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A DAILY DIARY INVESTIGATION OF BEHAVIORAL

DISINHIBITION AND ALCOHOL-RELATED AGGRESSION

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ABSTRACT

A DAILY DIARY INVESTIGATION OF BEHAVIORAL DISINHIBITION AND

ALCOHOL-RELATED AGGRESSION

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Old Dominion University, 2016
Director: Dr. Cathy Lau-Barraco

Experimental demonstrations and theoretical developments have identified that
the ability to control one's own behavior (i.e., trait self-control, state self-regulation) may
be particularly influential in the prediction of aggression and alcohol-related aggression.
The research investigating alcohol-related aggression, however, has neglected a large
body of research focused on state variation of self-regulation. Consequently, the current
study aimed to use a daily diary methodology design to examine associations between
daily alcohol use and aggressive behaviors (i.e., direct, indirect), as well as the influence
of trait self-control and state self-regulation on these relationships. Participants were 105
(80% female) college student drinkers. Mean age was 23.81 ($SD = 7.53$) years. Students
completed baseline questionnaires and up to 14 consecutive, daily surveys regarding the
prior days' exertion of self-regulation, alcohol use, aggression, and alcohol-related
aggression. Multilevel modeling results indicated that on days when participants
experienced greater stress, and thus exerted greater self-regulation, they were less likely
to consume alcohol and less likely to engage in indirect aggression. Further, the
relationship between self-regulation and indirect aggression was stronger for individuals
lower in trait self-control. Additionally, a priori exploratory analyses revealed that
alcohol-related direct aggression was more likely to occur on days in which alcohol-
related indirect aggression occurred, supporting a co-occurrence of alcohol-related

aggressive behaviors. Importantly, this association was found above the influence of baseline alcohol consumption, trait self-control, and dispositional aggression. Self-regulation also was found to be associated with the likelihood of alcohol-related direct and alcohol-related indirect aggression such that on days when participants exerted greater self-regulation, they were less likely to engage in aggression after consuming alcohol. Study findings support recent literature refuting the ego depletion effect. Future research is necessary to examine individual-level difference variables that may be influencing the effect of stress on self-regulation and examined outcomes.

This dissertation is dedicated to my goddaughter, Mackenzie.

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Finally, I would like to thank my parents, grandmother, and brother and sister for always supporting and encouraging me to succeed. My appreciation for you is indescribable.

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CHAPTER I

INTRODUCTION

Research has long supported the aggression-inducing effects of alcohol; however, these investigations have primarily focused on alcohol's effects on direct forms of aggression (i.e., physical, verbal) and have largely neglected less physically severe forms of aggressive behavior, such as indirect aggression (Eckhardt & Crane, 2008; Giancola, Godlaski, & Parrott, 2005; Giancola, Godlaski, & Roth, 2012). Indirect aggression victimization is associated with many deleterious effects including depression, suicide ideation, and perfectionism, as well as the potential for aggression escalation (Archer & Coyne, 2005, Miller & Vaillancourt, 2007; Owens, Slee, & Shute, 2000). Given that alcohol reduces the ability to control aggressive behavioral impulses and is associated with greater engagement in direct aggression (Bushman & Cooper, 1990; Dougherty, Cherek, & Bennett, 1996; Eckhardt & Crane, 2008; Giancola et al., 2005; Giancola et al., 2012), alcohol use also may be associated with engagement in indirect aggression. Additionally, research has identified individual-level variables that heighten the effects of alcohol on aggression. Specifically, experimental demonstrations and theoretical developments have identified that an individual's ability to control their behavior (i.e., trait self-control, state self-regulation) may be particularly influential in the prediction of aggression and alcohol-related aggression (DeWall, Baumeister, Stillman, & Gailliot, 2007; Giancola et al., 2012; Hoaken, Giancola, & Pihl, 1998). The research investigating alcohol-related aggression, however, has assessed trait levels of control only, neglecting a large body of research focused on state variation of self-regulation. Advanced methodological techniques such as daily diary investigations would enable the assessment of both the between-subjects variable of trait self-control and the within-subjects variable of state self-regulation. Such an investigation would

strengthen our understanding as to who and when people are using alcohol, and becoming aggressive. Consequently, the overall aim of the current proposal is to use a daily diary methodology design to examine associations between daily alcohol use and aggressive behaviors (i.e., direct, indirect), as well as the influence of trait self-control and state self-regulation on these relationships.

Aggression

Young adults between ages 18-30 years constitute 40% of the individuals experiencing violent crimes (Perkins, 1997). Due to the substantial physical, psychological, and economic consequences of this behavior, research has focused on understanding individuals who are likely to aggress as well as characteristics of the types of aggression (Archer, 2004). The most commonly studied form of aggression is direct aggression, consisting of physical and verbal aggressive acts (Buss, 1961; Coyne, Archer, & Eslea, 2006; Richardson & Green, 1999). A second, less commonly investigated subtype is indirect aggression, referring to purposeful harm caused using other persons or events, such as socially excluding an individual (Archer & Coyne, 2005; Bjorkqvist, Osterman, & Kaukiainen, 1992). A more in depth understanding of these types of aggression is needed to better understand the individual-level difference variables that may heighten the likelihood of this behavior.

Direct aggression. Direct aggression consists of physical and verbal acts meant to inflict harm on another person, such as hitting, kicking, verbally insulting or threatening physical harm (Buss, 1961; Richardson & Green, 1999). Physical aggression is described as an assault against a person by means of the aggressor's body parts or weapons whereas verbal aggression, which is more common than physical (Coyne et al., 2006) refers to a vocal response such as insults or threats of harm. A clear sex difference is found in the direct aggression literature with males

engaging in more verbal and physical aggression compared to females (Bjorkqvist, 1994; Harris, 1996), however this sex difference is smaller for verbal than for physical aggression (see Archer, 2004 for review). Although verbal aggression may not result in the injuries typically associated with physical aggression, acts such as verbal criticisms, threats, and abuse, can result in psychological damage such as the development of depressive symptoms (Gibb & Abela, 2008) and feelings of sadness, fear, embarrassment, and loss of trust in others (Horner, Asher, & Fireman, 2015). Many risk factors contributing to the occurrence and severity of direct aggression have been identified including behavioral and social influences (e.g., early childhood abuse, family violence, negative influences from peers) as well as psychological influences (e.g., attention deficit-hyperactivity disorder, loneliness, suspiciousness, mood disturbances; Sharma & Marimuthu, 2014). Additionally, alcohol has been found to exacerbate the likelihood of aggression as well as the severity of harm inflicted.

Direct aggression and alcohol. Approximately seven million violent crimes occur each year in which the perpetrator is perceived to have been drinking at the time of the offense (Bureau of Justice Statistics, 2010). These crimes include sexual assault, rape, robbery, and simple and aggravated assaults. Further, in a sample of 18 to 30 year old drinkers, roughly 86% of men and 78% of women report having experienced or observed bar-related violence in the previous year (Leonard, Quigley, & Collins, 2002; Leonard, Quigley, & Collins, 2003), suggesting that for the majority of young bar patrons, alcohol-related violence is a common occurrence.

The relationship between alcohol consumption and aggression has been reviewed extensively. Results from bar-related investigations suggest that the severity of threats and injuries sustained by victims are significantly related to the perpetrator's perceived level of

intoxication (Leonard, Collins, & Quigley, 2003; Wells & Graham, 2003). Experimental

research has mirrored these findings, identifying that individuals who consume alcohol exhibit

more physical and verbal aggression compared to those who do not consume alcohol (Bushman

& Cooper, 1990; Dougherty, Cherek, & Bennett, 1996; Eckhardt & Crane, 2008; Giancola et al.,

2005; Giancola et al., 2012). Experimentally, alcohol has been found to increase both physical

(Giancola et al., 2005; Giancola et al., 2012) and verbal aggression (Eckhardt & Crane, 2008)

among male and female drinkers. Giancola and colleagues found alcohol to produce a medium

and small effect on physical aggression among men and women, respectively (Giancola et al.,

2009). Although women may not engage in direct aggression as frequently as men (Archer,

2004; Giancola et al., 2009), men and women report similar levels of anger (Archer, 2004),

suggesting that women may be utilizing alternative means to express anger. One subtype of

aggression that has recently begun to be investigated is indirect aggression.

  Indirect aggression. Indirect aggression is delivered in a circuitous manner, using other

people or events to inflict harm, such as spreading rumors (see Archer & Coyne, 2005 for a

review; Bjorkqvist et al., 1992). Although indirect aggression may include damaging property or

one's possessions (Buss, 1961, p 8), it typically tends to focus on the social exclusion or

degradation of one's reputation and the manipulation of the victim's social standing (Archer &

Coyne, 2005). Unlike direct aggression, indirect aggression is committed in a way in which the

perpetrator may be unknown to the victim. For example, an indirect aggressor may withhold

information from a victim that other peers are aware of, they may exclude a victim from a group

activity, or they may make others stop talking to the victim. Using such indirect measures can

leave the victim questioning whether the aggressive act was purposeful or accidental and

whether their feelings of ostracism are warranted. Although indirect aggression is more

frequently used among girls during teenage years (i.e., 11-17 years; Archer, 2004), men's use increases during late teenage years (Bjorkqvist et al., 1992), eventually resulting in comparable use of indirect aggression among the sexes by adulthood.

Indirect aggression victims can suffer substantial psychological harm such as preoccupation with perfectionism, depression, anxiety and suicide ideation (Archer & Coyne, 2005; Bjorkqvist et al., 1994; Miller & Vaillancourt, 2007). Among middle school students, indirect victimization was found to be a stronger predictor of a variety of internalizing symptoms, including somatic complaints and depression, as compared to direct victimization (Baldry, 2004). Additionally, indirect aggression has shown to affect victims socially, resulting in social withdrawal, feelings of social ostracism, reduced sense of belongingness, and future social maladjustment (Archer & Coyne, 2005).

An important aspect of indirect aggression that is not thoroughly understood is whether this type of aggression escalates to more direct forms of aggressive behavior. One review found that interpersonal rejection leads to greater levels of anger and expressed aggression (Leary, Twenge, & Quinlivan, 2006). Participants who were sensitive to being rejected were more likely to use demeaning language, greater hostile tone of voice, and mock their partner during an argument. Similarly, in a study investigating the effects of being socially excluded, participants reacted more directly aggressive to criticism, as measured by the administration of an aversive noise, and offered negative ratings of others, compared to those who had not been excluded (Twenge, Baumeister, Tice, & Stucke, 2001). Results suggest that being a victim of indirect aggression may heighten the likelihood of engaging in more directly aggressive behaviors. Lastly, Owens and colleagues (2000) found that indirect victimization is associated with a greater likelihood of responding with escalated levels of aggression as measured by focus groups

using hypothetical vignettes (Owens et al., 2000); suggesting that being a victim of indirect aggression may promote a pattern of aggressive responding. Given qualitative support that aggression may increase following indirect aggression as well as support that victims of verbal aggression legitimize the escalation of violence (Geiger & Fischer, 2006), the consequences of indirect aggression may extend past the psychological effects of the victim and more immediately escalate situational levels of aggression.

   Indirect aggression and alcohol. Given that alcohol reduces the ability to disinhibit directly aggressive behavior (Eckhardt & Crane, 2008**;** Giancola et al., 2005; Giancola et al., 2012), drinkers also may be more likely to engage in various indirectly aggressive behaviors, such as ignoring peers and using malicious humor to insult others. Indeed, Bjorkqvist and colleagues (Bjorkqvist, 1994; Bjorkqvist, Osterman, & Lagerspetz, 1994) discuss an effect/danger ratio in which aggressors estimate the likely consequences of their behavior. Similar to weighing the pros and cons of a particular behavior, drinkers may be less able to estimate the negative consequences of indirect aggression and choose to engage in this impulse. Although limited, the body of literature on indirect aggression and alcohol suggests that these two constructs may be positively related. In particular, experimental research suggests that indirect aggression may be associated with alcohol-related constructs (Friedman, McCarthy, Bartholow, & Hicks, 2007; Subra, Muller, Begue, Bushman, & Delmas, 2010). These investigations have found that alcohol-related words and images (e.g., beer, vodka) may elicit indirectly aggressive responses that are consistent with indirect aggression. For example, participants exposed to alcohol cues, as compared to those neutral cues, provided more negative ratings of the study experimenter (Friedman et al., 2007; Subra et al., 2010). Additionally, alcohol use is associated with greater engagement in indirect aggression, such that above and

beyond one's level of trait aggression, individuals who reported greater typical alcohol consumption also reported more frequent acts of alcohol-related indirect aggression (Sheehan, Linden-Carmichael, & Lau-Barraco, 2016).

Despite the support reviewed above, additional research is needed to further examine the relationship between indirect aggression and alcohol use. Specifically, research has yet to directly investigate, beyond the cross-sectional level, whether alcohol consumption is related to indirect aggression or an increased likelihood of engaging in indirect aggression. Given the adverse effects of this subtype of aggressive behavior, particularly the potential for subsequent aggression (Owens et al., 2000; Twenge et al., 2001), such information would provide valuable insight regarding the relationship between alcohol use and aggression as well as advance our knowledge regarding a potential escalation of alcohol-related violence. It may be that alcohol use is related to an increased likelihood of both indirectly and directly aggressive behavior, thus we would expect to see a heightened likelihood of both types of aggression after the consumption of alcohol.

A Model of Alcohol-related Aggression

In an effort to further our understanding of alcohol-related aggression, researchers have proposed the alcohol myopia model (AMM) to explain how alcohol impacts the ability to control attention and impact subsequent behavior. The AMM posits that alcohol narrows attentional capacity, resulting in a myopic state in which a drinker is unable to attend to and interpret non-provocative cues (Steele & Josephs, 1990) and instead, focuses on the most salient, aggressive stimuli, thereby increasing the probability of reacting aggressively (Borders & Giancola, 2011; Giancola, Josephs, Parrott, & Duke, 2010). Importantly, investigations have not considered how variations in behavioral inhibition may impact behavior under a myopic state. Individual

differences in behavioral inhibition (i.e., self-control, self-regulation) may help explain why some drinkers become aggressive after consuming alcohol and others do not. Although the construct of trait self-control has long been considered a predecessor of aggression, the interaction of trait self-control and state self-regulation, have not been thoroughly examined in explaining alcohol-related aggression.

Behavioral Disinhibition. Behavioral disinhibition refers to an inability to control one's behavior and is a contributing factor of alcohol-related aggression (Baumeister & Heatherton, 1996; Baumeister, Heatherton & Tice, 1994; Carver & Scheier, 1982). Research has identified both a trait and state influence on the ability to control one's thoughts, feelings, and behaviors. The *trait* level of behavioral control is referred to as self-control whereas the *state* level of behavioral control is referred to as self-regulation (Baumeister, Gailliot, DeWall, & Oaten, 2006; DeWall et al., 2007; Finkel, Campbell, Brunell, Dalton, Scarbeck, & Chartrand, 2006; Hustad, Carey, Carey, & Maisto, 2009; Muraven, Collins & Nienhaus, 2002).

Self-control. Self-control refers to a trait characteristic, measured by the degree of inhibition or initiation of particular behaviors (Baumeister & Heatherton, 1996; Carver & Scheier, 1982). The theory of self-control emphasizes the impact of the construct on various impulsive behaviors. For example, low self-control has long been considered a precursor of greater levels of anger (Wilkowski, Robinson, & Troop-Gordon, 2010), aggression (DeWall et al., 2007; Finkel, DeWall, Slotter, Oaten, & Foshee, 2009), marijuana and alcohol use (Dvorak & Day, 2014; Hull & Slone, 2004; Wills, Walker, Mendoza, & Ainette, 2006), and alcohol-related problems (Kuvaas, Dvorak, Pearson, Lamis, & Sargent, 2014). As behaviors are either enacted upon or prevented by an individual, self-control can, in part, be understood as an inhibitory construct. That is, with adequate levels of self-control, impulsive actions, such as aggression,

can be inhibited or constrained (DeWall et al., 2007; Giancola, 2004; Giancola et al., 2012; Gottfredson & Hirschi, 1990).

