1, daily NA and Weekend status were entered as predictors. PANAS NA was person-mean centered for ease of interpretation, such that the term represented a fluctuation from each individual's mean level of negative affect. At Level 2, SRD was entered as a second main predictor variable and WASI Vocabulary T-Score was entered as a control variable. SRD was grand-mean centered for ease of interpretation, such that the term represented differences from the overall average SRD in the sample. The interaction of daily PANAS NA (person-mean centered) and SRD (grand-mean centered) was also included in the model (a cross-level interaction term).

Additionally, in order to account for variation in aggregate level of mood across participants, each participant's average PANAS NA score over the two-week diary period was included as a Level 2 predictor of alcohol use, as recommended by Raudenbush and Bryk (2002). As noted by Curran and Bauer (2011), this is an appropriate approach to disaggregating within- and between-person effects when the time-varying predictor is not systematically related to time. Examination of box plots (pooling across individuals) and line graphs (examined for separate individuals) of person-mean centered PANAS NA across days confirmed that there was no apparent systematic time trend in PANAS NA across days. The aggregate NA variable was also grand-mean centered for ease of interpretation.

Table 3 shows the results from the model for Hypothesis 1. (Note that this table also presents results from a model that used the MDMQ-SF measure of broad affect for contrast; results from this broad affect model are further explicated in a later section.) There was an overall main effect of daily PANAS NA on drinking, $OR=0.95$ [0.92, 0.99], $p=.01$. Individuals who experienced higher than their own average daily PANAS NA had significantly lower odds of drinking, holding other variables constant. There was no main effect of aggregate level of NA or SRD. Additionally, the interaction between daily PANAS NA and SRD was not significant in predicting drinking. Weekend status remained a significant predictor of drinking, $OR=5.33$ [4.05, 7.01], $p<.0001$. The WASI Vocabulary T-Score met criteria for significance in this model, $OR=1.03$ [1.00, 1.06], $p=.04$. Higher WASI Vocabulary scores were associated with slightly higher odds of drinking, holding other variables constant.

As a sensitivity analysis, the model was also run with expected SRD from the initial laboratory visit entered as a Level 2 predictor in place of the daily SRD measurement. However,

both the main effect of SRD and the interaction between PANAS NA and SRD in this model remained nonsignificant in predicting the outcome of alcohol use.

Hypothesis 2 (Specific Emotion/PANAS NA Model): Individual Differences in Emotional Self-Awareness as a Moderator of Negative Mood-Drinking Covariation

In the second hypothesis, I tested whether the relationship between daily specific negative affect (as measured by the PANAS NA) and evening drinking was moderated by individual differences in emotional self-awareness (measured by five different variables; each run in a separate model). At Level 1, daily PANAS NA (person-mean centered) and Weekend status were included as predictors of daily alcohol use. At Level 2, aggregate PANAS NA (grand-mean centered), emotional self-awareness (measured in five different ways, grand-mean centered), and the interaction of daily PANAS NA (person-mean centered) and emotional self-awareness (grand-mean centered) were included as predictors. As previously noted, there were five different emotional self-awareness predictors tested; each was tested in a separate model (with its own associated main effect and interaction term). The results from these models are presented in *Table 4*, *Table 5*, *Table 6*, *Table 7*, and *Table 8*. (Note that each of these tables also presents results from models that used the MDMQ-SF measure of broad affect for contrast; results from those models are further explicated in later sections.)

Across the five models, only one model found a significant interaction between emotional self-awareness and daily PANAS NA in predicting drinking. This was the model utilizing the fifth and final emotional self-awareness variable, the standard deviation of PANAS NA responses to the laboratory affect induction (*Table 8*), OR=1.11 [1.00, 1.24], $p=.05$. As it is difficult to understand the form of this interaction by reporting the odds ratio alone, the interaction was probed by graphing intercepts and slopes of high, medium, and low levels of

standard deviations of PANAS NA responses to the laboratory affect induction across the range of person-mean centered daily NA observed in the sample (*Figure 1*).

As observed in the graph, those with a high standard deviation of PANAS NA responses (indicating higher differentiation in responses and therefore higher emotional self-awareness) showed no change in their log odds of drinking at higher vs. lower than average levels of daily NA. However, those with a low standard deviation of PANAS NA responses (indicating lower differentiation in responses and therefore lower emotional self-awareness) had higher log odds of drinking on days characterized by lower than average levels of daily NA and lower log odds of drinking on days characterized by higher than average levels of daily NA. This was contrary to hypotheses, which predicted that individuals with lower levels of emotional self-awareness would drink more (i.e., have higher log odds of drinking) on days characterized by higher than average levels of negative affect.

Additionally, across all five models, there was a significant main effect of daily PANAS NA on drinking, such that on days characterized by higher than average levels of PANAS NA scores, participants were less likely to drink. Across all five models, there was no main effect of the emotional self-awareness variable on drinking.

Finally, across all five models, aggregate PANAS NA was not a significant predictor of drinking, and the control variables of Weekend status and WASI Vocabulary T-Scores were consistently significant predictors of drinking, such that participants were more likely to drink on the Weekend and participants with higher WASI Vocabulary T-Scores were somewhat more likely to drink.

Hypothesis 3a (Broad Affect/MDMQ-SF Model): Individual Differences in Alcohol Stress-Response Dampening (SRD) as a Moderator of Broad Affect-Drinking Covariation

In Hypotheses 1 and 2, emotion-specific negative affect (as measured by the PANAS NA) was tested in models. In these hypotheses, I turn to a broad affect measure in order to compare and contrast differences in findings between specific vs. broad affect measures. In Hypothesis 3a, I tested whether the relationship between broad daily affect (as measured by the MDMQ-SF) and evening drinking was moderated by individual differences in alcohol stress response dampening (using the daily SRD measure; a two-way interaction). Models were identical to those tested in Hypothesis 1, except that MDMQ-DF scores were used, rather than PANAS NA scores, and a random as well as fixed effect of MDMQ-SF scores was included

Table 3 shows the results from the model for Hypothesis 3a (alongside results from Hypothesis 1, which utilized the PANAS NA measure of affect). There was an overall main effect of MDMQ-SF on drinking, $OR=1.04 [1.00, 1.08]$, $p=.036$. Individuals who experienced higher than their own average MDMQ-SF score had higher odds of drinking, holding other variables constant. Of note, as the MDMQ-SF was a bipolar scale, this indicated that more positive affect was associated with a higher odds of drinking (rather than simply lower than average amount of negative affect, as in models with the PANAS NA measure of affect). There was no main effect of aggregate MDMQ-SF or SRD. Additionally, the interaction between daily MDMQ-SF scores and SRD was not significant in predicting drinking. Weekend status remained a significant predictor of drinking, $OR=5.55 [4.18, 7.37]$, $p<.0001$. The WASI Vocabulary T-Score was not a significant predictor of drinking in this model.

The model was also run with expected SRD from the initial laboratory visit entered as a Level 2 predictor in place of the daily SRD measurement. However, both the main effect of SRD

and the interaction between MDMQ-SF scores and SRD in this model remained non-significant in predicting the outcome of alcohol use.

Hypothesis 3b: Individual Differences in Emotional Self-Awareness as a Moderator of Broad Affect-Drinking Covariation

In hypothesis 3b, I tested whether the relationship between daily broad affect (as measured by MDMQ-SF scores) and evening drinking was moderated by individual differences in emotional self-awareness (measured in five different ways). Models were identical to those run in Hypotheses 2, except that MDMQ-SF scores were used rather than PANAS NA scores, and a random as well as fixed effect of MDMQ-SF scores was included. The results from these models are presented in *Table 4*, *Table 5*, *Table 6*, *Table 7*, and *Table 8* (alongside results from Hypothesis 2, which utilized the PANAS NA measure of affect).

Across the five models, two models found significant interactions between emotional self-awareness and daily PANAS NA in predicting drinking. The first was the model that utilized the TAS-20 measure of emotional self-awareness (*Table 4*). The interaction was probed by graphing intercepts and slopes of high, medium, and low levels of TAS-20 total scores across the range of person-mean centered daily affect observed in the sample (*Figure 2*). As observed in the graph, those with high TAS-20 scores (indicating lower emotional self-awareness) showed no significant change in their log odds of drinking at higher vs. lower than average levels of broad affect. This ran contrary to study hypotheses. However, those with low TAS-20 total scores (indicating higher emotional self-awareness) had lower log odds of drinking on days characterized by lower than average levels of broad affect and higher log odds of drinking on days characterized higher than average levels of broad affect. Those with mid-range TAS-20 total scores showed patterns in between the low and high TAS-20 score groups.

The second model that showed a significant interaction term was the model that utilized the standard deviation of PANAS NA responses to the laboratory affect induction as the measure of emotional self-awareness (*Table 8*). Again, the interaction was probed by graphing intercepts and slopes of high, medium, and low levels of standard deviations of PANAS NA responses to the laboratory affect induction across the range of person-mean centered daily broad affect observed in the sample (*Figure 3*). The form of this interaction was similar to the interaction observed in Hypothesis 2. As observed in the graph, those with a high standard deviation of PANAS NA responses (indicating higher differentiation in responses and therefore higher emotional self-awareness) showed no change in their log odds of drinking at lower vs. higher than average levels of broad affect. However, those with a low standard deviation of PANAS NA responses (indicating lower differentiation in responses and therefore lower emotional self-awareness) had lower log odds of drinking when they experienced lower than average levels of broad affect (i.e., more negative affect) and had higher log odds of drinking on days characterized by higher than average levels of broad affect (i.e., more positive affect). This was contrary to hypotheses, which predicted that individuals with lower levels of emotional self-awareness would drink more (i.e., have higher log odds of drinking) on days characterized by lower than average levels of broad affect (i.e., more negative affect).

All five models showed the same patterns of main effects. There were no significant main effects of any emotional self-awareness variables on drinking. There was a significant main effect of daily MDMQ-SF scores, such that individuals were more likely to drink on days with higher than average MDMQ-SF scores. There were no significant effects of aggregate MDMQ-SF scores. There was a significant effect of Weekend status, such that participants were more likely to drink on weekends. There was no significant effect of WASI-T Vocabulary Scores.

Sensitivity Analyses

Because it is not clear when affective cues for NA are most predictive, additional sensitivity analyses were run to examine whether model results would change when peak levels of negative affect on each day were used to predict drinking across all models, rather than affect across the day as a whole. In Hypotheses 1 and 2, results using the peak PANAS NA measure were largely similar to those found using the “whole day” PANAS NA measure. In hypothesis 1, there were again no significant moderating effects of SRD. However, in Hypothesis 2, LIWC negative affect and the Standard Deviation of LIWC negative affect categories both emerged as significant moderators (i.e., showed significant interactions with daily peak NA in predicting alcohol use) along with the Standard Deviation of PANAS NA responses to the affect induction. Probing of both of these new interactions showed a similar interaction pattern to that found with the Standard Deviation of PANAS NA responses to the negative affect induction in “whole day” PANAS NA models. Again, contrary to expectations, individuals with lower emotional self-awareness (as defined by lower LIWC Negative Emotion scores and lower standard deviations among LIWC negative emotion categories) had lower log-odds of drinking on days characterized by higher peak NA.

In Hypotheses 3a and 3b, which used the MDMQ-SF as a measure of broad affect, all models examining peak negative affect (represented by the minimum MDMQ-SF score) had results that were unchanged from those that used “whole day” MDMQ-SF reports.

Another set of sensitivity analyses examined whether there was more evidence for hypotheses when binge drinking – as opposed to any drinking – was used as an outcome measure. Binge drinking was defined as 5 or more drinks a day for men and 4 or more drinks a day for women. However, results from these models were again largely aligned with results from

previously tested models. In models using the specific measure of daily emotion (i.e., the PANAS NA), no hypothesized interactions were significant in predicting drinking. In models using the broad measure of affect (i.e., MDMQ-SF), the same two interactions were significant (i.e., the interactions between affect and the TAS-20 score and Standard Deviation of PANAS NA responses to the affect interaction); these interactions showed the same form as previously tested models.

