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Caffeinated and Non-caffeinated Alcohol Use and Indirect Aggression: The Impact of Self-regulation

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Abstract

Research shows that heavier alcohol use is associated with physical aggression. Scant research has examined the way in which alcohol relates to other forms of aggression, such as indirect aggression (e.g., malicious humor, social exclusion). Given the possible negative consequences of indirect aggression and the limited evidence suggesting alcohol use can elicit indirectly aggressive responses, research is needed to further investigate the association between drinking behavior and indirect aggression. Additionally, specific alcoholic beverages, such as caffeinated alcoholic beverages (CABs; e.g., Red Bull and vodka), may potentiate aggression above the influence of typical use, thus warrant examination with regard to indirect aggression. One factor that may impact the strength of the alcohol-indirect aggression and CAB-indirect aggression relationships is one's level of self-regulation. Consequently, our study examined the relationships between (1) alcohol use and indirect aggression, (2) CAB use and indirect aggression, and (3) self-regulation as a moderator. Participants were 733 (67.6% female) undergraduate students who reported their CAB and alcohol use, self-regulation, and aggressive behaviors. Results revealed that heavier alcohol use was associated with more frequent indirect aggression after controlling for dispositional aggression. Heavier CAB use was related to more frequent indirect aggression after accounting for typical use and dispositional aggression. Self-regulation moderated these associations such that for those with lower self-regulation, greater alcohol and CAB consumption was associated with greater indirect aggression. Our findings suggest that heavier alcohol and CAB consumption may be risk factors for engaging in indirect aggression and this risk is impacted by one's regulatory control.

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Keywords

Alcohol; caffeinated alcohol; indirect aggression; self-regulation

1. Introduction

The relationship between alcohol and physical and verbal aggression, is well established (e.g., Eckhardt & Crane, 2008; Giancola, 2002; Giancola, Godlaski, & Parrott, 2005; Giancola, Godlaski, & Roth, 2012; Smucker Barnwell, Borders, & Earleywine, 2006). Limited research, however, has examined associations between drinking and indirect aggression. Indirect aggression refers to harm delivered to a victim via mediating persons or events (e.g., social exclusion, guilt induction, malicious humor; Archer & Coyne, 2005; Bjorkqvist, Osterman, & Kaukiainen, 1992) and focuses on exclusion and degradation of social standing. Given potential adverse effects of indirect aggression (e.g., depression, somatic complaints; Baldry, 2004), a more in-depth understanding of indirect aggression and its relationship with alcohol use is warranted. Also, there is a need for research examining the link between indirect aggression and caffeinated alcoholic beverages (CABs), as consumption of such beverages is linked with heightened levels of physical aggression (Jones, Barrie, & Berry, 2012; Woolsey, Waigandt, & Beck, 2010). Self-regulation theory (Baumeister, Gailliot, DeWall, & Oaten, 2006; DeWall, Baumeister, Stillman, & Gailliot, 2007) suggests that individuals who are less able to regulate their behavior are less capable of resisting urges such as behaving aggressively. Thus, it is possible that the association between alcohol (i.e., non-caffeinated alcohol beverages) and CAB use with indirect aggression may be dependent upon one's ability to control their thoughts, behaviors, and impulses. Consequently, the present study explored the relationships between alcohol and CABs and indirect aggression, as well as the potential moderating role of regulatory control.

1.1 Indirect Aggression

Indirect aggression has been shown to negatively impact the recipient's mental health, with victimization being related to greater levels of depression, anxiety, and suicidal ideation (Archer & Coyne, 2007; Miller & Vaillancourt, 2007). Among middle school students, indirect victimization, rather than direct victimization, was a stronger predictor of internalizing symptoms, including somatic complaints and depression (Baldry, 2004). Being a victim of indirect aggression also predicts greater likelihood of responding with aggression (Owens, Slee, & Shute, 2000; Twenge, Baumeister, Tice, & Stucke, 2001); thus promoting a pattern of aggressive reacting.

Although limited, experimental research suggests that engagement in indirect aggression is related to alcohol use and alcohol-related constructs (Friedman, McCarthy, Bartholow, & Hicks, 2007; Subra, Muller, Begue, Bushman, & Delmas, 2010). Specifically, research has demonstrated that exposure to alcohol-related words and images (e.g., beer, vodka) may elicit indirectly aggressive responses. For example, participants exposed to alcohol-related cues provided more negative ratings of an experimenter as opposed to participants exposed to non-alcohol-related cues (Friedman et al., 2007; Subra et al., 2010). Despite some experimental support, several questions remain regarding the relationship between indirect

aggression and alcohol use. Specifically, research has yet to investigate the way in which typical drinking behavior is associated with self-reported history of indirect aggression. Given the adverse effects of indirect aggression, particularly the potential for subsequent aggression (Owens et al., 2000; Twenge et al., 2001), such information would provide valuable insight regarding potential precursors of indirect aggression as well as whether the likelihood of indirect aggression increases as alcohol is consumed.