Self-control and aggression. Individuals with greater levels of self-control are less likely to behave aggressively (DeWall et al., 2007; Finkel et al., 2009). Specifically, men with greater, opposed to lower, levels of self-control are less likely to aggress against a significant other (Finkel et al., 2009). Similarly, DeWall and colleagues found that self-control moderates the relationship between breaking a habit and aggressive responses (DeWall et al., 2007). Although breaking a habit caused some individuals to become aggressive, individuals with greater levels of self-control were able to resist the urge to become violent or aggressive even after provocation. The link between trait self-control and aggression may, in part, be explained by the inability to control anger (Denson, DeWall, & Finkel, 2012; Tangney, Baumeister, & Boone, 2004). Tangney and colleagues (2004) found that greater levels of self-control were significantly related to the absence of anger and once angered, self-control was strongly related to subsequent responses (Tangney et al., 2004). Individuals with high self-control may use constructive coping mechanisms to handle emotions such as anger, whereas individuals lower in this trait may ruminate about their anger, affecting both the aggression directed at others as well as inward negative thoughts (Tangney et al., 2004). Generally, prior research suggests that lower levels of self-control predict an increased likelihood of violence and aggression whereas greater levels may protect individuals against anger rumination and decrease the likelihood of aggressive responses.

Self-control and alcohol-related aggression. Self-control is a salient predictor of alcohol-related aggression. In an experimental study by Giancola (2004), behavioral and cognitive control was found to moderate the alcohol-aggression relationship among men (Giancola, 2004).

Another study found trait levels of behavioral control to be the best predictor of alcohol-related

aggression when examined in conjunction with a variety of executive functioning components

(Giancola et al., 2012). These findings highlight the integral role self-control plays in the

prediction of alcohol-related aggression. Parallel with non-alcohol related aggression (DeWall et

al., 2007; Finkel et al., 2009; Tangney et al., 2004), individuals with greater self-control appear

better able to inhibit impulses to aggress against another.

Although prior investigations have aided in the understanding of self-control and alcohol-

related aggression, they are lacking in a number of domains. Previous examinations utilized

paradigms to assess aggression, such as the Taylor Aggression Paradigm (TAP), in which

participants are provoked and can retaliate by administering electric shocks (see Giancola &

Chermack, 1998 and Tedeschi & Quigley, 2000 for reviews of measures). Despite reflecting

aggressive tendencies, using a paradigm such as this in an experimental setting does not advance

our understanding as to how alcohol-related aggression may organically occur in real-world

drinking interactions. Further, this paradigm does not allow for the assessment of less severe

forms of aggression such as road rage, verbal aggression, and aggressive threats. Some

individuals, particularly women, may refrain from physical aggression but may utilize other

forms of aggressive acts such as indirect aggression, or verbal threats (Archer, 2004; Eckhardt &

Crane, 2008) to express anger. Secondly, alcohol-related aggression assessments described in

the previous section measure trait levels of self-control and neglect state levels of self-regulation.

State self-regulation, which is variable, compared to the dispositional level of self-control, may

impact the likelihood of aggressive behaviors while under the influence of alcohol.

Self-regulation. Self-regulation refers to the state level of regulatory control that is

necessary to overcome momentary impulses and behaviors (Baumeister et al., 1994; Carver &

Scheier, 1982). As opposed to self-control, which refers to a trait level construct that is relatively unchanging, self-regulation is understood at a state-level orientation. The construct represents an individual's ability to guide behavior as aspects of the environment and personal goals may change, thereby requiring adequate attentional capacity and the ability to adjust behavior in order to remain aligned with the intended goal (Karoly, 1993). That is, self-regulation is impacted by daily tasks such as emotional encounters and cognitive concentration and consequently, has the potential to fluctuate over a period of time. Indeed, extant literature explains self-regulation as a limited resource, much like a muscle that can be overworked to exhaustion (DeWall et al., 2007; DeWall, Finkel, & Denson, 2011; Gino, Schweitzer, Mead, & Ariely, 2011; Hagger, Wood, Stiff, & Chatzisarantis, 2009; Muraven et al., 2002). This variation in self-regulation is referred to as the strength model of self-regulation. The strength model posits that individuals have a limited resource of self-regulatory control and once this resource is depleted, they are unable to resist various urges and impulses, referred to in the literature as *ego depletion*. That is, once the allotted regulatory control is exhausted, individuals are less able to refrain from behaviors they typically would resist, such as binge drinking and expressing uncontrolled anger.

Research has identified a myriad of daily tasks that require the use of self-regulation, thus depleting its resources. Cognitive and emotional tasks such as being forced to make choices (Baumeister, Bratslavsky, Muraven, & Tice, 1998; Vohs, Baumeister, Schmeichel, Twenge, Nelson & Tice, 2014), suppressing thoughts (Muraven, Tice & Baumeister, 1998), and having a negative affect or experiencing stress (see Baumeister & Heatherton, 1996 and Wagner & Heatherton, 2015 for reviews) have all shown to require self-regulatory capacities. As it relates to behavior, research has shown that resisting behavioral urges, such as inhibiting eating a

desirable food (e.g., cookies; Baumeister et al., 1998) and controlling emotional and behavioral responses (Baumeister et al., 1998; Muraven et al., 1998) require self-regulation (see Baumeister, Vohs, & Tice, 2007 for a review).

These short-term self-regulation depletions do not only impact the ability to perform that particular behavior but more globally impact other self-regulating tasks (Baumeister & Heatherton, 1996). As such, experimental studies have assessed the effect of ego depletion by measuring performance on subsequent tasks. For instance, in experimental studies by Baumeister et al. (1998), ego depletion was assessed via an impossible problem-solving test, an anagram test, and an active versus passive decision. Participants who had previously depleted their self-regulation spent less time attempting the problem-solving test, identified fewer anagrams, and took longer to make a decision that required active actions (Baumeister et al., 1998). Other experimental research has found that participants who previously exerted regulatory strength are more likely to lie and cheat (Mead, Baumeister, Gino, Schweitzer, & Ariely, 2009), set risky goals (Baumeister, Heatherton, & Tice, 1993), overeat (Baumeister, DeWall, Ciarocco, & Twenge, 2005), crave alcohol (Fox, Bergquist, Hong, & Sinha, 2007) and quit sooner on frustrating tasks (Baumeister et al., 2005). As it relates to health behaviors, coping with general stressors requires regulatory capabilities and consequently, individuals under stress are less able to resist unrelated impulses such as upholding a diet plan, smoking cigarettes, drinking alcohol, and engaging in violent and aggressive acts (Baumeister & Heatherton, 1996; Wagner & Heatherton, 2015).

Self-regulation and aggression. Experimental demonstrations investigating aggression support the strength model of self-regulation. These research studies have found, in general, as an individuals' self-regulation is depleted, they are more likely to engage in a variety of

aggressive acts (DeWall et al., 2007; Stucke & Baumeister, 2006; Vohs, Glass, Maddox & Markman, 2011). For example, in a series of experimental assessments, DeWall and colleagues induced ego depletion by having participants resist eating a tempting donut, control attention on a given task, and complete the Stroop task. Participants were then given the opportunity to aggress against a confederate via administering hot sauce, administering an aversive white noise, providing negative evaluations, and providing hypothetical aggressive responses to a vignette. Participants who were randomly assigned to exert greater levels of regulation subsequently engaged in more aggressive acts compared to those who had previously completed less demanding tasks (DeWall et al., 2007). Similarly, an experimental design by Stucke and Baumeister (2006) supported that the ability to inhibit aggressive behavior can become depleted due to previous exertion of self-regulation. Three separate studies showed that participants who experienced ego depletion from previous tasks provided more negative evaluations and were significantly more aggressive compared to those in the control condition who did not experience ego depletion. Findings from DeWall and colleauges (2007) and Stucke and Baumeister (2006) exemplify that acts of self-regulation, even if unrelated to later tasks, limit self-regulatory capacity and reduce one's ability to inhibit impulses. In particular, this reduction of self-regulation impacts one's ability to resist temptations of aggression. Thus, aggressive behaviors can, in part, be explained by the self-regulatory abilities of the aggressor.

Self-regulation and alcohol. Similarly, the alcohol literature has provided support for the strength model of self-regulation. In one study involving alcohol-dependent drinkers, Fox and colleagues (2007) exposed participants to a stress-related stimulus by having them recall a recent personal stressful event, and measured their subsequent craving for alcohol and level of self-reported anxiety. Participants exposed to the stressful stimuli reported greater levels of both

alcohol craving and anxiety. Imagining the stressful event depleted regulatory ability, which resulted in a greater likelihood of engaging in impulsive behaviors. Among alcohol-dependent individuals, resisting the urge to drink requires a large amount of self-regulatory control; if this regulatory ability were depleted, drinkers would be unable to resist temptations and we would expect them to consume alcohol. In an investigation of social drinkers, Muraven and colleagues (2002) induced ego depletion and measured the quantity of alcohol consumed during a taste-test. Researchers experimentally induced ego depletion in one group of participants by requiring them to suppress thoughts of a white bear, while the control group completed simple arithmetic problems thought to require little regulatory ability. All participants were told they would then be completing an alcohol taste-test followed by a driving simulation. Despite expecting a driving test, participants who experienced ego depletion consumed significantly more alcohol in the taste-test compared to the control group whose regulation had not been depleted. These findings extend our understanding of self-regulation by directly linking ego depletion to increased alcohol consumption, however they are limited in that ego depletion was experimentally induced in a laboratory setting rather than observed in a natural environment. Studying self-regulating behaviors in everyday life utilizing repeated assessments (e.g., daily diary designs) would advance our understanding of how daily stressors may influence maladaptive behaviors such as drinking and aggression.

Daily Diary Methodology

Daily diary methodology involves repeated assessments of participants, over a particular period of time (Bolger, Davis, & Rafaeli, 2003). These investigations are primarily concerned with within-person variation of behaviors and personality characteristics rather than between-person traits. Daily diary methodology extends cross-sectional and experimental results by

reducing the likelihood of biased reporting. For example, in the context of alcohol use, many cross-sectional studies require participants to report their alcohol use from the previous month(s) or year. This retrospective approach to data collection can result in inaccurate or biased reports (Ekholm, 2004; Gmel & Daeppen, 2007). Shortening the recall period to one day versus weeks, months, or even years would increase the validity of event reporting (Bolger, Davis, & Rafaeli, 2003). The current investigation, by using a daily diary design, allows participants to report previous day alcohol consumption, self-regulation, and aggressive behaviors.

The daily diary methodology enables stronger conclusions to be drawn about the relationships between trait self-control, state self-regulation, alcohol consumption and aggression. As stated previously, experimental investigations have highlighted the ego depleting effects of self-regulating and stressful tasks; however, these designs may not reflect stress as it is experienced in real-world settings. The current investigation addresses this limitation by having participants report previous day stressors and examine its association with same-day alcohol consumption and aggression.

Self-regulation in a daily context. Daily diary investigations have found that daily stressors have an ego depleting effect. Extant research supports that daily stressors elicit greater levels of self-regulation among undergraduate college students (Fabes & Eisenberg, 1997; Lavallee & Campbell, 1995). Given that self-regulation is viewed as a muscle, capable of being exhausted (DeWall et al., 2007; DeWall et al., 2011; Gino et al., 2011), this over-utilization of self-regulation could lead to ego depletion. Muraven and colleagues (2005) investigated this effect as it relates to alcohol consumption and found that the number of daily tasks that required greater regulatory control was related to greater levels of alcohol consumption among college drinkers. Participants who reported experiencing more regulatory demands than average were

more likely to violate their self-imposed drinking limits. Meaning, when faced with an event in which self-regulation was required, participants who had over used their regulatory control earlier in the day were no longer capable of resisting impulses to drink. These findings are consistent with the strength model of self-regulation in that stressful tasks depleted individual's self-regulatory capacity. Further, when individuals attempted to limit their drinking, they unknowingly presented themselves with another task requiring self-regulation. By experiencing ego depletion and imposing a drinking limit, participants were at greater risk for over consuming alcohol in the evening. Furthermore, self-control moderated this relationship such that the influence of stress on the number of drinks consumed was stronger among those lower in trait self-control. Overall, findings suggest that daily stressful events could deplete one's ability to control or resist impulses later in the day, which then could be associated with one's alcohol consumption.

Overall, daily diary investigations have advanced our understanding of state self-regulation; however, many questions remain with regard to its association with other behaviors. For instance, daily diary assessments have found that even typical daily stressful events heighten negative emotional arousal and deplete one's self-regulatory ability (Fabes & Eisenberg, 1997; Lavallee & Campbell, 1995) and that these daily stressors impact subsequent drinking (Muraven et al., 2005). There is a gap in the literature, however, in that these assessments of daily stressors have not examined its impact on aggression, another behavior requiring impulse control. The current study would integrate experimental research findings on ego depletion and aggression with the methodological advancements of daily diary investigations to assess self-regulation. Based on previous research investigating the impact of stressors on impulse control, daily

stressors may deplete one's self-regulation, which may be associated with greater alcohol use and aggressive behavior.

In addition to advancing our understanding of the relationship between self-regulation and aggressive behavior, it remains unknown how one's trait and state behavioral inhibition interact to account for aggression and alcohol-related aggression. Based on previous daily diary research suggesting state self-regulation variation and its relationship with alcohol consumption may be dependent on trait self-control (Muraven et al., 2005), the relative influence of state self-regulation on aggressive behavior also may be dependent on level of trait self-control. An examination of both of these influences would extend our understanding regarding how these variables interact and are associated with impulsive behavior. Further, although experimental studies have investigated trait control as a salient predictor of aggression (DeWall et al., 2007; Giancola, 2004) these studies have focused solely on physical acts of aggression. As previously reviewed, many other types of aggression may be used to express anger. Given the deleterious effects of indirect and verbal aggression, a more in depth understanding of the influence of trait and state behavioral inhibition on these less severe forms of aggression (i.e., indirect aggression) is warranted.

The Present Study

A primary aim of the current study was to better understand types of aggression and their co-occurrence with alcohol use. Specifically, the daily dairy approach enables the report of daily alcohol use and daily aggression, allowing for a better understanding as to whether aggression is more likely to occur on days that alcohol is consumed. Additionally, the daily diary approach extends our understanding regarding different types of aggression. Extant research focuses mainly on examining more severe forms of aggressive behavior, such as physical fighting,

whereas a daily self-report assessment allows for the valuation of less severe aggressive actions that would be more difficult to measure in a laboratory setting. Further, the assessment of these less severe acts may lend insight into the escalation of violence. For instance, direct aggression may be more likely to occur on days that indirect aggression also occurs, supporting an escalation of aggression.

Another aim was to gain a more in-depth understanding of the individual-level behavioral disinhibition variables that predict alcohol use and aggression. Specifically, pertaining to behavioral disinhibition variables, the current study addresses a gap in the alcohol-related aggression literature by utilizing more advanced methodological techniques (e.g., daily diary assessment) that allow for the assessment of every day behaviors and actions, such as daily stressors. Although previous experimental studies have examined self-control and self-regulation in a laboratory environment, these constructs have not been explored in a natural setting, using repeated assessments, in order to identify the proximal associations of trait and state control and aggression. The current study examined the associations between state self-regulation and both alcohol use and aggression, as well as the influence of trait levels of self-control. The current study consisted of six aims.

Aim 1: To investigate the relationship between alcohol use and aggressive behaviors (i.e., direct and indirect) at the daily level. Extant experimental research supports that individuals who consume alcohol exhibit more physical and verbal aggression compared to those who do not consume alcohol (Eckhardt & Crane, 2008; Giancola et al., 2005; Giancola et al., 2012). The current study used within-person analyses to examine whether alcohol consumption predicted greater *direct* and *indirect* aggression as well as whether alcohol consumption increased the likelihood of engaging in any direct or indirect aggression.

Aim 1a. To examine the association between alcohol consumption and <u>*direct aggression*</u> (i.e., measured continuously and dichotomously). It was hypothesized that greater daily alcohol consumption would be positively associated with greater direct aggression. It also was hypothesized that greater alcohol consumption would increase the likelihood of any direct aggression.

Aim 1b. To examine the association between alcohol consumption and <u>*indirect aggression*</u> (i.e., measured continuously and dichotomously). It was hypothesized that greater daily alcohol consumption would be positively associated with greater indirect aggression. It also was hypothesized that greater alcohol consumption would increase the likelihood of any indirect aggression.

Aim 2: To examine self-control as a moderator of the relationship between state self-regulation and alcohol consumption. One daily diary investigation supported greater daily self-regulation to be related to increased alcohol consumption, and this relationship was moderated by trait self-control (Muraven et al., 2005). Analyses utilized both between- (i.e., trait self-control) and within- (i.e., state self-regulation, alcohol consumption) person analyses to investigate the moderating role of self-control on the relationship between self-regulation and alcohol use. It was hypothesized that greater self-control would moderate the association between state self-regulation and reported daily alcohol use such that greater exertion of self-regulation would predict greater alcohol consumption only among those who report low trait self-control.