DISCUSSION

The current study sought to examine whether previously untested constructs of theoretical relevance to negative affect-related drinking – specifically, stress-response dampening (SRD) to alcohol and emotional self-awareness – might identify those at risk for negative affect-related drinking in a sample of college students. Findings offered little support for the predicted moderating effects of SRD to alcohol or emotional self-awareness on the relation between NA and alcohol use. Models testing interactions between SRD and negative affect in predicting drinking yielded no significant results. Though significant moderating effects for a subset of emotional self-awareness variables were found, the direction of these interactions did not support a hypothesized mechanism whereby vulnerable individuals experiencing higher levels of stress and negative affect would increase their level of drinking. Rather, they suggested that certain individuals are *less* likely to drink when experiencing higher levels of stress and negative affect, whereas other individuals do not show a change in their odds of drinking across different levels of affect. Potential implications of study findings as well as strengths and limitations are further discussed below.

Alcohol Stress-Response Dampening and Emotional Self-Awareness as Moderators of the Relationship Between Negative Affect and Drinking

Findings from the current study found little support for the proposed moderating roles of SRD and Emotional Self-Awareness on the relationship between daily experiences of stress-negative affect and evening drinking. In the case of SRD, results from all models were null, suggesting that differences in SRD to alcohol do not affect the likelihood that individuals will

drink when experiencing higher levels of negative affect. As the experience of SRD to alcohol does not preclude the possibility that other coping strategies to relieve stress and negative affect may be used, this result does not necessarily imply that there is no relevance of SRD to the relationship between negative affect and drinking. It may be that the relation needs to be further specified, such that individuals who experience higher levels of SRD *and* lack alternative coping strategies are more likely to drink in response to stress-negative affect. As testing this hypothesis would involve a three-way interaction, the sample size of the current study would likely lack power to appropriately assess this hypothesis.

An alternative possibility regarding the null findings for SRD as a moderator in the current study is that the temporal association of negative affect and drinking in the current study does not accurately model the process whereby SRD might moderate this relationship. Laboratory studies of differences in physiological SRD to alcohol have tested whether experiences of stress applied *after* individuals have consumed alcohol are attenuated. Thus, it may not be that individuals with higher SRD expect to dampen levels of stress-negative affect that have already occurred or that they are already experiencing. Rather, individuals with higher SRD might drink more *before* or *within* a situation that is *expected* to generate stress-negative affect. An example of such a scenario may be a social situation for an individual who experiences social anxiety. The individual might drink before the social interaction occurs or while it is occurring, thereby avoiding (or at least attenuating) the experience of negative affect. The fact that negative affect might therefore never be experienced presents a challenge in capturing this theoretical process, though perhaps assessments of mood that occur more proximally to (or concurrently with) drinking would evidence a stronger relationship between affect, SRD, and drinking.

In the case of Emotional Self-Awareness, three out of five of the tested Emotional Self-Awareness variables had no significant interaction effects across models. Two of the five tested Emotional Self-Awareness variables did evidence positive interaction findings in models, though the form of these interactions did not support study hypotheses. With regards to overall trend of null findings, it is of note that the range of negative affect endorsed by participants in the current study lacked variability and suffered from a restricted range among many study participants. As such, it is possible that the diary period did not capture the “true” range of negative emotion among all participants. This may have been a facet of the study sample (i.e., individuals in this sample may have lower levels of negative affectivity) or a facet of the length of the daily diary window (i.e., too brief to capture changes in negative affect that occur over time). Regardless of the cause, the restricted range of negative affect may suggest that coping with negative emotions was not needed among many participants in the current sample, as they did not experience significant negative affect. This could lead to null interaction findings due to lack of power to detect the proposed mechanism.

The restricted range of negative affect in the sample also had implications for the ICC measure of Emotion Differentiation in particular. Because this measure could only be derived from daily reports of negative affect within the study timeframe, it may not have captured an individual’s “true” or full ability to differentiate among negative emotions. Indeed, this measure was not able to be calculated for three participants in the sample due to the severely restricted range of their negative affect reports. As such, it is possible that different findings could be found with this moderator in future studies, should they monitor participants for longer intervals or include more study participants so that a larger range of negative affective experiences and individual differences in negative affectivity are captured. Alternatively, Erbas and colleagues

(2014) note this potential pitfall to experience sampling measures of Emotion Differentiation and suggest an alternative lab-based protocol that may be used to measure this construct instead.

In the case of the two variables that showed significant moderating effects of Emotional Self-Awareness on the negative affect-drinking relationship, the direction of the moderating effect was either counter-intuitive (when responses to a laboratory affect induction task were used as the measure of Emotional Self-Awareness) or not in support of the proposed moderating mechanism (when alexithymia scores were used as the measure of Emotional Self-Awareness). Given that counter-intuitive results resulted from models that utilized a novel measure of Emotional Self-Awareness and that this measure demonstrated questionable construct validity, the counter-intuitive nature of these findings may be better understood by examining whether this measure captured a different construct than intended. As I will further discuss, when a different interpretation of this measure is considered, the direction of this interaction effect converges with the direction of the interaction found in the alexithymia measure model. Though these interactions still do not support study hypotheses, they together shed light on a possible alternative mechanism whereby Emotional Self-Awareness moderates negative affect-drinking relations.

Distinguishing Measures of Emotional Awareness and Emotional Intensity

The current study utilized two extant measures, the TAS-20 (alexithymia) and an ICC measure of Emotion Differentiation, to capture the construct of emotional self-awareness. In addition to these measures, three novel measures were constructed utilizing open- and closed-ended responses to an affect induction task. Though these three novel measures were positively correlated with one another, they did not significantly correlate with TAS-20 total scores or the ICC measure of Emotion Differentiation in the expected direction. Further, concurrent validity

analyses also showed that the measures did not significantly and negatively correlate with Coping Motives as would be expected by theory; in fact, correlations with Coping Motives were in the positive direction. Given this lack of convergent and concurrent validity, it is likely that these measures did not map on to the construct of Emotional Self-Awareness as intended, and caution is warranted regarding interpretation of significant interactions between these novel constructs and negative affect in predicting drinking in study models.

Specifically, the standard deviation of the PANAS NA item responses to the negative induction task proved to be a significant moderator of the relation between daily negative affect and drinking. Higher standard deviations were hypothesized to represent greater variability in item responses, suggesting greater levels of differentiation between types of negative affect. This was thought to represent a higher degree of Emotional Self-Awareness. However, as noted, given findings from correlational analyses that were run to assess convergent and concurrent validity, it is unlikely that higher scores on this measure truly represented higher Emotional Self-Awareness.

One possible interpretation is that this measure captured emotion intensity/affect intensity (e.g., Larsen & Diener, 1987; Schimmack & Diener, 1997), rather than emotion differentiation. Affect intensity or emotion intensity refers to individual differences in the typical intensity with which people experience their emotional responses. Previous studies have found that emotion differentiation is inversely correlated with measures of emotion intensity (Erbas et al., 2014) and affect intensity (Boden, Thompson, Dizén, Berenbaum, & Baker, 2013). In contrast, alexithymia has been shown to positively correlate with affect intensity (Iancu, Horesh, Offer, Dannon, Lepkifker, & Kotler, 1999). It is hypothesized that these relations arise due to differences in emotion regulatory capacity. It has been shown that individuals who show higher levels of

emotion differentiation report engaging in more emotion regulatory strategies at higher levels of experienced affect (Barrett et al., 2001), resulting in an inverse correlation between emotion differentiation and experienced emotion intensity. Individuals higher in alexithymia have been shown to have difficulties with emotion regulation (e.g., Taylor, 2000), which would result in a positive correlation between alexithymia and emotion intensity, as these individuals cannot successfully regulate their experienced emotions.

Because the negative affect induction task has been shown to result in high intensity of negative experienced emotion, it may have resulted in use of emotion regulatory strategies among individuals with greater emotion regulatory skill (e.g., higher levels of Emotion Differentiation and lower levels of Alexithymia). Individuals with better emotion regulation may therefore have reported less intensity of experienced emotion on PANAS NA items in response to the negative affect induction. Though it was thought that these individuals would have higher standard deviations among PANAS NA items due to greater levels of differentiation among these emotions, if the intensity at which they endorsed some emotions was “a little” (2) and the rest were “very slightly or not at all” (1), these individuals would still have quite small standard deviations across PANAS NA items.

In contrast, among those with poorer emotion regulation skill, some NA items may have been endorsed at a particularly high intensity. It was thought that these individuals might show low standard deviations among PANAS NA items due to poor emotion differentiation. However, the standard deviation among the PANAS NA items might still be high among a poor emotion differentiator when examining responses to the scale at a single timepoint. For example, an individual might endorse feeling a mixed array of negative emotions in response to the affect induction, but may endorse some as “extremely” (5) and others as “moderately” (3) or “a little”

(2). Because the standard deviation of any set of scores is affected by outlying observations, this may still result in a higher standard deviation among PANAS NA responses in these individuals as compared to those who experienced only a few emotions at a lower intensity level. The standard deviation of PANAS NA items therefore may represent an index of intensity of emotional experience that is undergirded by differences in emotion regulation capacity.

As such, I will interpret interactions utilizing this measure with the understanding that the measure may represent emotional intensity in response to the affect induction task, rather than emotion differentiation. As such, I proceed with the assumption that higher standard deviations are representative of higher emotional intensity (and lower emotion regulatory skill) and lower standard deviations are representative of lower emotional intensity (and therefore higher emotional regulatory skill). Under this assumption, the scores on this emotional intensity measure are interpreted in the same manner as alexithymia scores, such that individuals with higher scores on these variables represent a theoretical “at risk” group.

Emotion Regulation Deficits as a Moderator of Daily Affect-Drinking Covariation

Probing of significant interaction effects showed that individuals with higher levels of alexithymia and higher levels of emotional intensity did not vary in their likelihood of drinking across different levels of affect. In contrast, those with low levels of alexithymia and lower levels of emotional intensity showed a lower propensity to drink when experiencing more negative affect and a higher propensity to drink when experiencing less negative affect. As higher levels of alexithymia and higher levels of emotion intensity are both thought to be related to poor emotion regulation, we can conclude that individuals poorer in emotion regulation do not modulate their level of drinking based on changes in their affective state, whereas those with

better emotion regulation capacity show modulation of their drinking in response to their affect, such that they drink less when they experience more negative affect.

The form of this interaction effect does not support the hypothesized emotion regulatory mechanism for drinking in the current study. The proposed mechanism was that individuals with poorer emotion regulatory skills would be more likely to drink when experiencing higher levels of negative affect. However, the form of this interaction is not inconsistent with findings from prior studies by Armeli and colleagues (Armeli et al., 2000; Armeli et al., 2005). These studies found that individuals who are more vulnerable to negative affect-related drinking (based on individual difference characteristics such as positive alcohol expectancies or higher coping motives for drinking) may not necessarily drink *more* in response to negative affect but may be less likely to *reduce* drinking in response to negative affect. In other words, most individuals will relegate drinking to low-stress days, but a certain subset of individuals may not display this reduction in drinking behavior in response to stress-negative affect.

Though coping-motivated theories of drinking have largely predicted that vulnerable individuals would increase drinking behavior in response to negative affective states, it is still theoretically possible that the lack of down-regulation of drinking among these individuals is, in fact, underpinned by coping motivations for drinking. Perhaps these individuals *do* drink to cope when experiencing negative affective states, but also drink at similar levels—albeit with different motivations—when experiencing positive affective states. Thus, though these individuals may have different *motivations* for drinking when experiencing different affective states, their actual drinking *behavior* may look the same, leading to this observed lack of variability across the range of affect.

Another possibility is that these individuals do not have different motivations for drinking across different types of affect. They may not show a linkage between their feelings and their behaviors, perhaps due to lack of ability to reflect upon and appropriately regulate their affective states through behaviors. Future daily process studies might examine daily motivations for drinking or desired outcomes of drinking along with affect and drinking behavior in order to test such competing hypotheses.

Specific Emotion Versus Broad Affect as a Predictor

It was hypothesized that relevant emotional self-awareness variables would not show significant moderating effects in models that used emotion specific measures of affect, but would show significant moderating effects in models that used a broad measure of affect. It was hypothesized that this difference in prediction would result from an inability to accurately report on daily mood when using an emotion-specific measure (i.e., the PANAS) among those lower in emotional self-awareness in the sample. The broad affective categories captured by MDMQ-SF items were thought to be easier for individuals to report on. Of the three significant interactions found across study models, two were found with the same moderator variable, which was significant in both specific emotion and broad affect models. This was therefore contrary to expectations. The final significant interaction was only significant in the broad affect model, which would appear to support the study hypotheses. However, further examination of the data does not necessarily suggest support for this interpretation.

The emotion-specific measure of affect, the PANAS NA scale, is a unidimensional scale that only measures negative affect (and not positive affect). The broad affect measure, the MDMQ-SF, is a bipolar mood scale that captures the full affective range (i.e., both negative and positive affect). There was a restricted range of PANAS NA reports in the data, with some

individuals showing little to no variability in endorsement of PANAS NA items across days. The MDMQ-SF also showed a much smaller range of scores on the negative side of the scale across study days, indicating convergent reports regarding a relative lack of negative affectivity across the daily diary collection window for most participants. In contrast, there was a great deal of variability in the positive range of the MDMQ-SF scale. Taken as a whole, these data suggest that individuals experienced a more limited range of negative affect and a greater range of positive affect.

The finding that alexithymia only moderated the relationship between daily affect and drinking in models utilizing the MDMQ-SF measure may therefore suggest that alexithymia is more related to changes in drinking in response to *positive* affect. However, given that the lower variability in negative affect found in this sample would lead to a lack of power to detect effects, this does not necessarily preclude a theoretical contribution of negative affect among these individuals. Rather, it may have simply been not possible to model it with the study data, given the lack of variability in the sample. Greater variability in negative across study days would be needed to further examine the moderating role of alexithymia in daily negative affect-drinking covariation and to examine whether different types of mood measures show differential predictive power.

Daily Negative Affect-Drinking Covariation Among College Students

A relatively consistent finding in the current study was that college students were less likely to drink on days characterized by higher than average levels of stress and negative affect (above and beyond the effect of other relevant factors, such as weekend status). Additionally, broad affect models that included both the negative and positive affective dimensions showed that in the overall sample, students were more likely to drink on days characterized by higher

than average levels of overall affect. Though this measure does not allow for disaggregation of the contributions of positive vs. negative affective states, these results do imply a potential contribution of both positive and negative affect in predicting drinking behavior, as students were more likely to drink when their mood moved further to the positive end of the negative-positive affect dimension.

While these main effects of mood on drinking were not specifically predicted in the current study, results offer insight into the overall relations between mood and drinking in a college student sample. These main effects are not inconsistent with previous experience sampling studies that have utilized college student samples (e.g., Hussong et al., 2005; Armeli, Todd, & Mohr, 2005). In the college context, the direction of these main effects may be related to the association between drinking occasions and celebratory and social gatherings. College students may experience greater positive affect (and related lower levels of negative affect) in anticipation of a celebratory or social occasion involving alcohol, leading to observed relationships between affect and drinking.

Additionally, though not specifically analyzed for the purpose of study hypotheses, in the daily diary surveys, students also reported on their reasons for not drinking on days when they did not engage in alcohol use. Though the most common cited reason was “no desire to drink,” this reason was almost never the only selected reason for not drinking. Most commonly, “no desire to drink” was accompanied by the endorsement of “too much schoolwork”; open responses also often indicated that students did not drink if they had exams or work the next day. Essentially, external responsibilities were often cited as a reason not to drink, and they may be related to endorsed lack of “desire” to drink. Given that stress and negative affect in the college context may often be related to amount of schoolwork and examinations, but that students likely

cannot complete schoolwork-related obligations under the influence of alcohol, it therefore follows that college students might be less likely to drink on days characterized by higher stress negative-affect.

Interestingly, if higher levels of stress-negative affect in the current study were largely related to school and work obligations, the finding that certain students did *not* decrease their drinking in response to higher stress-negative affect has additional implications. As students would likely need to remain sober in order to adaptively address school and work obligations, students who fail to do so would likely be at risk for greater negative consequences of drinking. If this subgroup of students were in fact drinking to cope on these days characterized by higher stress-negative affect, this would align with cross-sectional findings that students who drink to cope experience higher levels of alcohol-related problems, even above and beyond level of alcohol consumption (e.g., Cooper et al., 2015).

Clinical Implications

Results suggest that college student drinkers modulate their level of drinking in response of affective states, such that they drink less on days characterized by higher levels of stress-negative affect and drink more on days characterized by higher levels of positive affect. However, a subset of college drinkers – specifically, those who have higher levels of alexithymia and those who experience emotions more intensely – do not modulate their level of drinking in response to changes in their affective states.

The reasons underlying this invariance in drinking behavior across affective states is not yet clear from results of the current study. If results were supportive of the proposed mechanism of drinking to cope, whereby certain individuals showed an increase in drinking that corresponded to increases in negative affect, the interpretation that these individuals were

drinking in order to cope would be much more strongly supported. Were such results found, strategies involving psychoeducation about the maladaptive consequences of drinking to cope and bolstering a larger repertoire of coping skills might be indicated. However, these results do not necessarily support such an approach.

As previously noted, it may be that these individuals initiate drinking with different motivations on each occasion, and do drink to cope on days characterized by higher levels of negative affect. It is also possible that they are not aware of their motivations and simply do not link their affective states with their drinking behaviors. A critical next step will therefore be to replicate and extend current findings in order to further elucidate whether this subset of students is consistently found to show the same lack of modulation of drinking behavior in response to affective changes, whether they are aware of their motivations for drinking on any given day, and if their initiation of drinking behavior is deliberate (i.e., motivated towards a specific outcome) or incidental.

Whether drinking when experiencing greater negative affect is initiated for coping purposes or not, a first step therapeutically for all of these students may be daily monitoring in and of itself. Monitoring mood and alcohol use and reviewing with a therapist can lead to a better understanding regarding the relationship between mood and behavior, and help individuals to work towards engaging in behaviors that are goal-directed, rather than dictated by mood. Should students endorse drinking in order to cope, discussion of alternative or replacement behaviors can take place. Should students seem unaware of any mood-drinking relation or fail to endorse different motivations for drinking, clinicians might help students develop insight regarding their moods and behaviors. Potential consequences of not varying drinking behavior in response to affective states may be highlighted, as changes in affective states may be reflective of work or

environmental demands that require abstinence from alcohol use. As this subset of individuals may struggle to reflect on their own emotional state and therefore fail to vary their behaviors in response, they may benefit from psychoeducation regarding emotions and mindfulness practices to help identify emotions so they may change actions accordingly.

Strengths, Limitations, and Future Directions

The current study had several notable strengths. On a methodological level, one strength is that the use of multilevel modeling allowed for tests of both between- and within-person differences in constructs of interest; specifically, this model approach allowed for a test of whether between-person individual differences interact with within-person mood fluctuations in order to predict within-person variations in drinking behavior. On a theoretical level, the current study was the first to explore SRD to alcohol as a potential moderator of affect-drinking relations in a prospective longitudinal design, and it utilized a novel measure of SRD in the context of daily diary assessment. The current study also compared and contrasted measures of emotional self-awareness that were derived from retrospective self-report instruments, *in vivo* laboratory responses to an affect induction task, and daily diary responses. Some of these measurements represented novel measures and study findings illuminated the construct validity of these measurements for possible use in future studies.

Additionally, in terms of study design, the study utilized online daily diary questionnaires that were easily emailed and texted to participants in the form of a survey link each day. The ubiquity of smartphones among current college students allowed students to easily record survey responses without having to be seated at a laptop or carry additional electronic devices or paper-and-pencil instruments throughout the day, which likely increased ecological validity and decreased missing data in comparison to methods utilized in prior decades.

However, limitations to the study must also be noted. Limitations that have been discussed in prior sections include the lack of variability in negative affect in the diary data, which posed challenges to unpacking the specific role of negative (vs. positive) affect and may have led to lack of power to detect hypothesized relationships; the lack of construct validity with novel measures of emotional self-awareness, which cast doubt regarding interpretations of significant findings; and the possibility that the timing of the intervals between mood and drinking were not appropriate for assessing hypothesized mechanisms, particularly with regards to stress-response dampening, which may involve drinking *prior* to the experience of stress-negative affect. Another potential limitation is that the ICC for the unconditional model in this study was .04, indicating that only 4% of the variability in drinking occurred between individuals (as opposed to within individuals) in the sample. Because ICCs are often not reported (and are sometimes not estimable depending on the modeling approach used), it is unknown whether this ICC is typical when studying drinking among college student samples. Regardless, this low level of between-person variability may have made it difficult to detect between-person differences in alcohol use in the sample, which may in turn have had implications for tested interactions (which involved interactions among between-person and within-person variables).

Additional limitations to note include the fact that daily diary data in the study may not be missing at random, as participants may be less likely to complete surveys when they experience a negative mood state and may be less likely to complete surveys on days following heavy alcohol use. As these are two of the states most relevant to the question of interest, this is significant drawback of the data collection (and may be related to the lack of variability in negative affect observed in the current study). This limitation is unfortunately true for all daily process studies of mood and alcohol use and is difficult to surmount with surveys that require

participant responses. (As wearable technology becomes more widespread, studies utilizing technology that continuously measures physiological states may be an option for investigating similar questions in the future.) Another limitation of daily process research is that the final sample of participants included in analyses may be biased due to the burden of response in general. Participants who were appropriately motivated by study incentives may be more conscientious overall. In contrast, participants who repeatedly failed to complete surveys or completed surveys outside of the valid time range may have individual difference characteristics that are important to the overall variability of the analysis sample. Thus, the current sample may be biased both in terms of participants included and in terms of the data acquired from participants who were included.

Finally, demographically, though the gender ratio of the sample was reflective of the gender ratio of the university at large, the final sample overrepresented Caucasian students and underrepresented all other racial and ethnic groups relative to the larger university population. Beyond the broader population, the gender and race/ethnicity characteristics of this single university are not reflective of the broader population of college students. In addition, almost all students in the sample had at least one parent who had completed college; this measure is reflective of socioeconomic status and indicates that the sample was likely to be of a higher SES. Taken together, the demographic characteristics of the final study sample suggest that findings are limited in their generalizability.

Despite these limitations, the examination of these moderation models within a daily diary study design represents an important step towards better understanding the mechanisms underlying within-person covariation in negative affect and drinking. Given that this was the first study to investigate these specific moderators of affect-drinking relations, there is room for

future studies to test similar models with different or more refined measurements of SRD and emotional self-awareness in order to provide more robust tests of moderation. In terms of SRD to alcohol, physiological or biological based measures may be collected and compared against self-report assessments of these subjective SRD effects. In terms of emotional self-awareness, future studies may continue to utilize measures that capture different facets of emotional self-awareness or the broader construct of emotion regulation to better understand which mechanisms underlie differences in drinking behaviors. Studies with a larger sample size might also test three-way interactions between both of these moderators and negative affect in predicting drinking.