Aim 3. To examine self-control as a moderator of the relationship between state self-regulation and aggressive behaviors (i.e., direct, indirect). Currently, one experimental study demonstrated that individuals higher in self-control are less susceptible to ego depletion and are

better able to deter aggressive impulses (DeWall et al., 2007). However, the association of trait self-control and state self-regulation with aggression has not yet been examined in a daily context. Analyses utilized both between- (i.e., trait self-control) and within- (i.e., state self-regulation, direct and indirect aggression) person analyses to investigate the moderating role of self-control on the relationship between self-regulation and aggression.

Aim 3a. To determine whether self-control moderates the relationship between state self-regulation and *direct aggression*. It was hypothesized that greater self-control would moderate the association between state self-regulation on reported daily *direct aggression*. Similar to aim 2, it was hypothesized that greater trait self-control would moderate the association between state self-regulation and direct aggression.

Aim 3b. To determine whether self-control moderates the relationship between state self-regulation and *indirect aggression*. It was hypothesized that greater self-control would moderate the association between state self-regulation on reported daily *indirect aggression.*

Exploratory Analyses. There were three exploratory aims. These aims attempt to provide insight into the potential link between alcohol and aggressive behavior as well as how the severity of aggression may increase. Thus far, the aims in the current study, which are focused on aggression, concern the association of alcohol use and aggressive behavior. The proposed exploratory analyses attempt to examine whether alcohol increases the propensity to become aggressive and how this aggression may escalate. In addition to reporting daily aggression, participants were asked to report aggression that occurs specifically after the consumption of alcohol (i.e., alcohol-related aggression).

Further, current experimental research suggests that alcohol increases the likelihood of physical aggression after drinking (Giancola, 2004). Many questions remain, however,

regarding whether an individual who becomes physically aggressive is likely to have engaged in indirect aggression as well, and how one's self-regulation may be associated with aggression after consuming alcohol. Consequently, the proposed exploratory analyses aimed to examine the escalation of alcohol-related aggression by assessing both alcohol-related *indirect* aggression and alcohol-related *direct* aggression

   Aim 4. Limited extant evidence supports that direct aggression may increase following indirect aggression (Owens et al., 2000) and victims of verbal aggression legitimize the escalation of violence (Geiger & Fischer, 2006). While the current study design precludes ascertaining the temporal order of specific types of alcohol-related aggression, it does allow for the examination of the co-occurrence of alcohol-related indirect and direct aggression. Consequently, within-person analyses investigated whether alcohol-related direct aggression is more likely to occur on days in which alcohol-related indirect aggression also occurs. It was hypothesized that alcohol-related *indirect aggression* and alcohol-related *direct aggression* would be positively related.

   Aims 5 and 6. Aims 5 and 6 investigated whether self-control moderates the relationship between state self-regulation and alcohol-related aggression (i.e., *direct, indirect*). It was hypothesized that greater self-control would moderate the association between state self-regulation on reported daily alcohol-related *direct aggression* (Aim 5) and alcohol-related *indirect aggression* (Aim 6).

CHAPTER II

METHOD

Participants

Participants in the current research study were college students from Old Dominion University (ODU). Participants were recruited through an on-line psychology research pool (SONA), posted flyers, student announcements, and class announcements. Advertisements specified that this was a two-part study in which participants must first complete a baseline on-line survey, and then complete follow-up on-line surveys for 14 consecutive days. To be eligible, participants must (1) have been at least 18 years of age, (2) report drinking a minimum of three drinks per week, and (3) have had daily access to the internet for the period of data collection. Participants were offered research credit toward their psychology course or $10 for completing at least 12 days of surveys.

Procedure

Initial assessment. Participants completed an on-line baseline assessment in order to determine eligibility for the daily diary portion of the study. Participants completed baseline information about their drinking, self-control, and demographic information (see measure description below). Baseline surveys took no more than 30 minutes to complete. Prior to completing the baseline survey, participants were required to read the Informed Consent document (Appendix A). Participants' decision to continue the survey after reading the informed consent document indicated their consent to participate in the study. After completing the baseline assessment, participants were asked to provide their email address and phone number in order to receive reminders for the daily portion of the survey. Baseline responses were reviewed and the researcher determined participant eligibility for the daily portion of the study. If eligible,

the participant was emailed instructions regarding how to complete the follow-up assessments.

Participants were instructed that follow-up assessments would begin within one week of the

baseline assessment. Ineligible participants received an email describing their ineligibility,

thanking them for their participation, and indicated they would receive partial research credit for

participating in the baseline survey.

Private participant information, including names, email addresses, and phone numbers,

were kept in secure files that were password protected and accessible only to the researcher to

ensure confidentiality. Additionally, only participant research identification numbers were used

to link participant data from the baseline assessment to the daily assessments. The project was

reviewed and approved by the university Institutional Review Board. All participants were

treated in accordance with the American Psychological Association guidelines for ethical

treatment of participants.

Daily assessments. The daily diary portion of the current research study was collected

via on-line surveys. Participants were instructed to complete the surveys using their cell phone

or computer. Daily surveys were collected between the time of 7:00 am and 2:00 pm for 14

consecutive days. Each morning, participants were sent a reminder email with the survey link.

A follow-up email was sent at 1:30 pm to remind participants that they had 30 minutes to

complete the survey. The survey link was removed at 2:05 pm and could no longer be accessed

by participants.

Measures

Baseline assessment.

Demographic questionnaire (Appendix B). The demographic questionnaire asked participants about gender, age, race, height, weight, income, state of residence, and educational level.

Alcohol use (Appendix C). The Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) was used to assess typical consumption of alcohol for each day of the week in the past three months. Participants were provided with information defining a standard alcoholic drink. The DDQ is widely used to assess alcohol consumption (e.g., Geisner, Larimer, & Neighbors, 2004; Mallett, Bachrach, & Turrisi, 2008) and has demonstrated adequate convergent validity with self-reported measures of negative alcohol-related consequences (e.g., Collins, Bradizza, & Vincent, 2007; Collins, Koutsky, & Izzo, 2000; Collins, & Lapp, 1992). The sum of the number of alcoholic drinks consumed on each day of an average week was used as the baseline measure of alcohol consumption.

Self-control (Appendix D). The Brief Self-control Scale (BSCS; Tangey, Baumeister, & Boone, 2004) was used to assess trait self-control. The 13-item questionnaire asks participants to indicate the degree to which a variety of statements are reflective of how they typically are. Sample items include *"I am good at resisting temptation"* and *"I am able to work effectively toward long-term goals"* and are scored on a scale from 1 *(Not at all like me)* to 5 *(Very much like me)*. The BSCS has been used to assess dispositional self-control (DeWall et al., 2007), has demonstrated high internal reliability with alphas ranging from .83 - .85 (Study 1; Study 2; Tangney et al., 2004), high test-retest reliability ($\alpha = .87$; Tangney et al., 2004), and adequate convergent validity with measures of alcohol use disorders (Tangney et al., 2004) and self-reported measures of impulsivity and restraint (Maloney, Grawitch, & Barber, 2012). In the present study, $\alpha = .86$.

Dispositional Aggression (Appendix E). In order to test the true associations between study variables, dispositional or trait aggression, was examined and controlled for in analyses concerning aggression. The Buss-Perry Aggression Questionnaire (BPAQ; Buss & Perry, 1992) was used to measure dispositional aggression. The 29-item questionnaire asks participants to report the degree to which statements are characteristic of them. Sample items include "*When frustrated, I let my irritation show*" and "*There are people who pushed me so far that we came to blows*" and are scored on a scale from 1 (*Extremely uncharacteristic*) to 7 (*Extremely characteristic*). A mean composite score was computed with higher scores indicating higher dispositional aggression. The BPAQ has shown to have good test re-test reliability (Buss, & Perry, 1992), and adequate convergent validity with aggression expectancies (Smucker Barnwell, Borders, & Earleywine, 2006) and aggressive responses (Eckhardt & Crane, 2008). In the present study, $\alpha = .93$.

Daily assessment.

Self-regulation (Appendix F). Self-regulation was measured using a daily stress assessment that has been used previously to assess daily variation in self-regulating demands (Muraven, Collins, Shiffman, & Paty, 2005). Participants were asked to rate on an 11-point scale whether they needed to regulate their mood, control their thoughts, deal with stress, or felt overwhelmed on that particular day. For the current study, a continuous and dichotomous measure of self-regulation were used. The continuous measure was created by averaging responses to the four items. The dichotomous measure represented whether the level of stress experienced by the participant on a particular day was greater or less than average. This measure was created by first calculating each participant's average level of stress across the study period, and then recoding each day's level of stress as either higher or lower than the participant's

average. The resulting measure consisted of (0) representing less than average stress and thus less than average self-regulation exerted and (1) representing greater than average stress and thus greater than average self-regulation exerted on that particular day. The measure has shown adequate internal reliability, (α = .75) and, using a daily diary format, has shown to predict self-imposed drinking violations, increased daily alcohol consumption, and greater levels of intoxication after a drinking episode (Muraven et al., 2005).

Alcohol use (Appendix C). The Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) used in the baseline assessment was modified to assess daily alcohol use. Participants recorded the number of alcohol drinks consumed during each day of the daily assessment. Similar assessments of alcohol use have been used in previous daily diary investigations (Abreau et al., 2011; Armeli, Mohr, Todd, Maltby, et al., 2005; Armeli et al., 2005; Butler et al., 2010; Muraven et al., 2005; Muraven, Collins, Morsheimer et al., 2005).

Direct aggression and alcohol-related direct aggression (Appendix G-H). The Explicit Aggression Questionnaire (EAQ; Smucker Barnwell et al., 2006) is a 25-item measure, which assesses directly aggressive acts in general as well as after drinking alcohol. Participants indicated the number of times they had been involved in various acts such as *"yelling or cursing at someone"* and *"slapped or hit someone."* For alcohol-related direct aggression questions, participants were asked to report the number of times they engaged in the particular behavior after drinking such as "*After drinking, I have slapped or hit someone."* The EAQ has demonstrated adequate convergent validity with endorsement of aggression being related to dispositional aggression, and endorsement of alcohol-related aggression being related to aggression expectancies and alcohol consumption (Smucker Barnwell et al., 2006).

The EAQ was modified to assess *daily* direct aggression and *daily* direct aggression after alcohol consumption. The current study asked participants to report whether they engaged in any of the aforementioned behaviors in the previous day. To assess daily direct aggression, a continuous and dichotomous measure were evaluated. The dichotomous measure was created with (0) representing no direct aggression and (1) representing endorsement of at least one of the directly aggressive behaviors. Similarly, to assess daily alcohol-related direct aggression, the dichotomous measure was created with (0) representing no alcohol-related direct aggression and (1) representing endorsement of at least one of the alcohol-related directly aggressive behaviors.

Indirect aggression and alcohol-related indirect aggression (Appendix I-J). The Indirect Aggression Scale (IAS; Forrest, Eatough, & Shevlin, 2005) was used to assess indirect aggression and alcohol-related indirect aggression. The IAS is a 25-item measure that asks participants to report how often they have engaged in particular indirectly aggressive behaviors in the previous 12 months (e.g., "*Intentionally embarrassed them around others*"), ranging from 1 (*never*) to 5 (*regularly*). The IAS was modified to measure *daily* indirect aggression and *daily* indirect aggression *after alcohol consumption*. The current study asked participants to report whether they engaged in any of the aforementioned behaviors in the previous day, both without alcohol use and after consuming alcohol. The IAS subscales and modified alcohol-related IAQ composite score have demonstrated high internal reliability (α = .81 - .84; Forrest et al., 2005; α = .97; Sheehan et al., 2016). To assess daily indirect aggression, a continuous and dichotomous measure were examined. The dichotomous measure was created with (0) representing no indirect aggression and (1) representing endorsement of at least one of the indirectly aggressive behaviors. Similarly, to assess daily alcohol-related indirect aggression, the dichotomous measure was created with (0) representing no alcohol-related indirect aggression and (1)

representing endorsement of at least one of the alcohol-related indirectly aggressive behaviors.

CHAPTER III

RESULTS

Power Analysis

Based on previous longitudinal examinations of drinking behavior (Armeli et al., 2000) and aggression tendencies (Pond et al., 2012), a moderate to large amount of within-person variation was expected with regard to the outcome variables (i.e., 67-77%; ICC = .23-.33). Using this information, the $N_{effective}$ formula was used to calculate power for the present study (West, Ryu, Kwok, & Cham, 2011):

$$N_{effective} = \frac{n_{L1}n_{L2}}{1 + (n_{L1} - 1)ICC'}$$

The equation accounts for both level 1 (n_{L1}) and level 2 (n_{L2}) sample sizes. In order to ensure an adequate number of data points, data was collected for a 14-day period and all participants completing at least two level-1 observations (i.e., two days) were included in analyses (Mehl & Conner, 2012). Using the average of the interclass correlations (i.e., ICC = .285), and data collection of 14 days, it was assumed that I would need approximately 21 participants. Based on prior daily diary studies conducted in the lab, I expected approximately 41-53% of participants to complete at least seven days of data collection. Given the expected compliance rate, and the potential for limited aggressive behavior as well as limited alcohol-related aggression, 100 participants were recruited for the current study.

Data Cleaning

Prior to conducting analyses, data were cleaned and missing data were addressed. Duplicate and incomplete daily responses were deleted, and only participants who completed at least two daily surveys were included in subsequent analyses. Minimal data were missing across baseline (ranging from 0 to 3.8%) and daily measures (ranging from 0 to 20%). The pattern of

missingness was found to be missing completely at random for both the baseline data, Little's

MCAR $\chi^2 = 2.37$ ($df = 7$; $p = .937$), and the daily data, Little's MCAR $\chi^2 = 478.33$ ($df = 486$; $p =$

.589), indicating no identifiable patterns within the missing data. Consequently, missing data for

continuous baseline data were handled via multiple imputation in SPSS. For daily data, missing

data points were omitted using listwise deletion when conducting analyses in HLM software.

Cases were excluded only if Level 1 missing data existed for the particular analysis being

conducted.

Statistical assumptions also were addressed. First, normality was assessed using

histograms and assessing variable skewness and kurtosis. All continuous scales were within

normal range with the exception of Alcohol Quantity which showed kurtosis out of the +/- 2

range (i.e., 2.92), and was normalized via square root transformation. The square root

transformed variable yielded identical bivariate relationships as the non-transformed variable,

thus the non-transformed variable was retained to enhance interpretability. Second, outliers were

examined using boxplots. One extreme outlier (i.e., Alcohol Quantity) was outside the 3 *SD*

range and was winsorized to match the next highest value (Barnet & Lewis, 1994). Third,

continuous variables were centered to reduce potential effects of multicollinearity. When

conducting all multi-level analyses, level-1 predictors were specified as group-mean centered

unless dichotomous, and level-2 predictors were grand-mean centered. Fourth, a Bernoulli

distribution was specified for all dichotomous outcomes (e.g., Alcohol Consumption, *yes* or *no*;

Aggression, *yes* or *no*).

For the current study, level 1 variables included daily measurements of self-regulation,

direct and indirect aggression, alcohol use, and alcohol-related direct and indirect aggression,

while self-control was included as a level 2 variable. Prior to running analyses, gender and

dispositional aggression were examined with regard to key study variables. Gender was unrelated to daily alcohol consumption, $B = -0.74$, $SE = 0.59$, $p = .24$, direct aggression, $B = 0.08$, $SE = 0.20$, $p = .68$, and indirect aggression, $B = 0.00$, $SE = 0.30$, $p = .99$. Dispositional aggression was examined with regard to direct and indirect aggression. Individuals higher in dispositional aggression were found to be more likely to engage in direct, $B = 0.28$, $SE = 0.07$, $p < .001$, and indirect aggression, $B = 0.35$, $SE = 0.11$, $p = .003$. Consequently, dispositional aggression was included as a control variable in Aim 1, and Exploratory Aim 4.

Variable descriptives were conducted using SPSS 21 software and all multilevel modeling analyses were conducted using HLM 6.08 software (Raudenbush, Bryk, & Congdon, 2004). All results presented represent unit-specific model results with robust standard errors. The final sample consisted of 105 participants (80% female) who had completed at least two of the daily surveys. Of the 1470 possible daily diary days, participants completed 1304 days, representing a compliance rate of 88.7%. See Table 1 for a list of all baseline characteristics and reported daily behaviors.

Prior to exploring aim 1, outcome variables were examined in HLM to determine whether there were adequate within-person variation to conduct the proposed analyses. The ICC values for daily alcohol consumption, direct aggression, and indirect aggression were .146, .273, and .306, respectively; indicating that approximately 85% of the variance in alcohol consumption, 73% of the variance in direct aggression, and 69% of the variance in indirect aggression may be accounted for by within-person variation.

Table 1

Characteristics of Final Sample

Characteristic	Statistic	
	Mean (*SD*)	*Range*
Age	23.81 (7.53)	18 - 57
Typical weekly alcohol quantity	12.76 (9.71)	3 - 50
Dispositional aggression	2.84 (1.05)	1.25 – 6.69
Self-control	3.26 (0.75)	1.54 – 5.00
Sex	*Frequency*	
Male	21 (20%)	
Female	84 (80%)	
Race/ethnicity	*Frequency*	
Caucasian	58 (55.2%)	
African American	39 (37.1%)	
Hispanic	3 (2.9%)	
Native American	1 (1.0%)	
Asian	2 (1.9%)	
Other	2 (1.9%)	
Class Standing	*Frequency*	
Freshman	23 (21.9%)	
Sophomore	14 (13.3%)	
Junior	30 (28.6%)	
Senior	33 (31.4%)	

Table 1, continued

Characteristic	Statistic
Other	5 (4.8%)
Frequency of Daily Variables of Interest	*Frequency*
Alcohol consumption	515/1294 (39.8%)
Direct aggression	431/1304 (33.1%)
Indirect aggression	399/1294 (30.8%)
Alcohol-related direct aggression	104/556 (18.7%)
Alcohol-related indirect aggression	128/552 (23.2%)

Aim 1

The first aim was to examine the association between daily alcohol consumption and aggressive behaviors. Daily alcohol consumption was assessed continuously and outcome variables were assessed both continuously and dichotomously (i.e., 0 = no aggression, 1 = at least one act of aggression). Using separate equations, each outcome was regressed on daily alcohol use. The associations also were tested after controlling for dispositional aggression (Level 2). To determine the incremental influence of dispositional aggression, separate models were tested including (1) no covariates and (2) the inclusion of dispositional aggression.

An example of the two equations predicting a continuous outcome is provided below. Here, the number of directly aggressive acts is predicted by the number of alcoholic drinks consumed, in which time (t) is nested within individuals (i).

(1) $\text{Direct}_{ti} = \beta_{00} + \beta_{10}*(\text{ALCQ}_{ti} - \overline{\text{ALCQ}}_{.i}) + r_{0i} + r_{1i}*(\text{ALCQ}_{ti} - \overline{\text{ALCQ}}_{.i}) + e_{ti}$

(2) $\text{Direct}_{ti} = \beta_{00} + \beta_{10}*(\text{DISP}_{i} - \overline{\text{DISP}}_{.}) + \beta_{10}*(\text{ALCQ}_{ti} - \overline{\text{ALCQ}}_{.i}) + \beta_{11}*(\text{DISP}_{i} - \overline{\text{DISP}}_{.})*(\text{ALCQ}_{ti} - \overline{\text{ALCQ}}_{.i}) + r_{0i} + r_{1i}*(\text{ALCQ}_{ti} - \overline{\text{ALCQ}}_{.i}) + e_{ti}$

To examine dichotomous outcomes, a Bernoulli distribution was specified and odds ratios were examined to determine if the likelihood of engaging in either direct or indirect aggression was associated with alcohol use. An example of alcohol consumption predicting the odds of indirect aggression is provided below:

$\log(\pi/1\text{-}\pi) = \beta_{00} + \beta_{10}*(\text{ALCQ}_{ti} - \overline{\text{ALCQ}}_{.i}) + r_{0i} + r_{1i}*(\text{ALCQ}_{ti} - \overline{\text{ALCQ}}_{.i})$

Direct aggression. Regarding direct aggression, 33.1% of all daily diary days included at least one act of direct aggression. Multilevel analyses revealed that alcohol consumption did

not predict more direct aggression, $B = 0.03$, $SE = 0.02$, $p = .212$[1], and dispositional aggression

also did not significantly predict greater direct aggression, $B = 0.05$, $SE = 0.03$, $p = .166$ (see

Table 2). Direct aggression also was examined dichotomously such that greater alcohol

consumption predicted greater odds of engaging in at least one act of direct aggression. Similar

to the continuous measurement of the variable, alcohol did not significantly predict the

likelihood of direct aggression, $OR = 1.03$, $CI = 0.99\text{-}1.08$, and dispositional aggression

remained a non-significant predictor, $OR = 1.05$, $CI = 0.98\text{-}1.12$ (see Table 3).

Indirect aggression. Indirect aggression occurred on 30.8% of all daily diary days.

Multilevel analyses revealed that alcohol consumption did not predict more indirect aggression,

$B = 0.00$, $SE = 0.02$, $p = .867$[2], and dispositional aggression did not significantly predict greater

indirect aggression, $B = 0.05$, $SE = 0.04$, $p = .218$ (see Table 4). Indirect aggression also was

examined dichotomously such that greater alcohol consumption predicted a greater likelihood of

engaging in at least one indirectly aggressive act. Greater alcohol consumption did not

significantly predict the likelihood of indirect aggression, $OR = 1.00$, $CI = 0.94\text{-}1.06$, however,

dispositional aggression predicted the likelihood of engaging in indirect aggression, $OR = 1.07$,

$CI = 1.01\text{-}1.14$, such that individuals with greater dispositional aggression were more likely to

engage in indirect aggression than those with less dispositionally aggressive tendencies (see

Table 5).

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[1] Post-hoc analyses revealed that alcohol quantity significantly predicted alcohol-related direct aggression, $B = 0.10$, $SE = 0.03$, $p = .006$, and remained a significant predictor after controlling for baseline typical alcohol consumption, $B = 0.13$, $SE = 0.04$, $p = .002$.
[2] Post-hoc analyses revealed that alcohol quantity significantly predicted alcohol-related indirect aggression, $B = 0.09$, $SE = 0.04$, $p = .048$, and remained a significant predictor after controlling for baseline typical alcohol consumption, $B = 0.11$, $SE = 0.04$, $p = .004$.

Table 2

Multilevel Models Predicting Daily Direct Aggression

	Model 1	Model 2
	B (*SE*)	*B* (*SE*)
Intercept	0.71 (0.09)***	0.71 (0.08)***
Level 1: Daily Level		
Alcohol Use Quantity	0.03 (0.02)	0.02 (0.02)
Level 2: Person Level		
Dispositional Aggression	--	0.05 (0.03)

Note. Separate models were conducted adjusting for the covariate of dispositional aggression. Model 1: no covariates; Model 2: dispositional aggression. Alcohol Use Quantity = number of standard alcoholic beverages consumed each day. *SE* = standard error. * *p* < .05. ** *p* <.01. *** *p* < .001.

Table 3

Multilevel Models Predicting Likelihood of Daily Direct Aggression

	Model 1	Model 2
	OR (CI)	OR (CI)
Intercept	0.42 (0.31 – 0.58)***	0.42 (0.31 – 0.57)***
Level 1: Daily Level		
Alcohol Use Quantity	1.03 (0.99 – 1.08)	1.01 (0.97 – 1.06)
Level 2: Person Level		
Dispositional Aggression	--	1.05 (0.98 – 1.12)

Note. Separate models were conducted adjusting for the covariate of dispositional aggression.

Model 1: no covariates; Model 2: dispositional aggression. OR = odds ratio from Bernoulli

multilevel modeling distribution. CI = confidence interval. Alcohol Use Quantity = number of

standard alcoholic beverages consumed each day. *p <.05. **p < .01. *** p < .001.

Table 4

Multilevel Models Predicting Daily Indirect Aggression

	Model 1	Model 2
	B (*SE*)	*B* (*SE*)
Intercept	0.94 (0.15)**	0.95 (0.14)***
Level 1: Daily Level		
Alcohol Use Quantity	0.00 (0.02)	-0.00 (0.02)
Level 2: Person Level		
Dispositional Aggression	--	.05 (0.04)

Note. Separate models were conducted adjusting for the covariate of dispositional aggression.

Model 1: no covariates; Model 2: dispositional aggression. Alcohol Use Quantity = number of

standard alcoholic beverages consumed each day. *SE* = standard error. * *p* < .05. **p* <.01.

***p* < .001.

Table 5

Multilevel Models Predicting Likelihood of Daily Indirect Aggression

	Model 1	Model 2
	OR (CI)	OR (CI)
Intercept	0.36 (0.26 – 0.52)***	0.36 (0.26 – 0.51)***
Level 1: Daily Level		
Alcohol Use Quantity	1.00 (0.94 – 1.06)	0.98 (0.93 – 1.03)
Level 2: Person Level		
Dispositional Aggression	--	1.07 (1.01 – 1.14)*

Note. Separate models were conducted adjusting for the covariate of dispositional aggression.

Model 1: no covariates; Model 2: dispositional aggression. OR = odds ratio from Bernoulli

multilevel modeling distribution. CI = confidence interval. Alcohol Use Quantity = number of

standard alcoholic beverages consumed each day. *p <.05. **p < .01. *** p < .001.

Aim 2

The second aim was to examine the moderating role of trait self-control on the relationship between self-regulation and alcohol use. Multilevel modeling was used to test the influence of the level 1 variable (i.e., self-regulation), the level 2 variable (i.e., trait self-control), and the cross-level interaction of level 1 and level 2 (i.e., self-regulation and self-control). To examine the true moderating effect of self-control, both self-regulation (level 1) and self-control (level 2) were grand-mean centered. Self-control was controlled for at both the intercept and slope. The resulting B_{11} coefficient represents the interaction term of self-regulation and self-control. An example of yesterday's exertion of self-regulation predicting yesterday's alcohol consumption as moderated by trait self-control is provided below:

$$ALCQ_{ti} = \beta_{00} + \beta_{01}*(SC_j - \overline{SC}.) + \beta_{10}*(SR_{ti} - \overline{SR}..) + \beta_{11}*(SC_j - \overline{SC}.)*(SR_{ti} - \overline{SR}..)$$
$$+ r_{0i} + r_{1i}*(SR_{ti} - \overline{SR}..) + e_{ti}$$

Consistent with aim 1, to examine dichotomous outcomes, a Bernoulli distribution was specified and odds ratios were examined to determine if the likelihood of consuming alcohol was associated with daily reported self-regulation and trait self-control.

Multilevel analyses revealed that exerting more self-regulation was associated with less alcohol consumption, $B = -0.10$, $SE = 0.05$, $p = .025$, however this relationship was not moderated by trait self-control, $B = 0.05$, $SE = 0.05$, $p = .367$ (see Table 6). Self-regulation also was examined as a dichotomous predictor (0 = less than average self-regulation used; 1= greater than average self-regulation used). To do this, participants' individual mean level of stress was calculated and days were recoded as either higher or lower than the individual's mean, representing the exertion of higher or lower than average self-regulation. Results were consistent with the previous analysis; exerting greater than average self-regulation negatively predicted

alcohol consumption, $B = -0.38$, $SE = 0.16$, $p = .017$, however this relationship was not moderated by trait self-control, $B = -0.18$, $SE = 0.21$, $p = .388$ (see Table 6). When alcohol consumption was examined dichotomously, neither self-regulation nor the interaction of self-regulation and self-control predicted alcohol consumption, $OR = 0.95$, $CI = 0.87$-1.05, $OR = 0.94$, $CI = 0.83$-1.06, respectively. Similarly, when self-regulation was examined as a dichotomous predictor, neither greater than average self-regulation nor the interaction of self-regulation and self-control predicted alcohol consumption, $OR = 0.89$, $CI = 0.67$-1.19, $OR = 0.89$, $CI = 0.61$-1.29, respectively. See Table 7.

Table 6

Multilevel Models of the Interaction between Self-regulation and Trait Self-control Predicting Alcohol Use

	Model 1	Model 2
	B (*SE*)	*B* (*SE*)
Intercept	1.57 (0.14)***	1.73 (0.17)***
Level 1: Daily Level		
Self-regulation	-0.10 (0.05)*	-0.38 (0.16)*
Level 2: Person Level		
Trait Self-control	-0.39 (0.18)*	-0.31 (0.23)
Level 1 x Level 2		
Self-regulation x Self-control	0.05 (0.05)	-0.18 (0.21)

Note. Separate models were conducted adjusting for the measurement of self-regulation. Model 1: self-regulation is measured on a continuous scale; Model 2: self-regulation is measured on a dichotomous scale (0 = less than average self-regulation used that day; 1 = greater than average self-regulation used that day). Trait Self-control values represent intercepts. *SE* = standard error. * $p < .05$. **$p < .01$. ***$p < .001$.

Table 7

Multilevel Models of the Interaction between Self-regulation and Trait Self-control Predicting the Likelihood of Alcohol Use

	Model 1	Model 2
	OR (CI)	OR (CI)
Intercept	0.70 (0.57 – 0.85)**	0.74 (0.59 – 0.94)*
Level 1: Daily Level		
Self-regulation	0.95 (0.87 – 1.05)	0.89 (0.67 – 1.19)
Level 2: Person Level		
Trait Self-control	0.82 (0.62 – 1.10)	0.87 (0.62 – 1.22)
Level 1 x Level 2		
Self-regulation x Self-control	0.94 (0.83 – 1.06)	0.89 (0.61 – 1.29)

Note. Separate models were conducted adjusting for the measurement of self-regulation. Model 1: self-regulation is measured on a continuous scale; Model 2: self-regulation is measured on a dichotomous scale (0 = less than average self-regulation used that day; 1 = greater than average self-regulation used that day. Trait Self-control values represent intercepts. OR = odds ratio from Bernoulli multilevel modeling distribution. CI = confidence interval. * $p < .05$. ** $p < .01$. *** $p < .001$.

Aim 3

Similar to Aim 2, Aim 3 examined the moderating role of self-control on the relationship between daily self-regulation and reported aggression. Predictors included self-regulation (level 1), self-control (level 2) and the cross-level interaction of self-regulation and self-control (level 1 x level 2).

Direct aggression. Multilevel analyses revealed that self-regulation was not significantly associated with reported direct aggression, $B = 0.02$, $SE = 0.03$, $p = .585$, and this relationship was not moderated by trait self-control, $B = -0.01$, $SE = 0.04$, $p = .853$ (see Table 8). Results were consistent when self-regulation was examined as a dichotomous predictor; exerting greater than average self-regulation was not significantly associated with direct aggression, $B = 0.08$, $SE = 0.09$, $p = .381$, and this relationship was not moderated by trait self-control, $B = -0.02$, $SE = 0.10$, $p = .824$ (see Table 8). Similarly, when direct aggression was examined as a dichotomous outcome, neither self-regulation nor the interaction of self-regulation and self-control predicted a greater likelihood of engaging in direct aggression, $OR = 1.01$, $CI = 0.89$-1.13, $OR = 1.06$, $CI = 0.90$-1.24, respectively. Similarly, neither self-regulation, measured dichotomously, nor the interaction of self-regulation and self-control predicted a greater likelihood of engaging in direct aggression, $OR = 1.04$, $CI = 0.74$-1.48, $OR = 1.29$, $CI = 0.78$-2.12, respectively. See Table 9.

Indirect aggression. Multilevel analyses revealed that exerting greater self-regulation was negatively associated with indirect aggression, $B = -0.14$, $SE = 0.05$, $p = .004$, and this relationship was moderated by trait self-control, $B = 0.13$, $SE = 0.06$, $p = .039$ (see Table 10)[3].

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[3] The interaction of self-regulation and self-control was no longer significant once dispositional aggression was considered (self-regulation measured continuously: $B = 0.12$, $SE = 0.08$, $p = .11$; self-regulation measured dichotomously: $B = 0.07$, $SE = 0.21$, $p = .75$).

When self-regulation was examined as a dichotomous predictor, neither exerting greater than average self-regulation nor the interaction of self-regulation and self-control predicted indirect aggression, B = -0.06, SE = 0.13, p = .626, B = 0.07, SE = 0.19, p = .708 (see Table 10). When indirect aggression was examined dichotomously, self-regulation and the interaction of self-regulation and self-control did not increase the likelihood of indirect aggression, OR = 0.92, CI = 0.82-1.03, OR = 1.04, CI = 0.88-1.23, respectively. Similarly, exerting greater than average self-regulation and the interaction of this dichotomous predictor with trait self-control did not predict the likelihood of indirect aggression, OR = 1.01, CI = 0.73-1.39, OR = 1.12, CI = 0.66-1.89, respectively. See Table 11.