Future studies may also test similar moderation models among different age groups. Though individuals in the current study did not show increased drinking in response to increased negative affect, this may have been due to difficulties accessing alcohol and consistent school and work obligations that limit drinking outside of the weekend. Young adults who have graduated from college and/or are working full time may be a group of particular interest. These young adults would likely have more regular access to alcohol (if they are over 21) and would be less likely to have work obligations outside of regular work hours. This may therefore be the developmental period in which more individuals would begin to display a pattern of drinking in response to negative affect if this pattern does in fact exist among a subgroup of individuals.

Results also illuminate possibilities for future investigations in the college student population that move beyond models of affect-drinking relations tested in the current study. The finding that at-risk individuals do not vary in their drinking behaviors in response to changes in affect raises questions as to why this is the case. As previously noted, future studies might have students record their motivations for drinking on occasions when drinking does occur. This might elucidate whether individuals do, in fact, pursue drinking in order to cope when days are

characterized by higher stress-negative affect, even if they do not show an increased level of drinking compared to when their mood is more positive. In contrast, on days characterized by positive affect, these same individuals might engage in alcohol use with different motivations in mind (e.g., social or enhancement motives). In a similar vein, it may also be useful to test whether different types of negative affect are differentially related to drinking motivations and, in turn, drinking behavior. Previous daily process studies of negative affect and drinking have sometimes found different results depending on types of negative affect (e.g., sadness vs. anxiety vs. boredom), offering evidence that it may be important for future studies to further disaggregate negative affect in testing moderation models investigated in the current study.

Another option for future studies involves examination of different time intervals between the experience of negative affect and drinking. As noted with regards to the hypothesized mechanism behind stress-response dampening to alcohol, one possibility is that drinking in response to negative affect occurs when negative affect is more closely temporally linked to a drinking situation. This might be measured by assessing mood and alcohol use at multiple time points per day and in order to examine links between negative affect and drinking that are separated by different intervals of time. Additionally, while the ICC measure of Emotion Differentiation did not significantly moderate affect-drinking relations in the current study, it has been shown to moderate the relationship between negative emotion and drinking in one prior study (Kashdan et al., 2010). One key difference is that this study had participants self-initiate assessments at the start of any episode of alcohol use, and asked participants to report on what their mood state was immediately prior to use. Hypotheses regarding the specific temporal relationship between affect and use may therefore be key. Mood immediately prior to drinking

may be different than mood across the rest of the day, and may be more tightly linked to drinking behavior.

A final potential modeling approach, used by Armeli et al. (2008), Hussong (2007), and Littlefield et al. (2012), involves use of survival analysis to measure time to drink following experiences of negative affect. Because there may be barriers to drinking among college students outside of weekends (e.g., access to alcohol, work obligations), time-to-drink models allow for a delay in drinking for various reasons while still assessing whether the latency period may be briefer following experiences of negative affect in some individuals.

In summary, the current study utilized a daily diary design in order to investigate daily covariation of stress-negative affect and drinking behaviors among college students. The study tested stress-response dampening to alcohol and emotional self-awareness as moderators of this relationship in order to attempt to identify a high-risk population of students who may utilize alcohol as a coping strategy. Though a subset of variables emerged as significant moderators of the daily affect-drinking relationship, the direction of these interactions did not support hypotheses regarding the use of drinking to cope among these individuals. Future studies may build on findings by refining measurement of variables, including new relevant variables in analyses to further understand relationships between affect and drinking, and testing different temporal patterns in the affect-drinking relationship.

Table 1. Alcohol Consumption Across Study Days

Day	<i>n</i>	Alcohol Drink Frequency			Range	% Drinking
		<i>M</i>	<i>SD</i>			
1	103	1.56	2.62	0-10	34	
2	102	1.93	2.93	0-12	42	
3	100	1.63	2.95	0-14	33	
4	98	0.89	2.12	0-12	22	
5	98	0.87	2.24	0-12	20	
6	98	1.06	2.13	0-10	27	
7	99	1.21	2.48	0-13	28	
8	95	1.44	2.78	0-12	32	
9	94	1.69	2.88	0-12	37	
10	91	1.61	2.77	0-10	35	
11	90	0.66	1.74	0-10	18	
12	92	0.73	1.98	0-11	17	
13	89	0.94	2.61	0-15	19	
14	90	1.57	2.83	0-10	30	

Table 2. Bivariate Correlations Among Key Study Variables (N=106)

	1	2	3	4	5	6	7	8	9	10
1. Person-Mean Aggregate PANAS Negative Affect										
2. Person-Mean Aggregate MDMQ Affect	-0.48***									
3. Daily Alcohol Stress Response-Dampening (SRD)	0.01	0.04								
4. Initial Visit Alcohol Stress Response-Dampening (Expected SRD)	-0.03	0.07	0.50***							
5. Toronto Alexithymia Scale	0.17	-0.19*	0.18	0.08						
6. Emotion Differentiation Score [‡]	-0.40***	0.31***	-0.10	-0.05	-0.21*					
7. LIWC Negative Emotion	-0.02	-0.08	-0.10	0.05	0.05	0.03				
8. Standard Deviation of LWIC anxious, angry, sad emotions	-0.03	-0.08	0.00	0.07	0.16 ⁺	-0.03	0.91***			
9. Standard Deviation of PANAS NA items to Negative Affect Induction	0.11	-0.13	0.04	-0.09	0.16 ⁺	0.09	0.14	0.24*		
10. Mean # of Drinks Consumed	0.00	0.03	-0.14	-0.04	-0.03	-0.03	-0.05	-0.04	-0.02	

Note. Significance levels are indicated by ⁺ for $p < .10$, * for $p < .05$, ** for $p < .01$, and *** for $p < .001$.

[‡]n=103 for this correlation due to 3 missing data points.

Table 3. Alcohol Stress-Response Dampening (SRD) as a Moderator of Affect-Drinking Relations in Specific vs. Broad Affect Models

Predictor	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>	<i>OR</i>	<i>95% CI OR</i>
Intercept	-3.57	0.88	-4.05	<.0001	0.03	[0.01, 0.16]
Weekend	1.67	0.14	11.99	<.0001	5.33	[4.05, 7.01]
WASI Vocabulary T-Score	0.03	0.01	2.06	0.04	1.03	[1.00, 1.06]
Aggregate PANAS NA (Grand Mean Centered)	-0.02	0.02	-0.86	0.39	0.98	0.94, 1.02]
Daily PANAS NA (Person Mean Centered)	-0.05	0.02	-2.65	0.01	0.95	[0.92, 0.99]
Stress Response Dampening (Grand Mean Centered)	-0.02	0.03	-0.73	0.47	0.98	[0.93, 1.04]
Daily PANAS NA * Stress Response Dampening	0.01	0.01	1.21	0.23	1.01	[1.00, 1.02]
Intercept	-3.46	0.93	-3.70	0.0003	0.03	[0.00, 0.20]
Weekend	1.71	0.14	11.87	<.0001	5.55	[4.18, 7.37]
WASI Vocabulary T-Score	0.03	0.01	1.72	0.0886	1.03	[1.00, 1.06]
Aggregate MDMQ Mood (Grand Mean Centered)	-0.01	0.02	-0.44	0.66	0.99	[0.95, 1.04]
Daily MDMQ Mood (Person Mean Centered)	0.04	0.02	2.10	0.04	1.04	[1.00, 1.08]
Stress Response Dampening (Grand Mean Centered)	-0.02	0.03	-0.86	0.39	0.98	[0.92, 1.03]
Daily MDMQ Mood * Stress Response Dampening	0.00	0.01	-0.42	0.68	1.00	[0.99, 1.01]

Note. *N*=106

Table 4. TAS-20 Total Score as Emotional Self-Awareness Moderator of Affect-Drinking Relations in Specific vs. Broad Affect Models

Predictor	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>	<i>OR</i>	<i>95% CI OR</i>
Intercept	-3.59	0.881	-4.08	<.0001	0.03	[0.00, 0.16]
Weekend	1.66	0.140	11.87	<.0001	5.26	[3.99, 6.91]
WASI Vocabulary T-Score	0.03	0.014	2.04	0.04	1.03	[1.00, 1.06]
Aggregate PANAS NA (Grand Mean Centered)	-0.02	0.021	-0.94	0.35	0.98	[0.94, 1.02]
Daily PANAS NA (Person Mean Centered)	-0.05	0.018	-2.72	0.01	0.95	[0.92, 0.99]
Toronto Alexithymia Scale Score (Grand Mean Centered)	0.00	0.009	0.51	0.61	1.00	[0.99, 1.02]
Daily PANAS NA * Toronto Alexithymia Score	0.00	0.002	0.72	0.47	1.00	[1.00, 1.01]
Intercept	-3.395	0.936	-3.63	0.0005	0.03	[0.00, 0.21]
Weekend	1.696	0.144	11.77	<.0001	5.45	[4.11, 7.23]
WASI Vocabulary T-Score	0.02	0.01	1.66	0.10	1.02	[1.00, 1.05]
Aggregate MDMQ Mood (Grand Mean Centered)	-0.011	0.023	-0.45	0.65	0.99	[0.99, 1.04]
Daily MDMQ Mood (Person Mean Centered)	0.040	0.018	2.23	0.03	1.04	[1.00, 1.08]
Toronto Alexithymia Scale Score (Grand Mean Centered)	0.002	0.009	0.18	0.86	1.00	[0.98, 1.02]
Daily MDMQ Mood * Toronto Alexithymia Scale Score	-0.004	0.002	-2.42	0.02	1.00	[0.99, 1.00]

Note. *N*=106

Table 5. ICC Measure of Emotion Differentiation as Emotional Self-Awareness Moderator of Affect-Drinking Relations in Specific vs. Broad Affect Models

Predictor	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>	<i>OR</i>	<i>95% CI OR</i>
Intercept	-3.70	0.92	-4.00	0.0001	0.02	[0.00, 0.15]
Weekend	1.65	0.14	11.64	<.0001	5.19	[3.93, 6.85]
WASI Vocabulary T-Score	0.03	0.01	2.08	0.04	1.03	[1.00, 1.06]
Aggregate PANAS NA (Grand Mean Centered)	-0.02	0.02	-0.68	0.50	0.98	[0.94, 1.03]
Daily PANAS NA (Person Mean Centered)	-0.06	0.02	-2.51	0.01	0.95	[0.92, 0.99]
Emotion Differentiation (Grand Mean Centered)	0.07	0.23	0.28	0.78	1.07	[0.67, 1.70]
Daily PANAS NA * Emotion Differentiation	-0.03	0.04	-0.66	0.51	0.97	[0.89, 1.06]
Intercept	-3.60	0.96	-3.74	0.0003	0.03	[0.00, 0.18]
Weekend	1.69	0.15	11.64	<.0001	5.42	[4.08, 7.21]
WASI Vocabulary T-Score	0.03	0.02	1.84	0.07	1.03	[1.00, 1.06]
Aggregate MDMQ Mood (Grand Mean Centered)	-0.02	0.02	-0.67	0.51	0.98	[0.94, 1.03]
Daily MDMQ Mood (Person Mean Centered)	0.04	0.02	2.31	0.02	1.04	[1.01, 1.08]
ICC Emotion Differentiation (Grand Mean Centered)	0.18	0.23	0.82	0.42	1.20	[0.77, 1.88]
Daily MDMQ Mood * ICC Emotion Differentiation	0.02	0.04	0.37	0.71	1.02	[0.93, 1.10]

Note. *N*=103

Table 6. LIWC Negative Emotion as Emotional Self-Awareness Moderator of Affect-Drinking Relations in Specific vs. Broad Affect Models