Aim 3 follow-up analyses. Given the unexpected negative relationship between self-regulation and outcomes (i.e., alcohol consumption, indirect aggression), these associations were examined more closely to better understand the true relationships and the possible influence of day of the week. First, using three separate equations, self-regulation was examined as a predictor of each outcome. Self-regulation was group-mean centered for each analysis. On days when participants experienced greater stress and thus exerted greater self-regulation, participants reported consuming less alcohol, B = -0.19, SE = 0.05, p = .001 and less indirect aggression, B = -0.14, SE = 0.05, p = .008. See Table 12. After controlling for weekday versus weekend, exerting more self-regulation remained a significant negative predictor of alcohol consumption, B = -0.21, SE = 0.06, p = .001 and indirect aggression, B = -0.11, SE = 0.05, p = .029. See Table 13.

Table 8

Multilevel Models of the Interaction between Self-regulation and Trait Self-control Predicting Direct Aggression

	Model 1	Model 2
	B (*SE*)	*B* (*SE*)
Intercept	0.75 (0.09)***	0.67 (0.09)***
Level 1: Daily Level		
Self-regulation	0.02 (0.03)	0.08 (0.09)
Level 2: Person Level		
Trait Self-control	-0.26 (0.09)**	-0.29 (0.10)**
Level 1 x Level 2		
Self-regulation x Self-control	-0.01 (0.04)	-0.02 (0.10)

Note. Separate models were conducted adjusting for the measurement of self-regulation. Model 1: self-regulation is measured on a continuous scale; Model 2: self-regulation is measured on a dichotomous scale (0 = less than average self-regulation used that day; 1 = greater than average self-regulation used that day). Trait Self-control values represent intercepts. *SE* = standard error.

* $p < .05$. **$p < .01$. ***$p < .001$.

Note. Results were identical when controlling for dispositional aggression.

Table 9

Multilevel Models of the Interaction between Self-regulation and Trait Self-control Predicting the Likelihood of Direct Aggression

	Model 1 OR (CI)	Model 2 OR (CI)
Intercept	0.46 (0.34 – 0.62)***	0.41 (0.29 – 0.60)***
Level 1: Daily Level		
Self-regulation	1.01 (0.89 – 1.13)	1.04 (0.74 – 1.48)
Level 2: Person Level		
Trait Self-control	0.60 (0.40 – 0.90)*	0.51 (0.31 – 0.83)**
Level 1 x Level 2		
Self-regulation x Self-control	1.06 (0.90 – 1.24)	1.29 (0.78 – 2.12)

Note. Separate models were conducted adjusting for the measurement of self-regulation. Model 1: self-regulation is measured on a continuous scale; Model 2: self-regulation is measured on a dichotomous scale (0 = less than average self-regulation used that day; 1 = greater than average self-regulation used that day. Trait Self-control values represent intercepts. OR = odds ratio from Bernoulli multilevel modeling distribution. CI = confidence interval. * $p < .05$. **$p < .01$. ***$p < .001$.

Note. Results were identical when controlling for dispositional aggression.

Table 10

Multilevel Models of the Interaction between Self-regulation and Trait Self-control Predicting

Indirect Aggression

	Model 1	Model 2
	B (*SE*)	*B* (*SE*)
Intercept	1.00 (0.14)***	0.98 (0.17)***
Level 1: Daily Level		
Self-regulation	-0.14 (0.05)**	-0.06 (0.13)
Level 2: Person Level		
Trait Self-control	-0.74 (0.18)***	-0.68 (0.19)**
Level 1 x Level 2		
Self-regulation x Self-control	0.13 (0.06)*	0.07 (0.19)

Note. Separate models were conducted adjusting for the measurement of self-regulation. Model 1: self-regulation is measured on a continuous scale; Model 2: self-regulation is measured on a dichotomous scale (0 = less than average self-regulation used that day; 1 = greater than average self-regulation used that day). Trait Self-control values represent intercepts. *SE* = standard error. * $p < .05$. ** $p < .01$. *** $p < .001$.

Note. The interaction of self-regulation and self-control was no longer significant once trait dispositional aggression was considered.

Table 11

Multilevel Models of the Interaction between Self-regulation and Trait Self-control Predicting the Likelihood of Indirect Aggression

	Model 1 OR (CI)	Model 2 OR (CI)
Intercept	0.39 (0.27 – 0.54)***	0.36 (0.25 – 0.54)***
Level 1: Daily Level		
Self-regulation	0.92 (0.82 – 1.03)	1.01 (0.73 – 1.39)
Level 2: Person Level		
Trait Self-control	0.53 (0.36 – 0.78)**	0.50 (0.32 – 0.80)**
Level 1 x Level 2		
Self-regulation x Self-control	1.04 (0.88 – 1.23)	1.12 (0.66 – 1.89)

Note. Separate models were conducted adjusting for the measurement of self-regulation. Model 1: self-regulation is measured on a continuous scale; Model 2: self-regulation is measured on a dichotomous scale (0 = less than average self-regulation used that day; 1 = greater than average self-regulation used that day. Trait Self-control values represent intercepts. OR = odds ratio from Bernoulli multilevel modeling distribution. CI = confidence interval. * $p < .05$. ** $p < .01$. *** $p < .001$.

Note. Results were identical when controlling for dispositional aggression.

Table 12

Self-regulation Predicting Alcohol Use, Direct Aggression, and Indirect Aggression

	Alcohol Use	Direct Aggression	Indirect Aggression
	B (*SE*)	*B* (*SE*)	*B* (*SE*)
Intercept	1.53 (0.14)***	0.71 (0.09)***	0.94 (0.15)***
Level 1: Daily Level			
Self-regulation	-0.19 (0.05)**	0.02 (0.04)	-0.14 (0.05)**

Note. SE = standard error. * *p* < .05. ***p* <.01. ****p* < .001.

Table 13

Multilevel Models of Self-regulation Predicting Outcomes Controlling for Day of the Week

	Alcohol Use	Direct Aggression	Indirect Aggression
	B (*SE*)	*B* (*SE*)	*B* (*SE*)
Intercept	1.70 (0.16)***	0.61 (0.09)***	0.86 (0.16)***
Level 1: Daily Level			
Self-regulation	-0.21 (0.06)**	0.02 (0.04)	-0.11 (0.05)*
Level 2: Person Level			
Day of the Week	0.12 (0.10)	0.03 (0.12)	-0.14 (0.15)

Note. Day of the Week is dichotomous (0 = weekday, 1 = weekend day). *SE* = standard error. * *p* < .05. **p* <.01. ***p* < .001.

Exploratory Analyses

For all exploratory analyses, only days in which alcohol was consumed were included.

Aim 4. Aim 4 investigated the relationship between alcohol-related direct aggression and alcohol-related indirect aggression. In the first set of analyses, alcohol-related direct and indirect aggression were assessed continuously. To determine the incremental influence of covariates, separate models were tested including (1) no covariates, (2) the inclusion of dispositional aggression, (3) the inclusion of baseline alcohol use, (4) the inclusion of trait self-control, and (5) all covariates. Self-regulation (level 1) was entered into the equation as group-mean centered whereas all three covariates (level 2) were entered as grand-mean centered.

Findings indicated that alcohol-related indirect aggression positively predicted alcohol-related direct aggression, $B = 0.09$, $SE = 0.03$, $p = .005$. Alcohol-related indirect aggression remained a significant predictor of alcohol-related direct aggression after controlling for each covariate individually (i.e., dispositional aggression: $B = 0.09$, $SE = 0.04$, $p = .013$; baseline alcohol use: $B = 0.13$, $SE = 0.05$, $p = .009$; trait self-control: $B = 0.08$, $SE = 0.04$, $p = .031$), as well as concurrently, $B = 0.12$, $SE = 0.06$, $p = .041$. Results can be seen in Table 14.

For the second set of analyses, alcohol-related direct and indirect aggression were assessed dichotomously (i.e., $0 =$ no aggression, $1 =$ at least one act of aggression) in order to examine whether alcohol-related direct aggression was more likely to occur on days in which alcohol-related indirect aggression occurred. The association was again tested after controlling for dispositional aggression, baseline alcohol use, and trait self-control (level 2). Similar to the previous analyses, findings indicated that engaging in alcohol-related indirect aggression was related to a greater likelihood of alcohol-related direct aggression, $OR = 11.91$, $CI = 6.58\text{-}21.55$. Once again, alcohol-related indirect aggression significantly predicted a greater likelihood of

engaging in alcohol-related direct aggression after controlling for each covariate individually

(i.e., dispositional aggression: OR = 11.67, CI = 6.37-21.36; baseline alcohol use: OR = 11.11,

CI = 6.09-20.27; trait self-control: OR = 10.62, CI = 6.08-18.53), as well as concurrently, OR =

7.90, CI = 4.47-13.95. See Table 15.

Table 14

Multilevel Models of Alcohol-related Indirect Aggression Predicting Alcohol-related Direct Aggression

	Model 1	Model 2	Model 3	Model 4	Model 5
	B (*SE*)	*B* (*SE*)	*B* (*SE*)	*B* (*SE*)	*B* (*SE*)
Intercept	0.53 (0.09)***	0.53 (0.09)***	0.51 (0.09)***	0.53 (0.09)***	0.51 (0.08)***
Level 1: Daily Level					
Alcohol-related Ind. Agg.	0.09 (0.03)**	0.09 (0.04)*	0.13 (0.05)**	0.08 (0.04)*	0.12 (0.06)*
Level 2: Person Level					
Dispositional Aggression	--	0.04 (0.03)		--	0.01 (0.04)
Baseline Alcohol Use Quantity	--		-0.00 (0.00)	--	-0.00 (0.00)
Trait Self-control	--		--	-0.09 (0.05)	0.08 (0.06)

Note. Alcohol-related Ind. Agg. = alcohol-related indirect aggression. Separate models were conducted adjusting for covariates.

Model 1: no covariates; Model 2: dispositional aggression as a covariate; Model 3: baseline alcohol use as a covariate; Model 4: trait self-control as a covariate; Model 5: all three covariates examined in model. *SE* = standard error. * $p < .05$. ** $p < .01$. *** $p < .001$.

Table 15

Multilevel Models of Alcohol-related Indirect Aggression Predicting the Likelihood of Alcohol-related Direct Aggression

	Model 1	Model 2	Model 3	Model 4	Model 5
	OR (CI)	OR (CI)	OR (CI)	OR (CI)	OR (CI)
Intercept	0.09 (0.06 – 0.14)***	0.09 (0.06 – 0.13)***	0.09 (0.06 – 0.13)***	0.08 (0.05 – 0.13)***	0.11 (0.07 – 0.16)***
Level 1: Daily Level					
Alcohol-Ind. Agg.	11.91 (6.58 – 21.55)***	11.67 (6.37 – 21.36)***	11.11 (6.09 – 20.27)***	10.62 (6.08 – 18.53)***	10.08 (5.64 – 18.03)***
Level 2: Person Level					
Disp. Aggression	--	0.94 (0.59 – 1.50)	--	--	0.95 (0.56 – 1.60)
Baseline Alcohol Use Quantity	--		1.01 (0.96 – 1.06)	--	1.02 (0.97 – 1.07)
Trait Self-control	--		--	1.14 (0.55 – 2.40)	1.09 (0.46 – 2.59)

Note. Alcohol-Ind. Agg. = alcohol-related indirect aggression. Disp. Aggression = dispositional aggression. Separate models were conducted adjusting for covariates. Model 1: no covariates; Model 2: dispositional aggression as a covariate; Model 3: baseline alcohol use as a covariate; Model 4: trait self-control as a covariate; Model 5: all three covariates examined in model. OR = odds ratio from Bernoulli multilevel modeling distribution. CI = confidence interval. * $p < .05$. **$p < .01$. ***$p < .001$.

Aims 5 and 6. Aims 5 and 6 assessed the moderating role of trait self-control on self-regulation and alcohol-related direct and indirect aggression. Predictors included self-regulation (level 1), self-control (level 2) and the cross-level interaction of self-regulation and self-control (level 1 x level 2). Similar to Aims 2 and 3, the outcome variables were assessed two ways; continuously and dichotomously. For analyses with dichotomous outcomes, a Bernoulli distribution was specified.

Aim 5. Aim 5 assessed the interaction of trait self-control on self-regulation in predicting alcohol-related direct aggression. Multilevel analyses revealed that self-regulation was not significantly associated with reported alcohol-related direct aggression, $B = -0.05$, $SE = 0.02$, $p = .067$, and this relationship was not moderated by trait self-control, $B = 0.04$, $SE = 0.03$, $p = .229$ (see Table 16). When self-regulation was examined as a dichotomous predictor ($0 =$ less than average self-regulation used; $1 =$ greater than average self-regulation used), exerting greater than average self-regulation was associated with a decrease in alcohol-related direct aggression, $B = -0.24$, $SE = 0.12$, $p = .049$, however this relationship was not moderated by trait self-control, $B = 0.16$, $SE = 0.19$, $p = .408$ (see Table 16). When alcohol-related direct aggression was examined as a dichotomous outcome, neither self-regulation, $OR = 0.97$, $CI = 0.85$-1.11, nor the interaction of self-regulation and self-control, $OR = 1.01$, $CI = 0.87$-1.17, predicted a greater likelihood of engaging in alcohol-related direct aggression. Similarly, when self-regulation was measured dichotomously, neither self-regulation, $OR = 0.77$, $CI = 0.46$-1.27, nor the interaction of self-regulation and self-control, $OR = 1.13$, $CI = 0.59$-2.15, predicted a greater likelihood of engaging in alcohol-related direct aggression. See Table 17.

Aim 6. Aim 6 assessed the interaction of trait self-control on self-regulation in predicting alcohol-related indirect aggression. Multilevel analyses revealed that self-regulation was

negatively associated with alcohol-related indirect aggression, $B = -0.13$, $SE = 0.06$, $p = .024$,

however this relationship was not moderated by trait self-control, $B = 0.06$, $SE = 0.07$, $p = .350$

(see Table 18). When self-regulation was examined as a dichotomous predictor ($0 = $ less than

average self-regulation used; $1=$ greater than average self-regulation used), self-regulation was

not associated with a decrease in alcohol-related indirect aggression, $B = -0.20$, $SE = 0.20$, $p =$

.315, and this relationship was not moderated by trait self-control, $B = -0.02$, $SE = 0.26$, $p = .947$

(see Table 18). When alcohol-related indirect aggression was examined as a dichotomous

outcome, exerting more self-regulation during the day predicted a greater likelihood of *not*

engaging in indirect aggression when drinking, $OR = 0.85$, $CI = 0.73$-0.99. Interaction results

revealed that the interaction of self-regulation and self-control did not influence the likelihood of

alcohol-related indirect aggression, $OR = 0.99$, $CI = 0.82$-1.20. Identical results were found

when self-regulation was examined as a dichotomous predictor; self-regulation was associated

with a reduced likelihood of alcohol-related indirect aggression, $OR = 0.54$, $CI = 0.31$-0.95,

however the interaction of self-regulation and self-control did not influence the likelihood of

alcohol-related indirect aggression, $OR = 1.09$, $CI = 0.53$-2.25. See Table 19.

Table 16

Multilevel Models of the Interaction between Self-regulation and Trait Self-control Predicting

Alcohol-related Direct Aggression

	Model 1	Model 2
	B (*SE*)	*B* (*SE*)
Intercept	0.53 (0.09)***	0.64 (0.12)***
Level 1: Daily Level		
Self-regulation	-0.05 (0.02)	-0.24 (0.12)*
Level 2: Person Level		
Trait Self-control	-0.49 (0.13)***	-0.57 (0.19)**
Level 1 x Level 2		
Self-regulation x Self-control	0.04 (0.03)	0.16 (0.19)

Note. Separate models were conducted adjusting for the measurement of self-regulation. Model 1: self-regulation is measured on a continuous scale; Model 2: self-regulation is measured on a dichotomous scale (0 = less than average self-regulation used that day; 1 = greater than average self-regulation used that day). Trait Self-control values represent intercepts. *SE* = standard error. * $p < .05$. **$p < .01$. ***$p < .001$.