Predictor	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>	<i>OR</i>	<i>95% CI OR</i>
Intercept	-3.57	0.89	-3.99	0.0001	0.03	[0.00, 0.17]
Weekend	1.68	0.14	11.98	<.0001	5.35	[4.06, 7.04]
WASI Vocabulary T-Score	0.03	0.01	1.97	0.05	1.03	[1.00, 1.06]
Aggregate PANAS NA (Grand Mean Centered)	-0.02	0.02	-0.86	0.39	0.98	[0.94, 1.02]
Daily PANAS NA (Person Mean Centered)	-0.04	0.02	-2.31	0.02	0.96	[0.93, 0.99]
LIWC Negative Emotion (Grand Mean Centered)	0.00	0.00	-0.08	0.94	1.00	[0.99, 1.01]
Daily PANAS NA * LIWC Negative Emotion	0.00	0.00	1.83	0.07	1.00	[1.00, 1.00]
Intercept	-3.43	0.95	-3.63	0.0004	0.03	[0.00, 0.21]
Weekend	1.71	0.14	11.86	<.0001	5.54	[4.17, 7.35]
WASI Vocabulary T-Score	0.02	0.01	1.67	0.10	1.03	[1.00, 1.06]
Aggregate MDMQ Mood (Grand Mean Centered)	-0.01	0.02	-0.51	0.61	0.99	[0.94, 1.03]
Daily MDMQ Mood (Person Mean Centered)	0.04	0.02	2.07	0.04	1.04	[1.00, 1.08]
LIWC Negative Emotion (Grand Mean Centered)	0.00	0.00	-0.20	0.85	1.00	[0.99, 1.01]
Daily MDMQ Mood * LIWC Negative Emotion	0.00	0.00	0.13	0.90	1.00	[1.00, 1.00]

Note. *N*=106

Table 7. Standard Deviation Among LIWC Negative Emotions as Emotional Self-Awareness Moderator of Affect-Drinking Relations in Specific vs. Broad Affect Models

Predictor	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>	<i>OR</i>	<i>95% CI OR</i>
Intercept	-3.56	0.89	-4.01	0.0001	0.03	[0.00, 0.17]
Weekend	1.67	0.14	11.97	<.0001	5.33	[4.05, 7.01]
WASI Vocabulary T-Score	0.03	0.01	1.98	0.05	1.03	[1.00, 1.06]
Aggregate PANAS NA (Grand Mean Centered)	-0.02	0.02	-0.86	0.39	0.98	[0.94, 1.02]
Daily PANAS NA (Person Mean Centered)	-0.04	0.02	-2.45	0.01	0.96	[0.93, 0.99]
Standard Deviation Among LIWC Specific Negative Emotions (Grand Mean Centered)	0.00	0.01	-0.23	0.82	1.00	[0.98, 1.02]
Daily PANAS NA * Standard Deviation Among LIWC Specific Negative Emotions	0.00	0.00	1.64	0.10	1.00	[1.00, 1.01]
Intercept	-3.43	0.94	-3.64	0.0004	0.03	[0.01, 0.21]
Weekend	1.71	0.14	11.85	<.0001	5.53	[4.17, 7.34]
WASI Vocabulary T-Score	0.02	0.01	1.68	0.10	1.03	[1.00, 1.06]
Aggregate MDMQ Mood (Grand Mean Centered)	-0.01	0.02	-0.51	0.61	0.99	[0.94, 1.03]
Daily MDMQ Mood (Person Mean Centered)	0.04	0.02	2.07	0.04	1.04	[1.00, 1.08]
SD of LIWC Specific Negative Emotions (Grand Mean Centered)	0.00	0.01	-0.29	0.77	1.00	[0.98, 1.02]
Daily MDMQ Mood *SD of LIWC Specific Negative Emotions	0.00	0.00	-0.34	0.74	1.00	[1.00, 1.00]

Note. *N*=106

Table 8. Standard Deviation Among PANAS NA Responses to Affect Induction as Emotional Self-Awareness Moderator

Predictor	<i>B</i>	<i>SE(B)</i>	<i>t</i>	<i>p</i>	<i>OR</i>	<i>95% CI OR</i>
Intercept	-3.59	0.89	-4.05	0.0001	0.03	[0.00, 0.16]
Weekend	1.67	0.14	11.94	<.0001	5.30	[4.03, 6.98]
WASI Vocabulary T-Score	0.03	0.01	2.01	0.05	1.03	[1.00, 1.06]
Aggregate PANAS NA (Grand Mean Centered)	-0.02	0.02	-0.95	0.34	0.98	[0.94, 1.02]
Daily PANAS NA (Person Mean Centered)	-0.05	0.02	-2.58	0.01	0.96	[0.92, 0.99]
SD of PANAS NA Responses to Affect Induction (Grand Mean Centered)	0.07	0.25	0.29	0.78	1.07	[0.65, 1.77]
Daily PANAS NA * SD of PANAS NA Responses to Affect Induction	0.11	0.05	1.96	0.05	1.11	[1.00, 1.24]
Intercept	-3.52	0.94	-3.74	0.0003	0.03	[0.00, 0.19]
Weekend	1.71	0.14	11.89	<.0001	5.55	[4.18, 7.36]
WASI Vocabulary T-Score	0.03	0.01	1.78	0.08	1.03	[1.00, 1.06]
Aggregate MDMQ Mood (Grand Mean Centered)	-0.01	0.02	-0.40	0.69	0.99	[0.95, 1.04]
Daily MDMQ Mood (Person Mean Centered)	0.04	0.02	2.42	0.02	1.04	[1.01, 1.08]
SD of PANAS NA Responses to Affect Induction (Grand Mean Centered)	0.01	0.26	0.02	0.98	1.01	[0.60, 1.68]
Daily MDMQ Mood * SD of PANAS NA Responses to Affect Induction	-0.14	0.05	-2.73	0.01	0.87	[0.79, 0.96]

Note. *N*=106

Figure 1. Interaction Between Standard Deviation Among PANAS NA Responses to Affect Induction (Emotional Self-Awareness Moderator) and Daily PANAS NA (Specific Affect) in Predicting Log Odds of Drinking

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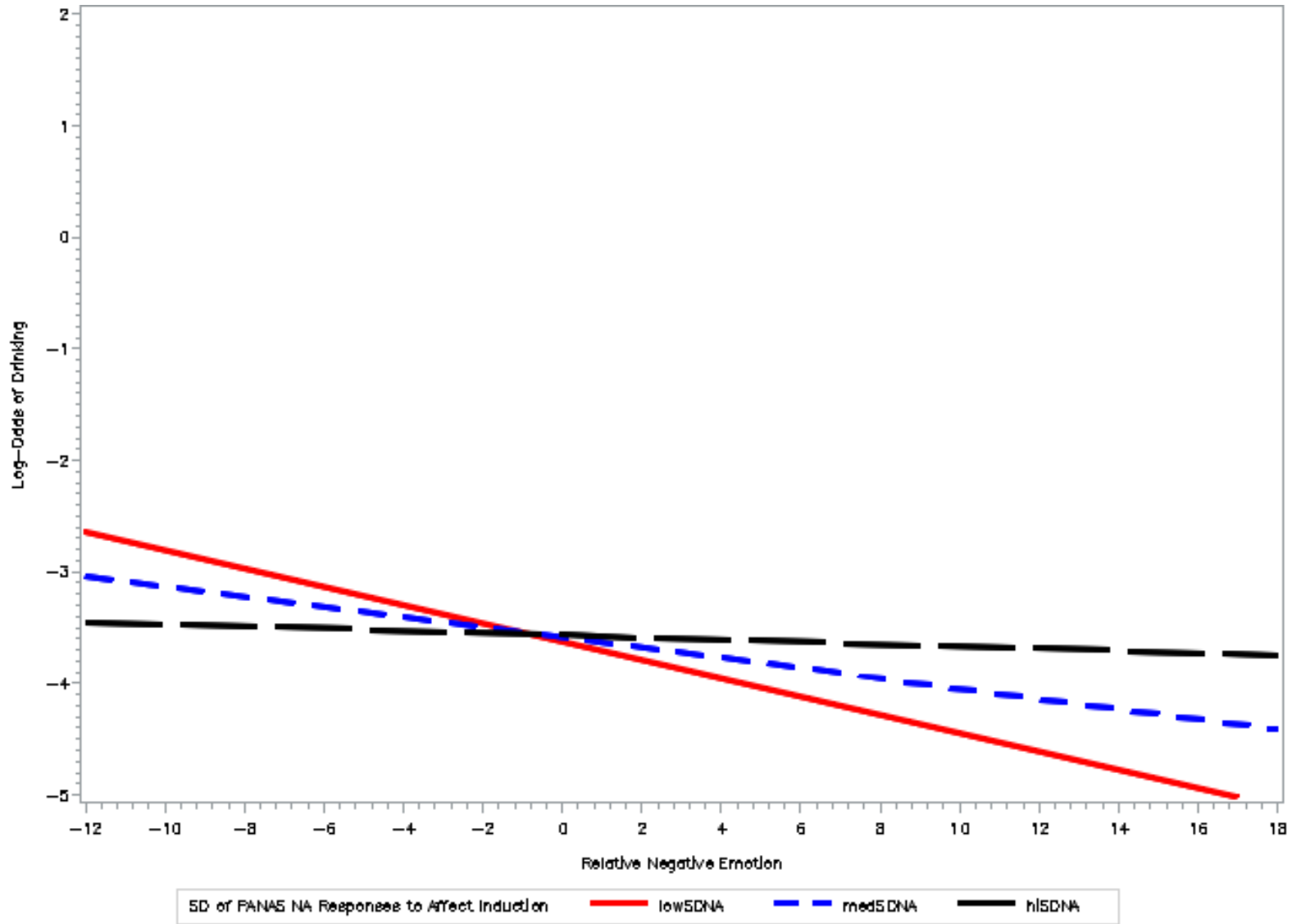


Figure 2. Interaction Between TAS-20 Scores (Emotional Self-Awareness Moderator) and Daily MDMQ-SF Scores (Broad Affect) in Predicting Log Odds of Drinking

68

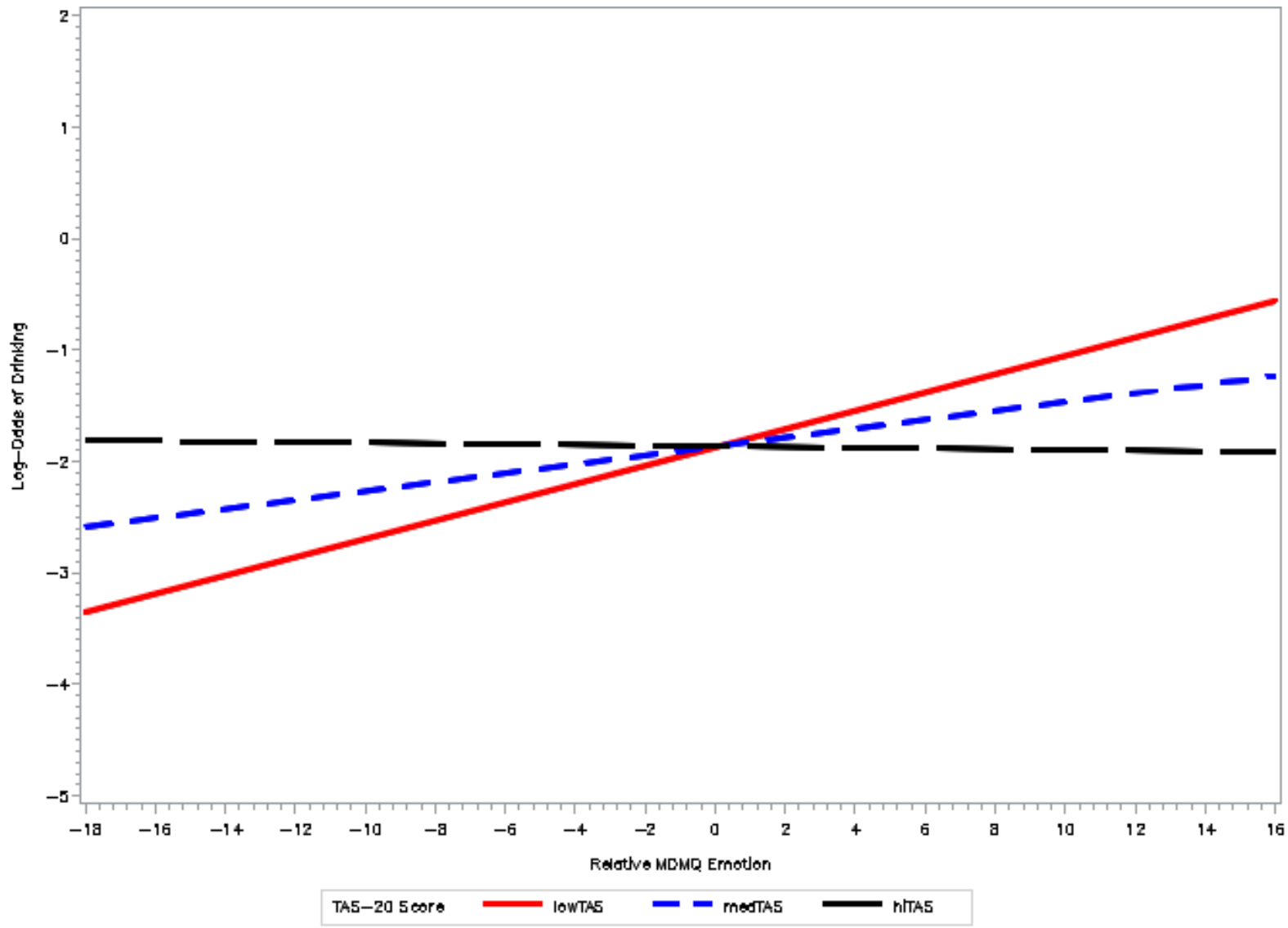
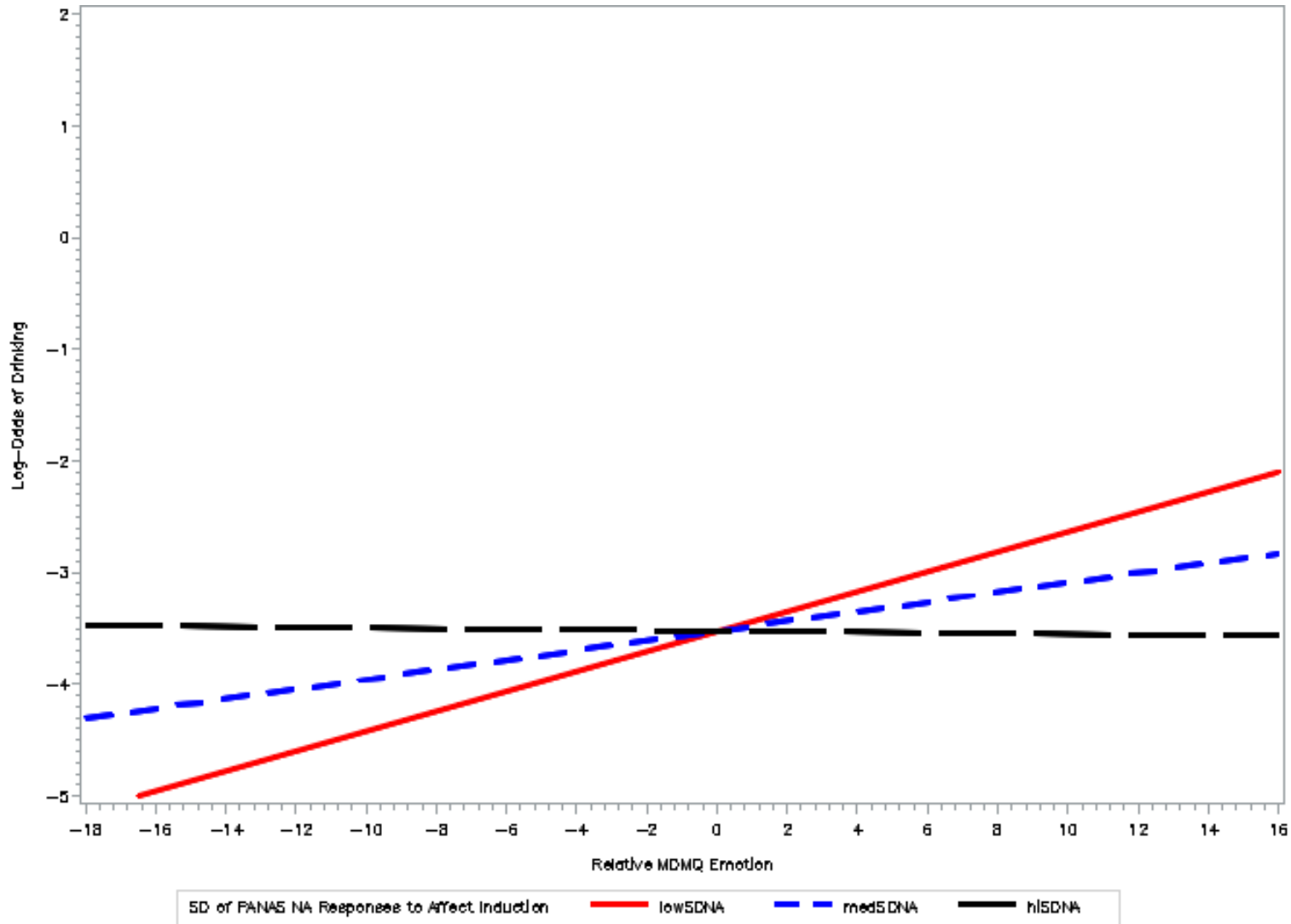


Figure 3. Interaction Between Standard Deviation Among PANAS NA Responses to Affect Induction (Emotional Self-Awareness Moderator) and Daily MDMQ-SF Scores (Broad Affect) in Predicting Log Odds of Drinking

06



APPENDIX A: LABORATORY AND DAILY DIARY QUESTIONNAIRES

Lab Visit Questionnaire

Start of Block: Default Question Block

Q61 Please ask a research assistant to enter your Study ID number.

Page Break



Q1 What is your gender?

Male (1)

Female (2)

Other - Please Specify (3) _____

Page Break

Q2 How old are you?

- 18 (2)
- 19 (3)
- 20 (4)
- 21 (5)
- 22 (6)
- 23 (7)
- 24 (8)

Page Break



Q3 What is the highest level of education that your mother (or woman whom you consider to primarily have raised you) has completed?

(If more than one woman raised you, choose the highest level that any of them completed.)

- Not applicable, I did not have a mother or mother figure (1)
- Less than High School (2)
- High School Graduate (3)
- Some College or Technical School (4)
- College Graduate (5)
- Some Graduate, Medical, or Professional School (6)
- Completed Graduate, Medical, or Professional School (7)
- Don't Know (8)

Page Break



Q4 What is the highest level of education that your father (or man whom you consider to primarily have raised you) has completed?

(If more than one man raised you, choose the highest level that any of them completed.)

- Not applicable, I did not have a father or father figure (1)
- Less than High School (2)
- High School Graduate (3)
- Some College or Technical School (4)
- College Graduate (5)
- Some Graduate, Medical, or Professional School (6)
- Completed Graduate, Medical, or Professional School (7)
- Don't Know (8)

Page Break

Q5 What race do you consider yourself to be? Please select from one or more of these categories.

- White/Caucasian (1)
 - Black or African American (2)
 - American Indian or Alaska Native (3)
 - South Asian (e.g., Indian, Pakistani, Bengali) (9)
 - East Asian (e.g., Chinese, Korean, Japanese) (10)
 - Southeast Asian (e.g., Thai, Vietnamese, Malaysian, etc.) (12)
 - Native Hawaiian or other Pacific Islander (13)
 - Some other race, please specify: (16)
-
- Prefer not to answer (17)

Page Break



Q6 Do you consider yourself to be Hispanic or Latinx?

Yes (1)

No (0)

Q63 What is your specific Hispanic/Latinx origin or ancestry?

Page Break

Q7 What is your official classification in school?

- First Year (1)
- Sophomore (2)
- Junior (3)
- Senior (4)
- Grad/Professional (5)
- Not seeking a degree (6)
- Other, please specify: (7) _____

Page Break



Q8 How well do you know your biological father's drinking history?

- I do not know my biological father. (1)
- I know my biological father but not his drinking history. (2)
- I know a little about my biological father's drinking history. (3)
- I am reasonably familiar with my biological father's drinking history. (4)
- I am very familiar with my biological father's drinking history. (5)

Page Break

Q62 The following are yes or no questions regarding your biological father's drinking history. Please answer to the best of your ability.



Q9 Do you feel your father has been a normal drinker?

(If this parent doesn't drink alcohol, select "yes" for this question.)

- Yes (1)
 - No (0)
-



Q10 Did your mother, grandparent, or other near relative ever complain to you about your father's drinking?

- Yes (1)
 - No (0)
-



Q11 Did your father ever feel guilty about his drinking?

- Yes (1)
 - No (0)
-



Q12 Did friends and relatives think your father was a normal drinker?

- Yes (1)
 - No (0)
-



Q13 Was your father able to stop drinking when he wanted to?

- Yes (1)
 - No (0)
-



Q14 Has your father ever attended a meeting of Alcoholics Anonymous?

- Yes (1)
 - No (0)
-



Q15 Has your father's drinking ever created problems between him and your mother (or step-parent) or another near relative?

- Yes (1)
 - No (0)
-



Q16 Has your father ever gotten into trouble at work because of drinking?

- Yes (1)
 - No (0)
-



Q17 Has your father ever neglected his obligations, family, or work for two or more days in a row because he was drinking?

- Yes (1)
 - No (0)
-



Q18 Has your father ever gone to anyone for help about his drinking?

Yes (1)

No (0)

X→

Q19 Has your father ever been in a hospital because of drinking?

Yes (1)

No (0)

X→

Q20 Has your father ever been arrested for drunken driving, driving while intoxicated, or driving under the influence of alcoholic beverages?

Yes (1)

No (0)

X→

Q21 Has your father ever been arrested, even for a few hours, because of other drunken behavior?

Yes (1)

No (0)

Page Break



Q23 How well do you know your biological mother's drinking history?

- I do not know my biological mother. (1)
- I know my biological mother but not her drinking history. (2)
- I know a little about my biological mother's drinking history. (3)
- I am reasonably familiar with my biological mother's drinking history. (4)
- I am very familiar with my biological mother's drinking history. (5)

Page Break

Q63 The following are yes or no questions regarding your biological mother's drinking history. Please answer to the best of your ability.



Q24 Do you feel that your mother has been a normal drinker?

(If this parent doesn't drink alcohol, select "yes" for this question.)

Yes (1)

No (0)



Q25 Did your father, grandparent, or other near relative ever complain about your mother's drinking?

Yes (1)

No (0)



Q26 Did your mother ever feel guilty about her drinking?

Yes (1)

No (0)



Q27 Did friends and relatives think your mother was a normal drinker?

Yes (1)

No (0)



Q28 Was your mother able to stop drinking when she wanted to?

- Yes (1)
 - No (0)
-



Q29 Has your mother ever attended a meeting of Alcoholics Anonymous?

- Yes (1)
 - No (0)
-



Q30 Has your mother's drinking ever created problems between her and your father (or step-parent) or another near relative?

- Yes (1)
 - No (0)
-



Q31 Has your mother ever gotten into trouble at work because of drinking?

- Yes (1)
 - No (0)
-



Q32 Has your mother ever neglected her obligations, family, or work for two or more days in a row because she was drinking?

- Yes (1)
 - No (0)
-



Q33 Has your mother ever gone to anyone for help about her drinking?

Yes (1)

No (0)

X→

Q34 Has your mother ever been in a hospital because of drinking?