Table 17

Multilevel Models of the Interaction between Self-regulation and Trait Self-control Predicting the Likelihood of Alcohol-related Direct Aggression

	Model 1 OR (CI)	Model 2 OR (CI)
Intercept	0.17 (0.12 – 0.25)***	0.19 (0.12 – 0.31)***
Level 1: Daily Level		
Self-regulation	0.97 (0.85 – 1.11)	0.77 (0.46 – 1.27)
Level 2: Person Level		
Trait Self-control	0.37 (0.22 – 0.61)***	0.35 (0.20 – 0.61)***
Level 1 x Level 2		
Self-regulation x Self-control	1.01 (0.87 – 1.17)	1.13 (0.59 – 2.15)

Note. Separate models were conducted adjusting for the measurement of self-regulation. Model 1: self-regulation is measured on a continuous scale; Model 2: self-regulation is measured on a dichotomous scale (0 = less than average self-regulation used that day; 1 = greater than average self-regulation used that day. Trait Self-control values represent intercepts. OR = odds ratio from Bernoulli multilevel modeling distribution. CI = confidence interval. * $p < .05$. **$p < .01$. ***$p < .001$.

Table 18

Multilevel Models of the Interaction between Self-regulation and Trait Self-control Predicting

Alcohol-related Indirect Aggression

	Model 1	Model 2
	B (*SE*)	*B* (*SE*)
Intercept	0.89 (0.21)***	0.97 (0.23)***
Level 1: Daily Level		
Self-regulation	-0.13 (0.06)*	-0.20 (0.20)
Level 2: Person Level		
Trait Self-control	-0.67 (0.26)*	-0.66 (0.25)*
Level 1 x Level 2		
Self-regulation x Self-control	0.06 (0.07)	-0.02 (0.26)

Note. Separate models were conducted adjusting for the measurement of self-regulation. Model 1: self-regulation is measured on a continuous scale; Model 2: self-regulation is measured on a dichotomous scale (0 = less than average self-regulation used that day; 1 = greater than average self-regulation used that day). Trait Self-control values represent intercepts. *SE* = standard error. *p < .05. **p <.01. ***p < .001.

Table 19

Multilevel Models of the Interaction between Self-regulation and Trait Self-control Predicting the Likelihood of Alcohol-related Indirect Aggression

	Model 1	Model 2
	OR (CI)	OR (CI)
Intercept	0.22 (0.15 – 0.33)***	0.28 (0.17 – 0.46)***
Level 1: Daily Level		
Self-regulation	0.85 (0.73 – 0.99)*	0.54 (0.31 – 0.95)*
Level 2: Person Level		
Trait Self-control	0.42 (0.25 – 0.71)**	0.41 (0.23 – 0.75)**
Level 1 x Level 2		
Self-regulation x Self-control	0.99 (0.82 – 1.20)	1.09 (0.53 – 2.25)

Note. Separate models were conducted adjusting for the measurement of self-regulation. Model 1: self-regulation is measured on a continuous scale; Model 2: self-regulation is measured on a dichotomous scale (0 = less than average self-regulation used that day; 1 = greater than average self-regulation used that day. Trait Self-control values represent intercepts. OR = odds ratio from Bernoulli multilevel modeling distribution. CI = confidence interval. * $p < .05$. **$p < .01$. ***$p < .001$.

CHAPTER IV

DISCUSSION

Experimental demonstrations and theoretical developments have identified that the ability to control one's own behavior (i.e., trait self-control, state self-regulation) may be particularly influential in the prediction of aggression and alcohol-related aggression (DeWall, Baumeister, Stillman, & Gailliot, 2007; Giancola et al., 2012; Hoaken, Giancola, & Pihl, 1998). The research investigating alcohol-related aggression, however, has assessed trait levels of control only, neglecting a large body of research focused on state variation of self-regulation. Further, advanced methodological techniques, such as daily diary investigations, enable the assessment of both the between- and within-subject variation; yet, they have not been applied to the study of alcohol-related aggression, specifically focusing on directly and indirectly aggressive behavior. Consequently, the overall aim of the current study was to use a daily diary methodology design to examine associations between daily alcohol use and aggressive behaviors (i.e., direct, indirect), as well as the influence of trait self-control and state self-regulation on these relationships. Specifically, the current study examined the association between daily alcohol use and reported aggression; the interaction of trait self-control and state self-regulation on both alcohol use and aggression; the association of alcohol-related direct and indirect aggression; and the interaction of trait self-control and state self-regulation on alcohol-related aggression.

Alcohol and Aggression

The first aim of the study examined the associations between daily alcohol use and reported direct and indirect aggression. It was hypothesized that alcohol consumption would be associated with greater engagement and a greater likelihood of engaging in both directly aggressive and indirectly aggressive behaviors. Results showed that alcohol use was not

associated with a greater likelihood of direct or indirect aggression nor was it associated with greater engagement in either type of aggressive behavior. Findings are inconsistent with much cross-sectional and experimental research that has supported the positive relationship between alcohol use and direct aggression (Eckhardt & Crane, 2008; Giancola et al., 2005; Giancola et al., 2012; Leonard, Quigley, & Collins, 2002; Leonard, Quigley, & Collins, 2003) as well as recent cross-sectional research supporting the link between alcohol and indirect aggression (Sheehan, Linden-Carmichael, & Lau-Barraco, 2016) and alcohol-related constructs (e.g., alcohol-related primes) and indirect aggression (Friedman et al., 2007; Subra et al., 2010).

These unexpected findings may be explained by the methodology of assessment. The relationship between alcohol and aggression supported in existing literature is presumed to reflect a temporal order such that alcohol use increases the likelihood of aggression (Giancola, Duke, & Ritz, 2011; Giancola et al., 2005; Giancola et al., 2012; Wells & Graham, 2000). For instance, the alcohol myopia model posits that alcohol narrows attentional capacity, resulting in a myopic state in which a drinker is more likely to focus on the most salient, aggressive stimuli, thereby increasing the likelihood of aggression (Borders & Giancola, 2011; Giancola et al., 2010), and is unable to attend to non-provocative cues (Steele & Josephs, 1990). In the current study, participants were asked to report their aggressive behaviors unassociated with alcohol consumption, as well as aggressive behaviors that *specifically* occurred during or because of their alcohol consumption. It may be that participants presumed the non-alcohol related aggression questions referred to aggressive behaviors that occurred during the day, prior to any alcohol consumption. Indeed, ad-hoc exploratory analyses revealed that alcohol consumption did significantly predict alcohol-related direct aggression and alcohol-related indirect aggression, even after controlling for participants' baseline typical alcohol use (see *Note 2*). Given this

potential interpretation of participants' responses, we would not expect aggressive behaviors, direct or indirect, that occurred earlier in the day, to be associated with alcohol consumption. This is consistent with a longitudinal investigation of early aggressive behaviors and alcohol use in later adulthood (Merline, Jager & Schulenberg, 2008). Merline and colleagues (2008) found that aggression during late adolescence (age 18) did not predict 30-day drinking or heavy drinking and was inconsistently related to abuse and dependence symptoms during early adulthood (ages 22 and 26) and middle adulthood (age 35). Considering this, it is unsurprising that alcohol consumption and aggression were unrelated in the current study.

Ego-depletion

One of the main goals of the present study was to examine the phenomenon of ego-depletion in a daily context. Previous research has found that daily stressors have an ego depleting effect, requiring an excessive exertion of self-regulation (Fabes & Eisenberg, 1997; Lavallee & Campbell, 1995; Muraven et al., 2005). Specifically, Muraven et al. (2005) found that days in which participants exerted greater regulatory control than average (i.e., experienced greater than average levels of stress), they consumed greater levels of alcohol. This relationship was moderated by participants' trait level of self-control such that the relationship between daily self-regulating demands and alcohol consumption was stronger for individuals lower in self-control. The current study aimed to replicate these findings (aim 2) and extend the strength theory of self-regulation to daily aggressive behaviors (aim 3). Thus, aim 2 investigated the relationship between trait self-control, state self-regulation, and alcohol use and aim 3 investigated the relationship between trait self-control, state self-regulation, and aggressive behavior (i.e., direct, indirect).

Alcohol use. Results did not support the hypothesis that self-control would moderate the

relationship between self-regulation and alcohol use. In fact, findings revealed that greater exertion of self-regulation was significantly associated with *less* alcohol consumption. Given the sample of the current study (i.e., college students), this relationship may have been due to coursework during the week, which would be expected to be associated with increased stress and may prohibit the consumption of weekday alcohol consumption. Thus, students would be expected to experience less stress and consume more alcohol during the weekend (i.e., Friday and Saturday). Post-hoc analyses revealed that the negative relationship between self-regulation and alcohol consumption remained even after controlling for day of the week, suggesting this unexpected relationship is not due to weekday versus weekend stress and alcohol use.

On days when participants experienced less stress, they reported consuming greater amounts of alcohol. Although current findings are inconsistent with those presented by Muraven and colleagues (2005) and the strength theory of self-regulation (Baumeister & Heatherton, 1996; DeWall et al., 2007; DeWall et al., 2011; Gino et al., 2011; Hagger et al., 2009; Muraven et al., 2002), findings may be partially explained by extant alcohol theories regarding drinking motives. Drinking for enhancement motives, which primarily includes drinking with peers, are commonly reported by college student drinkers and are associated with increased alcohol consumption and alcohol-related problems, whereas drinking to cope, which is primarily done alone (Cooper, 1994), is generally unrelated to college student drinking patterns (Read, Wood, Kahler, Maddock, & Palfai, 2003). Read and colleagues (2003) also noted conceptual and statistical overlap between social and enhancement motives among the college student population, suggesting that drinking to socialize with others and become drunk are common drinking motivations within the college drinking culture. It may be that on days when individuals experience less stress, they are more likely to socialize and have stronger motives to

drink alcohol with others to have a good time. Therefore, greater alcohol consumption in the presence of others may be expected on days when participants have *not* depleted their self-regulation. Given that the current study did not assess drinking motives, this explanation is conjecture only and future research would benefit from including assessments of drinking motives and expectations about drinking. These cognitive constructs may help explain whether an individual under stress would turn to alcohol as a coping mechanism or would indicate social and enhancement motives on days in which less stress is experienced.

Aggression. Findings revealed that self-control did not moderate the relationship between self-regulation and direct aggression; however, it was a significant moderator of self-regulation and indirect aggression. The non-significant findings regarding direct aggression are inconsistent with experimental research by DeWall and colleagues (2007) which found ego depletion to increase the likelihood of direct aggression. This discrepancy may be explained by the method of ego depletion measurement. The majority of evidence supporting the strength theory of self-regulation relies on experimental manipulations (Baumeister et al., 1998; Baumeister et al., 2007; DeWall et al., 2007; Muraven et al., 1998), whereas the current study utilized the advanced methodological technique of a daily diary investigation. First, the single self-report assessment of daily stress in the current study may not validly reflect state self-regulation. A more detailed description of this is discussed in the *General Discussion of Ego Depletion* section on pages 70-72. Second, assuming that the assessment of daily stressors in the current study did represent a valid measure of self-regulation, findings raise concern regarding the stability of the ego depletion effect. The applied utility of the strength theory of self-regulation may be limited if the occurrence of ego depletion is restricted to laboratory settings and is not experienced in un-manipulated, real world environments.

Findings revealed that on days when participants experienced greater stress, they were *less* likely to engage in indirect aggression and this relationship was stronger for individuals with lower levels of trait self-control. Although analyses involving a discrete level of stress (i.e., lower than average stress = 0, higher than average stress = 1) as well as analyses involving a dichotomous outcome (no indirect aggression = 0, indirect aggression = 1) yielded non-significant interaction results, these findings were likely due to lack of statistical power. In these instances, variables were artificially categorized which removed variance, thus reducing power. The analysis involving a continuous measure of stress and a continuous assessment of indirect aggression indicated that on days of greater stress, and thus over-exertion of self-regulation, participants were less likely to engage in indicated aggression. One possible explanation for the negative relationship may be related to differences between direct and indirect aggression. Indirect aggression, which typically focuses on the degradation of one's reputation (Archer & Coyne, 2005), is used by individuals possessing a considerable amount of social intelligence (Kaukiainen, Bjorkqvist, Lagerspetz, Osterman, Salmivalli, Rothberg, & Ahlbom, 1999). The ability to manipulate social standing requires an awareness of social status and covert execution of specific behaviors and statements. Assuming participants in the current study were depleted of self-regulation on days of high stress, they may have been less likely to engage in indirect aggression because this subtype of aggression may require effort on the part of the aggressor to *employ* tactful actions, unlike direct aggression, which requires effort to *inhibit* actions (DeWall et al., 2007; Vohs et al., 2011).

Alcohol-related Aggression

Alcohol-related direct and indirect aggression. One of the goals of the present study was to investigate the co-occurrence of alcohol-related direct and alcohol-related indirect

aggression. Currently, only one qualitative study supports that indirect aggression may escalate to promote direct aggression (Owens et al., 2000), however, this study was limited in its methodological design and it did not investigate alcohol-related aggression. To advance our understanding of the potential escalation of aggression, the current study sought to examine whether alcohol-related direct aggression was more likely to occur on days in which alcohol-related indirect aggression occurred. We also examined whether the level of engagement in alcohol-related indirect aggression was associated with greater alcohol-related direct aggression.

Results supported hypotheses that alcohol-related indirect aggression and alcohol-related direct aggression were positively associated. In fact, findings revealed that alcohol-related indirect aggression was associated with an increased likelihood of alcohol-related direct aggression and greater engagement in alcohol-related direct aggression. These relationships existed after controlling for baseline alcohol consumption, trait self-control, and dispositional aggression. Furthermore, alcohol consumption was significantly associated with alcohol-related direct aggression, however, when alcohol consumption was examined simultaneously with alcohol-related indirect aggression, the variable was rendered non-significant. Meaning, alcohol-related indirect aggression, compared to alcohol consumption, was a more salient predictor of alcohol-related direct aggression. Study findings are an imperative step in identifying determinants of more severe aggressive behaviors. It is important to note that given the longitudinal, rather than experimental, design of the current study, findings do not definitively conclude that alcohol-related indirect aggression leads to alcohol-related direct aggression. Nevertheless, this is the first study to link these forms of alcohol-related aggression. Considering the costs associated with alcohol-related aggression (Bureau of Justice Statistics, 2010), and the high prevalence of alcohol-and bar-related violence (Leonard et al., 2002; Leonard et al., 2003),

there is a need to identify aggression at its earliest stages in order to desist any potential escalation of violence. Future research is needed to confirm these findings and explore these relationships in greater depth; however, current findings represent the first step in identifying a co-occurrence of and potential escalation of alcohol-related aggression.

Ego depletion and alcohol-related aggression. Aims 5 and 6 examined the ego depleting effect of self-regulation and trait self-control on both alcohol-related direct and indirect aggression. Although the prevalence of alcohol-related aggression in the current study was less frequent than that of non-alcohol related aggression, direct aggression and indirect aggression occurred on approximately 19% and 23% of all drinking occasions, respectively. Similar to aim 3a, findings did not support hypotheses that trait self-control would moderate the relationships between self-regulation and alcohol-related direct aggression and self-regulation and alcohol-related indirect aggression. Overall, although the interaction of self-regulation and trait self-control did not significantly predict outcomes, the direction of the association between self-regulation and examined outcomes was consistent with other findings in the current study. Regarding alcohol-related direct aggression, when stress was examined as a dichotomous predictor, days of higher than average stress, and thus greater exertion of self-regulation, was associated with *less* alcohol-related direct aggression. Similarly, regarding alcohol-related indirect aggression, significant negative associations were found in three of the four examined analyses. Specifically, greater exertion of self-regulation was associated with less alcohol-related indirect aggression, and both greater exertion of self-regulation and days in which participants exerted greater than average self-regulation was associated with a reduced likelihood of any alcohol-related indirect aggression. Findings support that the exertion of greater self-regulation is associated with less alcohol-related aggression. A more thorough explanation as to

why these negative associations may have been found in the current study is detailed below.

General Discussion on Ego Depletion

Overall, current study results do not support the strength theory of self-regulation. In fact, post-hoc analyses revealed that the over exertion of self-regulation predicted less alcohol use and less indirect aggression. These unexpected results may be explained by a number of reasons. First, findings may be related to the individual differences of participants who reported experiencing stress. To assess self-regulation, participants in the current study were asked to reflect on their day and estimate their level of stress, feelings of being overwhelmed, and degree of mood regulation and thought control. It may be that individuals who possessed the self-awareness necessary to accurately reflect on these attributes also may be less likely to engage in potentially harmful behavior such as alcohol use and aggression. According to the self-determination theory, the development of autonomous functioning depends on self-awareness (Deci & Ryan, 2008) which is fundamentally intertwined with self-regulation. Research on self-awareness has found this attribute to be related to a greater exertion of effort in tasks, an increased inhibiting response to aggressive impulses (see Baumeister, 1998), positive affect and psychological well-being (Brown & Ryan, 2003). It may be that individuals who had the self-awareness to reflect on their day were less likely to cope using maladaptive behaviors such as alcohol use and the expression of anger and instead, were more likely to use adaptive coping methods.