Yes (1)

No (0)

X→

Q35 Has your mother ever been arrested for drunken driving, driving while intoxicated, or driving under the influence of alcoholic beverages?

Yes (1)

No (0)

X→

Q36 Has your mother ever been arrested, even for a few hours, because of other drunken behavior?

Yes (1)

No (0)

Page Break

Q37 The next questions ask about your alcohol use. We hope that you will be able to answer all questions as honestly as possible. Remember that your answers will be kept strictly confidential.



Q38 How often do you have a drink containing alcohol?

- Never (0)
 - Monthly or less (1)
 - 2-4 times a month (2)
 - 2-3 times a week (3)
 - 4 or more times a week (4)
-



Q39 How many standard drinks containing alcohol do you have on a typical day when drinking?

- 1 or 2 (0)
 - 3 or 4 (1)
 - 5 or 6 (2)
 - 7 to 9 (3)
 - 10 or more (4)
-



Q40 How often do you have six or more drinks on one occasion?

- Never (0)
- Less than monthly (1)
- Monthly (2)
- Weekly (3)
- Daily or almost daily (4)



Q41 During the past year, how often have you found that you were not able to stop drinking once you had started?

- Never (0)
 - Less than monthly (1)
 - Monthly (2)
 - Weekly (3)
 - Daily or almost daily (4)
-



Q42 During the past year, how often have you failed to do what was normally expected of you because of drinking?

- Never (0)
 - Less than monthly (1)
 - Monthly (2)
 - Weekly (3)
 - Daily or almost daily (4)
-



Q43 During the past year, how often have you needed a drink in the morning to get yourself going after a heavy drinking session?

- Never (0)
 - Less than monthly (1)
 - Monthly (2)
 - Weekly (3)
 - Daily or almost daily (4)
-

X→

Q44 During the past year, how often have you had a feeling of guilt or remorse after drinking?

- Never (0)
 - Less than monthly (1)
 - Monthly (2)
 - Weekly (3)
 - Daily or almost daily (4)
-

X→

Q45 During the past year, have you been unable to remember what happened the night before because you had been drinking?

- Never (0)
 - Less than monthly (1)
 - Monthly (2)
 - Weekly (3)
 - Daily or almost daily (4)
-

X→

Q46 Have you or someone else been injured as a result of your drinking?

- No (0)
 - Yes, but not in the past year (2)
 - Yes, during the past year (4)
-

X→

Q47 Has a relative or friend, doctor or other health worker been concerned about your drinking or suggested you cut down?

- No (0)
 - Yes, but not in the past year (2)
 - Yes, during the past year (4)
-

Page Break

Q48 Listed below are 20 reasons people might be inclined to drink alcoholic beverages. Using the five-point scale below, decide how frequently your own drinking is motivated by each of the reasons listed.

You drink...

	Almost Never / Never (1)	Some of the Time (2)	Half of the Time (3)	Most of the Time (4)	Almost Always / Always (5)
To forget your worries. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Because you like the feeling. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Because your friends pressure you to drink. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Because it makes social gatherings more fun. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
So that others won't kid you about not drinking. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
So you won't feel left out. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To be sociable. (22)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Because it helps you when you feel depressed or nervous. (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To fit in with a group you like. (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To forget about your problems. (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To be liked. (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
To get high. (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

To cheer up
when you are
in a bad mood.
(13)

Because you
feel more self-
confident and
sure of
yourself. (14)

Because it
improves
parties and
celebrations.
(15)

To celebrate a
special
occasion with
friends. (16)

Because it's
fun. (17)

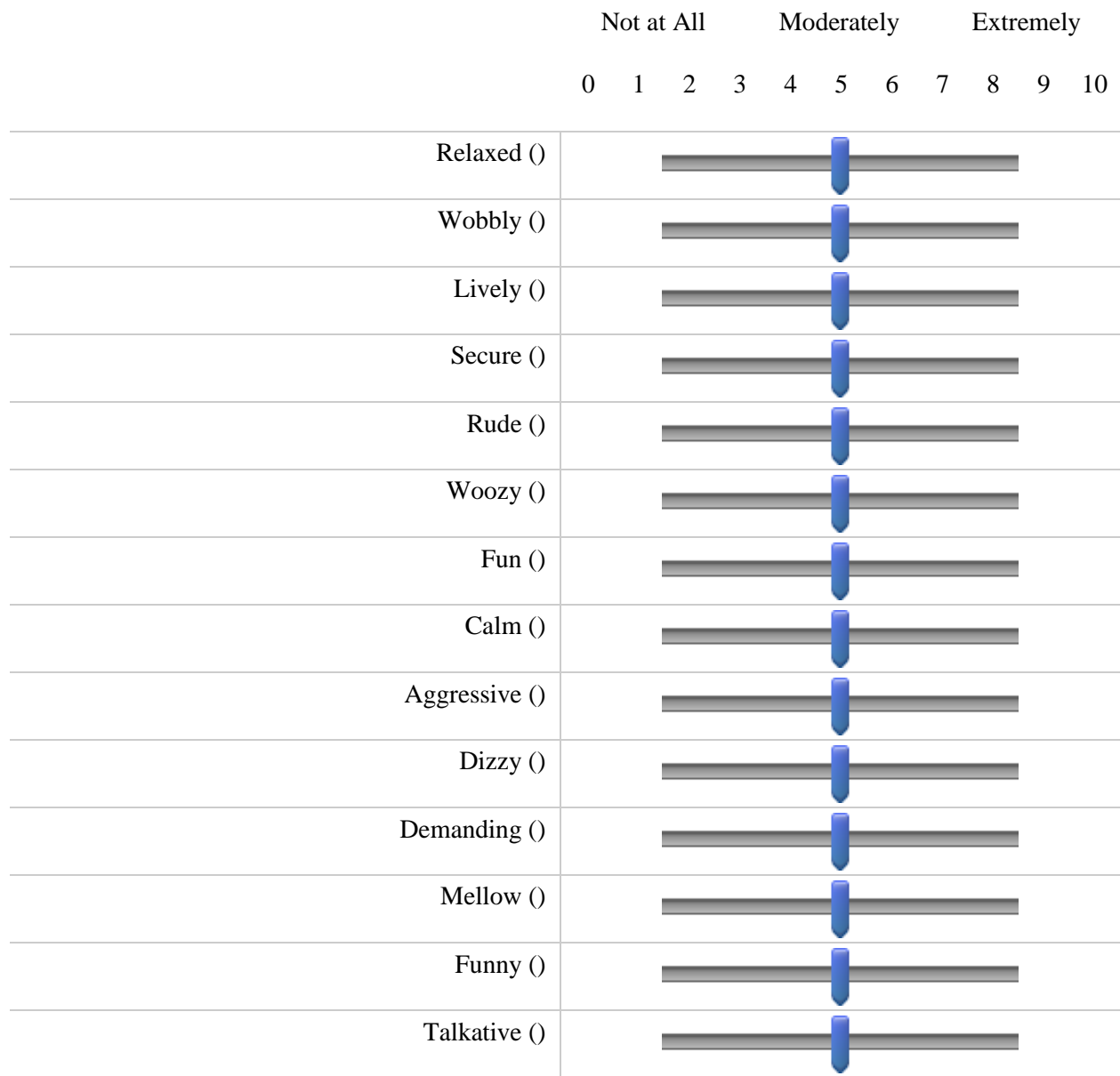
Because it's
exciting. (18)

Because it
gives you a
pleasant
feeling. (19)

Because it
helps you
enjoy a party.
(20)

Page Break

Q49 The following is a list of feelings that people may experience after drinking alcohol. Because alcohol affects people in different ways, we would like to know which of the effects you experience when you drink alcohol. **Based on your own drinking experience, on a scale of 1-10, please rate the extent to which you believe you would experience each of the feelings after drinking alcohol.**



Page Break

Q50 Now we would like you to watch some brief videos that consist of picture clips that are set to music. Please put on your headphones now and adjust the volume to be comfortable. Let the research assistant know if there are any problems with the volume or sound from your headphones. Then, when you are ready, proceed to watch the following video. There will be three videos in total.

Page Break

End of Block: Default Question Block

Start of Block: Block 1

Q65

Please press play and watch the video in its entirety without skipping.

Page Break

Q51 How are you feeling right now? Be as descriptive as you would like.

Page Break

Q52 Indicate to what extent you feel this way right now, that is, at the present moment.

	Very Slightly or Not at All (1)	A Little (2)	Moderately (3)	Quite a Bit (4)	Extremely (5)
Interested (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Distressed (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Excited (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Upset (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strong (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guilty (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scared (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hostile (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enthusiastic (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proud (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Irritable (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Alert (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ashamed (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspired (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervous (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determined (16)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attentive (17)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jittery (18)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Active (19)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Afraid (20)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stressed (21)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page Break

End of Block: Block 1

Start of Block: Block 2

Q66

Please expand the video to full-screen, press play, and watch the video in its entirety without skipping.

Page Break

Q54 How are you feeling right now? Be as descriptive as you would like.

Page Break

Q63 Indicate to what extent you feel this way right now, that is, at the present moment.

	Very Slightly or Not at All (1)	A Little (2)	Moderately (3)	Quite a Bit (4)	Extremely (5)
Interested (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Distressed (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Excited (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Upset (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strong (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guilty (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scared (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hostile (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enthusiastic (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proud (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Irritable (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Alert (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ashamed (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspired (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervous (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determined (16)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attentive (17)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jittery (18)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Active (19)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Afraid (20)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stressed (21)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page Break

End of Block: Block 2

Start of Block: Block 3

Q67

Please expand the video to full-screen, press play, and watch the video in its entirety without skipping.

Page Break

Q57 How are you feeling right now? Be as descriptive as you would like.

Page Break

Q64 Indicate to what extent you feel this way right now, that is, at the present moment.

	Very Slightly or Not at All (1)	A Little (2)	Moderately (3)	Quite a Bit (4)	Extremely (5)
Interested (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Distressed (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Excited (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Upset (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Strong (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Guilty (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Scared (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Hostile (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Enthusiastic (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Proud (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Irritable (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Alert (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ashamed (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Inspired (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Nervous (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Determined (16)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attentive (17)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Jittery (18)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Active (19)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Afraid (20)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Stressed (21)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

End of Block: Block 3

Start of Block: Block 4

X→

Q66 Please answer the following questions using the scale provided.

	Completely Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Completely Agree (5)
I am often confused about what emotion I am feeling. (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is difficult for me to find the right words for my feelings. (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I have physical sensations that even doctors don't understand. (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am able to describe my feelings easily. (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer to analyze problems rather than just describe them. (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I am upset, I don't know if I am sad, frightened, or angry. (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am often puzzled by sensations in my body. (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I prefer to just let things happen rather than to understand why they turned out that way. (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

I have feelings
I can't quite
identify. (9)

Being in touch
with emotions
is essential.
(10)

I find it hard to
describe how I
feel about
people. (11)

People tell me
to describe my
feelings more.
(12)

I don't know
what's going
on inside me.
(13)

I often don't
know why I
am angry. (14)

I prefer talking
to people
about their
daily activities
rather than
their feelings.
(15)

I prefer to
watch "light"
entertainment
shows rather
than
psychological
dramas. (16)

It is difficult
for me to
reveal my
innermost
feelings, even
to close
friends. (17)

I can feel close to someone, even in moments of silence. (18)

I find examination of my feelings is useful in solving personal problems. (19)

Looking for hidden meanings in movies or plays distracts from their enjoyment. (20)

End of Block: Block 4







Daily Diary Questionnaire

Start of Block: Start 1 to 6

JS

1. At this moment I feel:

0 1 2 3 4 5 6

Very Tired ()	
Content ()	
Agitated ()	
Full of Energy ()	
Unwell ()	
Relaxed ()	

Page Break

2. Indicate to what extent you feel this way **RIGHT NOW**, that is, at the present moment:

	Very Slightly or Not at All (1)	A Little (2)	Moderately (3)	Quite a Bit (4)	Extremely (5)
1. Interested (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Distressed (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Excited (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Upset (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Strong (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Guilty (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Scared (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Hostile (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Enthusiastic (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Proud (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Irritable (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Alert (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Ashamed (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Inspired (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Nervous (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Determined (16)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Attentive (17)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. Jittery (18)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

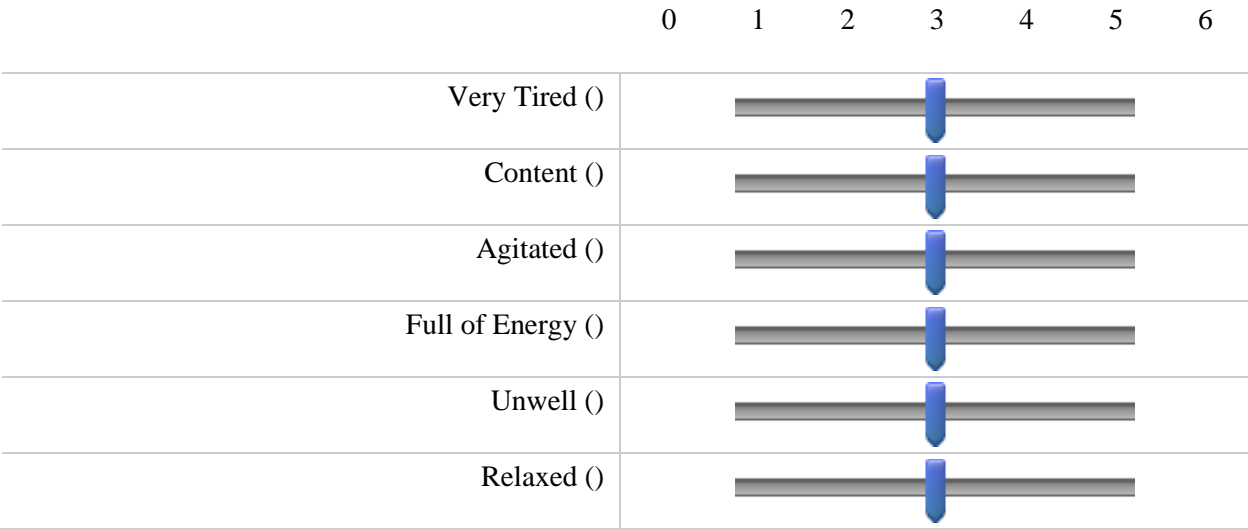
19. Active (19)

20. Afraid (20)

21. Stressed
(21)

Page Break

Q46 Over the course of the **whole day**, I have felt:



Page Break

4.

Indicate to what extent you have felt the following emotions over the course of the **entire day** up to now:

	Very Slightly or Not at All (1)	A Little (2)	Moderately (3)	Quite a Bit (4)	Extremely (5)
1. Interested (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. Distressed (2)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. Excited (3)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. Upset (4)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. Strong (5)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. Guilty (6)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. Scared (7)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. Hostile (8)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. Enthusiastic (9)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. Proud (10)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. Irritable (11)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. Alert (12)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. Ashamed (13)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. Inspired (14)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. Nervous (15)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. Determined (16)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. Attentive (17)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. Jittery (18)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. Active (19)

20. Afraid (20)

21. Stressed
(21)

Page Break



5. Did you consume alcohol yesterday?

- Yes (1)
- No (0)
-



Q55 Did you drink alcohol after you completed yesterday's daily survey? (If you did not take a survey yesterday, respond "yes" to this question if you consumed alcohol yesterday.)

- Yes (1)
- No (0)

End of Block: Start 1 to 6

Start of Block: Block for NO to alcohol yesterday

Q54

What were some of your reasons for not drinking yesterday? Please check **all** that apply.

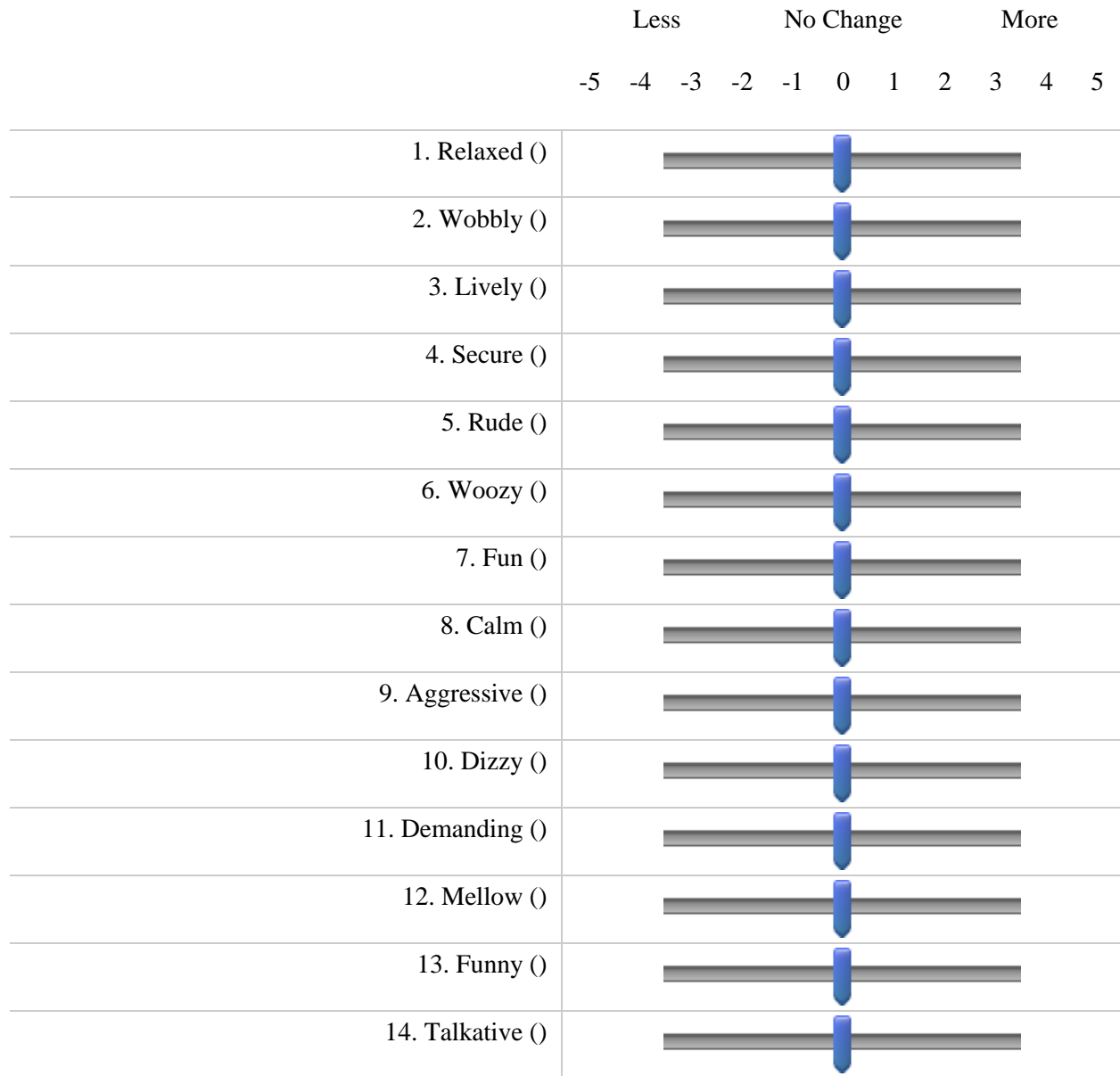
- No desire to drink (1)
- Could not obtain alcohol (2)
- Nobody to drink with (3)
- Had to work at job (4)
- Too much school work (5)
- Usually don't drink on this night (6)
- Other (please specify) (7)
-

Page Break

Q56 The following words describe feelings that are sometimes produced by drinking alcohol.

If you HAD drank last night, please rate the extent to which you believe you would

have experienced each of these effects **after drinking alcohol** (relative to **before** you started drinking).



End of Block: Block for NO to alcohol yesterday

Start of Block: Block for Yes to alcohol yesterday

Q11 We would like you to report on how many standard drinks you had when you drank yesterday.

Note: in the United States, one "standard" drink contains roughly 14 grams of pure alcohol, which is found in:

12 ounces of regular beer, which is usually about 5% alcohol

5 ounces of wine, which is about 12% alcohol

1.5 ounces of distilled spirits, which is about 40% alcohol



Q13 How many standard drinks of alcohol did you drink last night?

Page Break

Q12 The following words describe feelings that are sometimes produced by drinking alcohol. Because alcohol affects people in different ways, we would like to know which of these effects **you** experience when you drink alcohol.

Did you experience a **CHANGE** in the extent to which you felt each of the following ways **AFTER** you started drinking alcohol?



Q14 Relaxed:

Yes (1)

No (0)

Q50 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q17 Wobbly:

Yes (1)

No (0)

Q45 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q21 Lively:

Yes (1)

No (0)

Q46 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q24 Secure:

- Yes (1)
 - No (0)
-

Q47 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q27 Rude:

- Yes (1)
 - No (0)
-

Q49 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q30 Woozy:

- Yes (1)
 - No (0)
-

Q48 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q33 Fun:

- Yes (1)
 - No (0)
-

Q38 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q36 Calm:

- Yes (1)
 - No (0)
-

Q51 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q39 Aggressive:

- Yes (1)
 - No (0)
-

Q52 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q42 Dizzy:

- Yes (1)
 - No (0)
-

Q53 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q45 Demanding:

- Yes (1)
 - No (0)
-

Q54 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q48 Mellow:

- Yes (1)
 - No (0)
-

Q55 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q51 Funny:

- Yes (1)
 - No (0)
-

Q44 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>



Q60 Talkative:

Yes (1)

No (0)

Q45 Please rate the **extent** to which this feeling changed:

	-5 (1)	-4 (2)	-3 (3)	-2 (4)	-1 (5)	0 (6)	1 (7)	2 (8)	3 (9)	4 (10)	5 (11)
1 (1)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Page Break

End of Block: Block for Yes to alcohol yesterday

Start of Block: Block to continue after Q6 conditions/ Morning Drink?



Q56

Have you consumed any alcohol since you woke up today?

(Clarification note: If you drank last night and continued drinking into the early morning hours, but then went to sleep for the night and have not had a drink since waking up, respond "no." If you started a new drinking event since waking up today that would constitute drinking today separate from drinking yesterday, respond "yes.")

Yes (1)

No (0)

End of Block: Block to continue after Q6 conditions/ Morning Drink?

Start of Block: Block YES to Morning drink

Q58 We would like you to report on how many standard drinks you had when you drank.

Note: in the United States, one "standard" drink contains roughly 14 grams of pure alcohol, which is found in:

12 ounces of regular beer, which is usually about 5% alcohol

5 ounces of wine, which is about 12% alcohol

1.5 ounces of distilled spirits, which is about 40% alcohol



Q57

How many standard drinks of alcohol have you had since waking up this morning?















Page Break

Q60

The following words describe feelings that are sometimes produced by drinking alcohol. Because alcohol affects people in different ways, we would like to know which of these effects you experience when you drink alcohol.

Please rate the extent to which you experienced each of the following effects **after** drinking alcohol today (relative to **before** you drank).

		Less	No Change			More				
-5	-4	-3	-2	-1	0	1	2	3	4	5

1. Relaxed ()	
2. Wobbly ()	
3. Lively ()	
4. Secure ()	
5. Rude ()	
6. Woozy ()	
7. Fun ()	
8. Calm ()	
9. Aggressive ()	
10. Dizzy ()	
11. Demanding ()	
12. Mellow ()	
13. Funny ()	
14. Talkative ()	

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