Relatedly, the single assessment of stress utilized in the present study inherently neglected whether and how participants attempted to cope with stress. On days of high stress, participants may have utilized coping mechanisms and thus may have prevented an ego depleting effect, despite experiencing high levels of stress. In this instance, participants would be unlikely

to engage in potentially harmful behaviors such as excessive alcohol consumption and aggression. Indeed, highly stressful days, which were assumed to reflect less self-regulation at the end of the day, were related to *less* alcohol consumption and *less* engagement in indirect aggression. Further, protective individual-level characteristics, such as mindfulness and emotion regulation, may limit the physiological responses to stress as well as promote positive coping mechanisms in response to stress. These personal attributes would not reduce the number of external stressors experienced; rather, would reduce one's psychological and behavioral responses to stress. Thus, these individuals would report experiencing greater levels of mood and emotion regulation on highly stressful days, however, they would likely engage in proactive coping strategies, thus limiting adverse consequences of the exertion of self-regulation.

Current study results join a burgeoning number of research studies which do not support the strength model of self-regulation. Although a 2010 meta-analysis asserted a medium effect size with regard to ego depletion (Hagger, Wood, Stiff & Chatzisarantis, 2010), a more recent bias-corrected meta-analysis (Carter, Kofler, Forster, & McCullough, 2015) and a 2015 registered replication report (Hagger, Chatzisarantis, Alberts, Anggono, Batailler, Birt, & Zwienenberg, 2015) largely refuted the ego depletion effect altogether. The registered replication report included participation from 23 independent laboratories with strict procedural guidelines to ensure consistency. Findings revealed only a small ego depletion effect size with 95% confidence intervals that included zero, and instability in effect sizes across laboratories (Hagger et al., 2015). Although these research studies are not met without reservations (Inzlicht, Gervais, & Berkman, 2015; Lee, Chatzisarantis, & Hagger, 2016), they do raise serious concerns regarding the strength model of self-regulation.

It is important to note that although the current findings do not support the strength

theory of self-regulation, the current study also does not provide support for any alternative theory of behavioral impulses. For instance, limited research supports that reframing temptations to be a purposeful test of willpower (Magen & Gross, 2007) as well as convincing participants that self-control is a renewable resource (Job, Dweck, & Walton, 2010), nullifies the effects of ego depletion. These findings lend support that ego depletion may be due to a lack of willpower or motivation rather than true resource depletion (see Inzlicht & Berkman, 2015). Similarly, other theories purport that individuals high in trait self-control may not possess a greater capacity to inhibit impulses but may instead *avoid* temptations altogether. Ent and colleagues (2015) found that individuals higher in trait self-control chose to avoid temptations in their everyday life and preferred distraction-free work areas. Furthermore, a study by Imhoff and colleagues (2014) found individuals with higher trait self-control to be lacking the resources necessary to resist temptation. These findings suggest that routinely inhibiting impulses may be beneficial when faced with temptation and individuals with high trait self-control appear to lack experience inhibiting impulses and thus may be more prone to give into temptations. Given that the main goals of the current study were to test an ego depleting effect of daily stressors on impulsive behavior (i.e., alcohol, aggression), the study did not include the assessment of other variables and thus cannot test these alternative theories.

Future Directions

The current study offers insight as to the daily relationships between self-regulation, alcohol use, and aggression. Moreover, findings open the doors to a more fine-grained investigation of these associations. Regarding the assessment of stress and self-regulation, future research investigating these variables would benefit greatly from the inclusion of coping mechanisms. The self-regulation depleting effects of stress remain uncertain in part due to the

absence of a coping strategies assessment in the current study. Future longitudinal research should include these assessments to advance our understanding as to whether self-regulation is renewed following positive coping strategies. Similarly, assessments of behavior motivation could be included to help determine whether self-regulation may not be depleted by stressors but instead may be guided by alternative theories such as motivation and willpower (Inzlicht & Berkman, 2015).

The negative relationship between self-regulation exertion and alcohol use is inconsistent with previous findings (Muraven et al., 2005), suggesting that more research is needed to understand the true association between these variables. Although the current study sample was similar to the sample utilized in Muraven and colleagues' (2005) study in terms of drinking behavior, participants in the current study were more diverse in terms of ethnicity and age. Specifically, with regard to age, the current sample of participants ranged from 18-57 years of age, whereas the sample of participants from Muraven and colleagues' study included only college students under the age of 21. The relationship between study variables, particularly daily stress, its effect on self-regulatory ability, and alcohol use, may differ as a function of age, thus future research should consider investigating these constructs with a range of age groups. Additionally, future research should investigate drinking motivations and expectancies about drinking in order to tap into the underlying motivations of this behavior. A daily diary investigation in which baseline drinking motives and expectancies are included, as well as daily motives for consumption, would advance our understanding as to when and why individuals may be more likely to drink on days of lower than average stress.

The current study offered a preliminary overview of the association between alcohol-related indirect and alcohol-related direct aggression. Although this is the first study to link

these two subtypes of alcohol-related aggression, the study lacked a time assessment to indicate a temporal order to aggression. Future research should consider utilizing ecological momentary assessment (EMA) to examine whether aggression increases in severity over time. Specifically, if indirect aggression is found to escalate to more severe forms of aggressive behavior such as verbal and physical, we may begin to inform interventions of aggression de-escalation to discern and desist indirectly aggressive situations in order to avoid physical harm and damage.

Limitations

Some key limitations of the study should be noted. First, although the current study found several significant associations between self-regulation and examined outcomes, the nature of the study design precludes any causal inferences between self-regulation and alcohol use as well as self-regulation and indirect aggression. Second, the current study used an assessment of self-regulation that has been used previously (Muraven et al., 2005), however, this assessment is an implied assessment of self-regulation based on emotion regulation, mood and thought control, and feelings of being overwhelmed, and thus, may not accurately reflect self-regulation. Similarly, the study did not assess coping mechanisms, therefore the valuation of self-regulation may not be accurate given personal coping mechanisms participants may have utilized to manage stress and self-regulatory control. Behaviors such as these may have strengthened self-regulation rather than reducing it. Fourth, despite some variability in age (M = 23.81, SD = 7.53; Range: 18-57 years), the average participant is considered an emerging adult who, research has found, may show greater negative affect compared to middle-aged and older adults (Diehl & Hay, 2010), thus findings may be limited to this age group. Fifth, the current sample consisted primarily of female (80%) college students, thereby limiting generalizations to a non-college student sample and potentially limiting conclusions to females only. Finally,

alcohol-related aggression was found to have occurred on 19% and 23% of drinking days for direct and indirect aggression, respectively. Although the current study represents the first to examine alcohol-related aggression in a daily context, it is important to interpret findings with caution. Given that some of the questionnaires included items that would be considered minor forms of aggression such as *"I said mean things to someone,"* findings likely represent minor to moderate forms of aggression rather than severe alcohol-related violence.

CHAPTER V

CONCLUSIONS

The current study used a daily diary methodology to examine associations between daily alcohol use and aggressive behaviors (i.e., direct, indirect), as well as the influence of trait self-control and state self-regulation on these relationships. Additionally, this study was the first to examine the co-occurrence of alcohol-related direct and alcohol-related indirect aggression using a daily diary approach. Inconsistent with the strength theory of self-regulation, findings revealed that on days that participants experienced greater stress and exerted greater use of their self-regulation, they were *less* likely to consume alcohol and *less* likely to engage in indirect aggression. Further, the relationship between self-regulation and indirect aggression was stronger among individuals with lower levels of trait self-control. Additionally, a priori exploratory analyses revealed that alcohol-related indirect aggression was associated with alcohol-related direct aggression above and beyond the influence of baseline alcohol use, trait self-control, and dispositional aggression. Moderation analyses revealed that the interaction of self-regulation and self-control did not significantly predict alcohol-related aggression, however, self-regulation showed the same directional effect as in previous non-alcohol related aggression analyses. Specifically, greater exertion of self-regulation was associated with less alcohol-related direct and alcohol-related indirect aggression. Overall, these findings largely support recent advancements in social science, which contests the ego depletion effect. Future research is needed to examine potential individual-level constructs that may underlie the examined associations.

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APPENDIX A

INFORMED CONSENT

Participant Notification Form #1
Project Stress - Part 1

Project Title: Project Stress - Part 1

Introduction: The purpose of this form is to give you information that may affect your decision whether to say YES or NO to participation in this research, and to record the consent of those who say YES. The name of this research study is "Project Stress – Part 1". The study will be conducted online.

Researchers: Responsible Project Investigator: Cathy Lau-Barraco, Ph.D., Assistant Professor, College of Sciences, Department of Psychology; Investigator: Brynn Sheehan, M.S., M.A., Graduate Researcher, College of Sciences, Department of Psychology.

Description of research study: The purpose of the present research is to study the health behaviors of college students. We are specifically interested in learning more about your level of stress, substance use, and other behaviors. The knowledge gained from this study will help us develop more effective strategies to address health behaviors among young adults. If you decide to participate, you will be asked to complete a confidential survey online. The survey will ask you about various health behaviors and psychological factors that may be associated with these behaviors. Some of the questions may be of a sensitive nature (i.e., questions about your alcohol use). You can refuse to answer any question. Neither your name nor any identifying information will appear in this survey. If you say YES to this study, then your participation will last for approximately 30-45 minutes. Approximately 100 students will be participating in this study. At the end of the study, you will be asked for your email and/or cell phone number to participate in the second part of this study, an online follow-up that will occur over the next few weeks.

Exclusionary criteria: To be eligible for the present study, you must (1) be at least 18 years of age, (2) typically consume at least 3 alcoholic beverages per week, and (3) have access to the internet for the next few weeks.

Risks and benefits:
Risks: If you decide to participate in this study, you may face a risk of emotional distress as a result of reporting stress, alcohol use, and experience of alcohol-related problems. Another potential risk associated with all research involves breach of confidentiality. The researcher will try to reduce the risk of breach of confidentiality by removing any identifiers from your survey so that your responses cannot be linked with your name. And, as with any research, there is some possibility that you may be subject to risks that have not yet been identified.

Benefits: There are no direct benefits for participation in this study. You may, however, benefit from increased self-knowledge into your own personal experiences. More generally, this study may benefit others as knowledge gained will help broaden our understanding of various health-related

behaviors in young adults, with the aim of developing more effective intervention strategies to promote health within this population.

Costs and payments: If you decide to participate in this study and are associated with the SONA program, you will receive .5 OFF-site Psychology Department research credit, which may be applied to course requirements or extra credit in certain Psychology courses. Equivalent credits may be obtained in other ways. You do not have to participate in this study, or any Psychology Department study, in order to obtain this credit.

New information: If the researchers find new information during this study that would reasonably change your decision about participating, then they will give it to you.

Confidentiality: All information obtained about you in this study is strictly confidential unless disclosure is required by law. The results of this study may be used in reports, presentations and publications, but the researcher will not identify you and your name will not be attached to your data. Your data is only linked through a unique study ID number that is not linked with any other identifying information.

Withdrawal privilege: It is OK for you to say NO. Even if you say YES now, you are free to say NO later, and walk away or withdraw from the study – at any time. Your decision will not affect your relationship with Old Dominion University, or otherwise cause a loss of benefits to which you might otherwise be entitled. The researchers reserve the right to withdraw your participation in this study, at any time, if they observe potential problems with your continued participation.

Compensation for illness and injury: If you say YES, then your consent in this document does not waive any of your legal rights. However, in the event of harm arising from this study, neither Old Dominion University nor the researchers are able to give you any money, insurance coverage, free medical care, or any other compensation for such injury. In the event that you suffer injury as a result of participation in any research project, you may contact either Dr. Cathy Lau-Barraco at (757) 683-4445, Dr. George Maihafer, IRB chairperson at (757) 683-4520, or the Office of Research at (757) 683-3460 who would be glad to review the matter with you.

Voluntary consent: By continuing with this survey, you are saying several things. You are saying that you have read this form or have had it read to you, that you are satisfied that you understand the form, the research study, and its risks and benefits. If you have any questions later on, then the researchers should be able to answer them:

Cathy Lau-Barraco, Ph.D.
Department of Psychology, MGB 244D
Phone: (757) 683-4445

George Maihafer, Ph.D.
IRB Chairperson
(757) 683-4520

If at any time you feel pressured to participate, or if you have any questions about your rights or this form, then you can call the Old Dominion University Office of Research, at (757) 683-3460. And

importantly, by clicking below, you are telling the researcher YES, that you agree to participate in this study.

Participant Notification Form #2
Project Stress - Part 2

Project Title: Project Stress - Part 2

Introduction: The purpose of this form is to give you information that may affect your decision whether to say YES or NO to participation in this research, and to record the consent of those who say YES. The name of this research study is "Project Stress - Part 2". The study will be conducted online.

Researchers: Responsible Project Investigator: Cathy Lau-Barraco, Ph.D., Assistant Professor, College of Sciences, Department of Psychology. Investigator: Brynn Sheehan, M.S., M.A., Graduate Researcher, College of Sciences, Department of Psychology.

Description of research study: The purpose of the present study is to study the health behaviors of college students. We are specifically interested in learning more about your stress, substance use, and health behaviors as it occurs on a daily basis. The knowledge gained from this study will help us develop more effective strategies to address health behaviors among young adults. If you decide to participate, you will be asked to complete a brief, confidential survey online for two weeks. More specifically, each morning for 14 consecutive days, you will be provided with a reminder from an email system to complete the online survey each day. The survey will ask you about various stress and health behaviors. These questions will pertain to your behavior from the previous day. It is important that you report only on your behaviors for the day and night prior– and not to backlog your responses (i.e., report on past days that were missed). Some of the questions may be of a sensitive nature (i.e., questions about your alcohol use). You can refuse to answer any question. Neither your name nor any identifying information will appear in this survey. If you say YES to this study, then your participation will last for approximately 5-10 minutes per day for 14 days, starting today. Approximately 100 students will be participating in this study.

Exclusionary criteria: To be eligible for the present study, you must (1) be at least 18 years of age, (2) typically consume at least 3 alcoholic beverages per week, and (3) have access to the internet for the next 14 days.

Risks and benefits:
Risks: If you decide to participate in this study, you may face a risk of emotional distress as a result of reporting stress, alcohol use, and experience of alcohol-related problems. Another potential risk associated with all research involves breach of confidentiality. The researcher will try to reduce the risk of breach of confidentiality by removing any identifiers from your survey that your responses cannot be linked with your name. And, as with any research, there is some possibility that you may be subject to risks that have not yet been identified.

Benefits: There are no direct benefits for participation in this study. You may, however, benefit from increased self-knowledge into your own personal experiences. More generally, this study may benefit others as knowledge gained will help broaden our understanding of various health-related behaviors in young adults, with the aim of developing more effective intervention strategies to promote health within this population.

Costs and payments: You will be compensated with up to 2.5 OFF-site Psychology Department research credits, which may be applied to course requirements or extra credit in certain Psychology courses. Specifically, if you complete 7 to 11 daily surveys, you will earn 1.0 research credit; if you complete 12 to 14 daily surveys, you will earn 2.5 research credits. If you complete fewer than 7 days, you will not earn research credit. Equivalent credits may be obtained in other ways. You do not have to participate in this study, or any Psychology Department study, in order to obtain this credit. If you choose monetary compensation rather than research credit, you will be compensated with up to $10. Specifically, if you complete 7 to 11 daily surveys, you will earn $5; if you complete 12 to 14 daily surveys, you will earn $10. If you complete fewer than 7 days, you will not earn a monetary reward.

New information: If the researchers find new information during this study that would reasonably change your decision about participating, then they will give it to you.

Confidentiality: All information obtained about you in this study is strictly confidential unless disclosure is required by law. The results of this study may be used in reports, presentations and publications, but the researcher will not identify you and your name will not be attached to your data. Your data is only linked through a unique study ID number that is not linked with any other identifying information.

Withdrawal privilege: It is OK for you to say NO. Even if you say YES now, you are free to say NO later, and walk away or withdraw from the study – at any time. Your decision will not affect your relationship with Old Dominion University, or otherwise cause a loss of benefits to which you might otherwise be entitled. The researchers reserve the right to withdraw your participation in this study, at any time, if they observe potential problems with your continued participation.

Compensation for illness and injury: If you say YES, then your consent in this document does not waive any of your legal rights. However, in the event of harm arising from this study, neither Old Dominion University nor the researchers are able to give you any money, insurance coverage, free medical care, or any other compensation for such injury. In the event that you suffer injury as a result of participation in any research project, you may contact either Dr. Cathy Lau-Barraco at (757) 683-4445, Dr. George Maihafer, IRB chairperson at (757) 683-4520, or the Office of Research at (757) 683-3460 who would be glad to review the matter with you.

Voluntary consent: By continuing with this survey, you are saying several things. You are saying that you have read this form or have had it read to you, that you are satisfied that you understand the form, the research study, and its risks and benefits. If you have any questions later on, then the researchers should be able to answer them.

Cathy Lau-Barraco, Ph.D.
Department of Psychology, MGB 244D

Phone: (757) 683-4445

George Maihafer, Ph.D.
IRB Chairperson
(757) 683-4520

If at any time you feel pressured to participate, or if you have any questions about your rights or this form, then you can call the Old Dominion University Office of Research, at (757) 683-3460.

And importantly, by clicking below, you are telling the researcher YES, that you agree to participate in this study.

APPENDIX B

DEMOGRAPHIC QUESTIONNAIRE

1) How old are you? _____

2) What is your student class (circle one)?
      a. Freshman
      b. Sophomore
      c. Junior
      d. Senior
      e. Graduate student
      f. Other (please specify): _____

3) What is your gender?
      a. Female
      b. Male

4) What is your living situation?
      a. On-campus
      b. Off-campus

5) What is your race?
      a. African American/Black
      b. Caucasian/White
      c. Asian
      d. Hispanic
      e. Native Hawaiian or Other Pacific Islander
      f. Native American or Alaskan Native
      g. Other (please specify): _____

6) Are you currently a member of a fraternity or sorority on campus?
      a. Yes
      b. No

7) What is your height?
      _____ feet, _____ inches

8) What is your weight?
      _____ pounds

9) Yearly Individual Income:
      a. Under $10,000
      b. $10,000 - $20,000
      c. $20,001 - $40,000
      d. $40,001 - $60,000

e. $60,001 - $80,000
f. $80,000 - $100,000
g. $100,000 or more

10) What is your relationship status?
a. Single/never married
b. Living with partner
c. Married
d. Separated/Divorced
e. Widowed

11) Are you employed now?
a. Yes, part-time only
b. Yes, full and part-time
c. Yes, full time only
d. No

12) What is your current overall GPA?

_____

APPENDIX C

ALCOHOL USE QUESTIONNAIRE

A standard drink of beer, distilled spirits and wine each contains the same amount of alcohol.

12 oz = 1½ oz = 5 oz
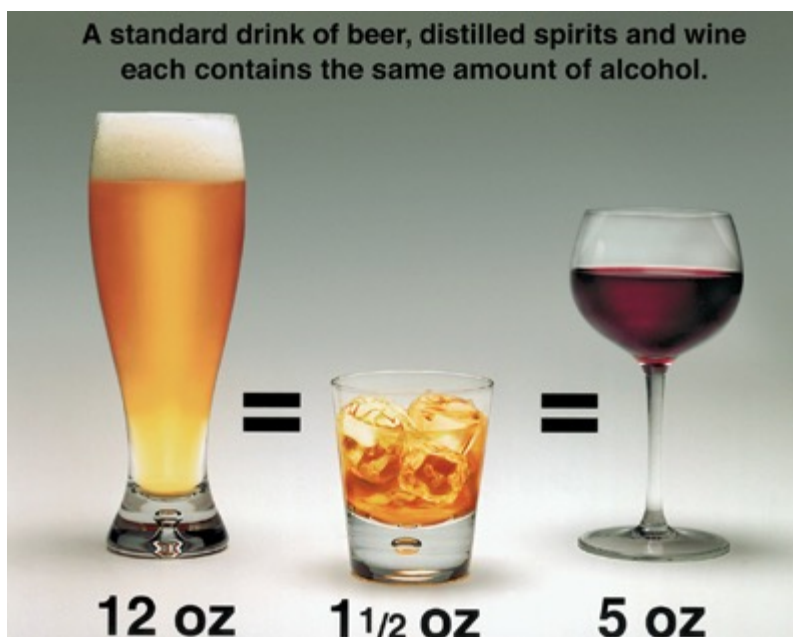
Please think about your typical drinking over the **PAST 3 MONTHS**. On a typical day, how many drinks would you have, and over how many hours would you have them? That is, how many drinks would you typically have on each day in the 3 months? How long (in hours) would a typical drinking occasion last on that day? Use any applicable number, starting with 0, and please note that each space must be filled in.

NOTE: 1 drink = 1 Beer (12 oz.) = 1 Wine Cooler (12 oz.) = 1 Glass of Wine (5 oz.) = 1 Shot of Liquor (1-1.5 oz.) = 1 Mixed Drink (1-1.5 oz. of liquor)

Over the **PAST 3 MONTHS**, on a….

	Typical Monday	Typical Tuesday	Typical Wednesday	Typical Thursday	Typical Friday	Typical Saturday	Typical Sunday
Number of Drinks							
Number of Hours							

APPENDIX D

SELF-CONTROL QUESTIONNAIRE

Using the scale provided, please indicate how much each of the following statements reflects how you typically are.

	Not at all			Very much	
1. I am good at resisting temptation.	1	2	3	4	5
2. I have a hard time breaking bad habits.	1	2	3	4	5
3. I am lazy.	1	2	3	4	5
4. I say inappropriate things.	1	2	3	4	5
5. I do certain things that are bad for me, if they are fun.	1	2	3	4	5
6. I refuse things that are bad for me.	1	2	3	4	5
7. I wish I had more self-discipline.	1	2	3	4	5
8. People would say that I have iron self-discipline.	1	2	3	4	5
9. Pleasure and fun sometimes keep me from getting work done.	1	2	3	4	5
10. I have trouble concentrating.	1	2	3	4	5
11. I am able to work effectively toward long-term goals.	1	2	3	4	5
12. Sometimes I can't stop myself from doing something, even if I know it is wrong.	1	2	3	4	5
13. I often act without thinking through all the alternatives.	1	2	3	4	5

APPENDIX E

DISPOSITIONAL AGGRESSION QUESTIONNAIRE

Please rate each of the following items in terms of how characteristic they are of you. Use the following scale for answering these items.

		Extremely UNLIKE me						Extremely LIKE me
		1	2	3	4	5	6	7
1.	Once in a while I can't control the urge to strike another person.	1	2	3	4	5	6	7
2.	Given enough provocation, I may hit another person.	1	2	3	4	5	6	7
3.	If somebody hits me, I hit back.	1	2	3	4	5	6	7
4.	I get into fights a little more than the average person.	1	2	3	4	5	6	7
5.	If I have to resort to violence to protect my rights, I will.	1	2	3	4	5	6	7
6.	There are people who pushed me so far that we came to blows.	1	2	3	4	5	6	7
7.	I can think of no good reason for ever hitting a person.	1	2	3	4	5	6	7
8.	I have threatened people I know.	1	2	3	4	5	6	7
9.	I have become so mad that I have broken things.	1	2	3	4	5	6	7
10.	I tell my friends openly when I disagree with them.	1	2	3	4	5	6	7
11.	I often find myself disagreeing with people.	1	2	3	4	5	6	7
12.	When people annoy me, I may tell them what I think of them.	1	2	3	4	5	6	7
13.	I can't help getting into arguments when people disagree with me.	1	2	3	4	5	6	7
14.	My friends say that I'm somewhat argumentative.	1	2	3	4	5	6	7
15.	I flare up quickly but get over it quickly.	1	2	3	4	5	6	7
16.	When frustrated, I let my irritation show.	1	2	3	4	5	6	7
17.	I sometimes feel like a powder keg ready to explode.	1	2	3	4	5	6	7
18.	I am an even-tempered person.	1	2	3	4	5	6	7
19.	Some of my friends think I'm a hothead.	1	2	3	4	5	6	7
20.	Sometimes I fly off the handle for no good reason.	1	2	3	4	5	6	7
21.	I have trouble controlling my temper.	1	2	3	4	5	6	7
22.	I am sometimes eaten up with jealousy.	1	2	3	4	5	6	7

23.	At times I feel I have gotten a raw deal out of life.	1	2	3	4	5	6	7
24.	Other people always seem to get the breaks.	1	2	3	4	5	6	7
25.	I wonder why sometimes I feel so bitter about things.	1	2	3	4	5	6	7
26.	I know that "friends" talk about me behind my back.	1	2	3	4	5	6	7
27.	I am suspicious of overly friendly strangers.	1	2	3	4	5	6	7
28.	I sometimes feel that people are laughing at me behind me back.	1	2	3	4	5	6	7
29.	When people are especially nice, I wonder what they want.	1	2	3	4	5	6	7

APPENDIX F

SELF-REGULATION (STRESS QUESTIONNAIRE) - Daily

Please think about **yesterday** as you answer the following questionnaire. Please indicate the degree to which you engaged in the following behaviors **yesterday.**

Controlled or regulated your mood.

0	1	2	3	4	5	6	7	8	9	10

Not at all   Moderately   Very much

Controlled your thoughts.

0	1	2	3	4	5	6	7	8	9	10

Not at all   Moderately   Very much

Dealt with stress.

0	1	2	3	4	5	6	7	8	9	10

Not at all   Moderately   Very much

Felt overwhelmed.

0	1	2	3	4	5	6	7	8	9	10

Not at all   Moderately   Very much

APPENDIX G

EXPLICIT AGGRESSION QUESTIONNAIRE - Daily

Please think about **YESTERDAY** as you answer the following questionnaire. Please read the following and indicate whether you engaged in the particular behavior **yesterday**.

	No	Yes
1. I said mean things about someone		
2. I had an argument		
3. I said hurtful things to someone		
4. I yelled or cursed at someone		
5. I threatened to hurt someone		
6. I threw things in anger		
7. I broke things in anger		
8. I grabbed someone		
9. I pushed or shoved someone		
10. I pulled someone's hair		
11. I twisted someone's arm		
12. I slapped or hit someone		
13. I got into a physical fight		
14. I got into a physical fight at a bar		
15. I engaged in aggressive behavior or verbal aggression that is not listed above.		

15b. Please describe the behavior **Open Response**		

APPENDIX H

ALCOHOL-RELATED EXPLICIT AGGRESSION QUESTIONNAIRE - Daily

Please think about **YESTERDAY** as you answer the following questionnaire. Please read the following and indicate whether you engaged in the particular behavior **yesterday**.

	No	Yes	N/A (Did not consume alcohol)
1. Once I started drinking, I said mean things about someone			
2. Once I started drinking, I had an argument			
3. Once I started drinking, I said hurtful things to someone			
4. Once I started drinking, I yelled or cursed at someone			
5. Once I started drinking, I threatened to hurt someone			
6. Once I started drinking, I threw things in anger			
7. Once I started drinking, I broke things in anger			
8. Once I started drinking, I grabbed someone			
9. Once I started drinking, I pushed or shoved someone			
10. Once I started drinking, I pulled someone's hair			
11. Once I started drinking, I twisted someone's arm			
12. Once I started drinking, I slapped or hit someone			
13. Once I started drinking, I got into a physical fight			

14. Once I started drinking, I engaged in aggressive behavior or verbal aggression that is not listed above.			
14b. Please describe the aggression.			

APPENDIX I

INDIRECT AGGRESSION SCALE - Daily

Please think about **YESTERDAY** as you answer the following questionnaire. Read the below statements and mark down whether you engaged in any of the following behaviors **yesterday,** with friends, family members, co-workers, strangers, etc. Mark down whether you engaged in any behavior either with or without alcohol.

	No	Yes
1. Used my relationship with someone to try and get them to change a decision.		
2. Used sarcasm to insult someone.		
3. Tried to influence someone by making them feel guilty.		
4. Withheld information from someone that the rest of a group was let in on.		
5. Purposefully left someone out of activities.		
6. Made other people not talk to someone.		
7. Excluded someone from a group.		
8. Used someone's feelings to coerce them.		
9. Made negative comments about someone's physical appearance.		
10. Used private in-jokes to exclude someone.		
11. Used emotional blackmail on someone.		
12. Imitated someone in front of others.		
13. Spread rumors about someone.		
14. Played a nasty practical joke on someone.		

15. Done something to try and make someone look stupid.		
16. Pretended to be hurt and/or angry with someone to make them feel bad about him/her-self.		
17. Made someone feel that they don't fit in.		
18. Intentionally embarrassed someone around others.		
19. Stopped talking to someone.		
20. Put undue pressure on someone.		
21. Omitted someone from conversations on purpose.		
22. Made fun of someone in public.		
23. Called someone names.		
24. Criticized someone in public.		
25. Turned other people against someone.		

APPENDIX J

ALCOHOL-RELATED INDIRECT AGGRESSION SCALE - Daily

Please think about **YESTERDAY** as you answer the following questionnaire. Read the below statements and mark down whether you engaged in any of the following behaviors **yesterday,** with friends, family members, co-workers, strangers, etc. Mark down whether you engaged in any behavior either with or without alcohol.

	No	Yes	N/A (Did not consume alcohol)
1. Once I started drinking, I used my relationship with someone to try and get them to change a decision.			
2. Once I started drinking, I used sarcasm to insult someone.			
3. Once I started drinking, I tried to influence someone by making them feel guilty.			
4. Once I started drinking, I withheld information from someone that the rest of a group was let in on.			
5. Once I started drinking, I purposefully left someone out of activities.			
6. Once I started drinking, I made other people not talk to someone.			
7. Once I started drinking, I excluded someone from a group.			
8. Once I started drinking, I used someone's feelings to coerce them.			
9. Once I started drinking, I made negative comments about someone's physical appearance.			
10. Once I started drinking, I used private in-jokes to exclude someone.			

11. Once I started drinking, I used emotional blackmail on someone.			
12. Once I started drinking, I imitated someone in front of others.			
13. Once I started drinking, I spread rumors about someone.			
14. Once I started drinking, I played a nasty practical joke on someone.			
15. Once I started drinking, I done something to try and make someone look stupid.			
16. Once I started drinking, I pretended to be hurt and/or angry with someone to make them feel bad about him/her-self.			
17. Once I started drinking, I made someone feel that they don't fit in.			
18. Once I started drinking, I intentionally embarrassed someone around others.			
19. Once I started drinking, I stopped talking to someone.			
20. Once I started drinking, I put undue pressure on someone.			
21. Once I started drinking, I omitted someone from conversations on purpose.			
22. Once I started drinking, I made fun of someone in public.			
23. Once I started drinking, I called someone names.			
24. Once I started drinking, I criticized someone in public.			
25. Once I started drinking, I turned other people against someone.			

VITA

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Education and Training

Ph.D.	**Old Dominion University,** *Norfolk, VA*
	Applied Experimental Psychology, 2016
	Advisor: Cathy Lau-Barraco, Ph.D.

M.S.	**Old Dominion University,** *Norfolk, VA*
	Applied Experimental Psychology, 2014
	Advisor: Cathy Lau-Barraco, Ph.D.

M.A.	**The University of New Hampshire**, *Durham, NH*
	Justice Studies, 2011
	Advisor: Ellen Cohn, Ph.D.

B.A.	**Bloomsburg University of Pennsylvania,** *Bloomsburg, PA*
	Psychology, 2010
	Advisor: Julie Kontos, Ph.D.

Background

Brynn E. Sheehan is a fifth year doctoral candidate in the Applied Experimental Psychology doctoral program at Old Dominion University. Her research interests are primarily in using advanced methodological and statistical techniques to investigate young adult health behaviors. Specifically, Brynn is interested in understanding the social influences and individual-level protective factors of aggressive behavior and substance use.

Selected Publications

Sheehan, B. E., & Lau-Barraco, C. (In Press, 2016). A conceptual model of ego depletion and alcohol-related aggression. *Aggression and Violent Behavior*. doi: http://dx.doi.org/10.1016/j.avb.2016.08.002

Sheehan, B. E., Linden-Carmichael, A. N., & Lau-Barraco, C. (2016). Caffeinated and non-caffeinated alcohol use and indirect aggression: The impact of self-regulation. *Addictive Behaviors, 58,* 53-59. doi: 10.1016/j.addbeh.2016.02.002

Sheehan, B. E., Murphy, S., Moynihan, M., & Dudley, E. (2014). Intimate partner homicide: New insights for understanding lethality and risks. *Violence against Women, 21*(2), 269-288. doi: 10.1177/1077801214564687