1.2 Caffeinated Alcohol

Caffeinated alcoholic beverages (CABs; e.g., Red Bull and vodka) are commonly consumed among college students, with 75% consuming CABs in their lifetime (Berger, Fendrich, & Fuhrmann, 2013) and 24% in the past month (O'Brien, McCoy, Rhodes, Wagoner, & Wolfson, 2008). Despite its popularity, CAB use is particularly associated with engagement in risky behaviors (see Linden & Lau-Barraco, 2014 for a review). Experimental research suggests that consumption of CABs subjectively reduced drinkers' feelings of intoxication without reducing cognitive and behavioral impairment (Ferreira, De Mello, Pompeia, & SouzaFormigoni, 2006; Marczinski & Fillmore, 2006). Consequently, CAB consumption is related to heavy episodic drinking, riding in a car with someone under the influence of alcohol, risky sexual behaviors (O'Brien et al., 2008), and stimulant drug use (Brache & Stockwell, 2011; Snipes & Bentosch, 2013). Overall, CAB use may reduce perceptions of intoxication, resulting in an increased likelihood of engaging in behaviors drinkers would not have engaged in otherwise.

CAB consumption may be uniquely related to engaging in aggressive behavior even after considering one's typical alcohol use. That is, although drinking alcohol can decrease inhibitions and lead to physical aggression (Giancola, 2002; Giancola et al., 2009; Smucker Barnwell et al., 2006), the caffeine properties of CABs may make someone become even more aggressive as they feel less intoxicated and more energized. Thus, because individuals may not be experiencing a sedative effect from alcohol (Marczinski & Fillmore, 2006), yet are still under the influence, they may be more responsive and quick to react aggressively. Moreover, CABs are commonly consumed in social environments such as bars and clubs (Peacock, Bruno, & Martin, 2012) that can elicit aggression (Rossow, 1996; Single & Wortley, 1993). Thus, the properties of CABs and the context in which CABs are frequently used may lower inhibitions, thereby increasing the likelihood of aggressive behavior. Indeed, limited extant research suggests that CAB use is associated with heightened levels of physical aggression. Woolsey et al. (2010) found that among young adults who typically drink CABs, individuals reported being more likely to act aggressively when drinking CABs as compared to occasions where they consumed only non-caffeinated alcohol. Similarly, a qualitative study found that CAB users reported aggressive behavior after drinking CABs (e.g., lashing out, becoming violent; Jones et al., 2012). Researchers also suggested that because some users may feel less inhibited when drinking CABs, they may attribute their aggressiveness to their CAB use, negating personal responsibility for uncharacteristically aggressive behavior (Jones et al., 2012).

In general, prior studies suggest CAB use may heighten one's risk of engaging in aggressive behaviors even more than consuming non-caffeinated alcohol. However, the extent to which

CAB use may be related to indirectly aggressive behavior is unknown. Given the reported aggressive responses and reduced behavioral inhibitions associated with CAB use (Droste, Tonner, Zinkiewicz, Pennay, Lubman, & Miller, 2014; Jones et al., 2012; Woolsey et al., 2010), heavier use may increase the likelihood of indirectly aggressive behavior. Further, examinations of individual-level characteristics that may mitigate indirectly aggressive responses are needed.

1.3 Self-regulation

Self-regulation is an individual-level variable that may impact the aggression-inducing effects of alcohol. Self-regulation refers to one's attempts to exert control over thoughts, feelings, impulses, and behaviors (Baumeister et al., 2006), and its breakdown is believed to lead to impulsive behaviors (DeWall et al., 2007; Giancola et al., 2012; Quinn & Fromme, 2010). Lower levels of self-regulation are associated with adverse consequences including problematic alcohol use (Patock-Peckham, Cheong, Balhorn, & Nagoshi, 2001; Quinn & Fromme, 2010) and criminal behavior (Gottfredson & Hirschi, 1990).

The ability to regulate one's behavior has been identified as an influential factor of the relationship between alcohol consumption and various types of aggression (Giancola, 2004; Giancola et al., 2012; Sheehan & Lau-Barraco, 2013). Specifically, the ability to regulate behavioral and emotional impulses was found to moderate the relationship between acute alcohol consumption and physically aggressive responses (Giancola et al., 2012); suggesting that individuals with lower regulation are more likely to become aggressive after consuming alcohol than those with greater regulation. Consistent with the self-regulation literature, individuals who report behaving impulsively (e.g., acting without forethought) also report greater levels of indirect aggression (Warren, South Richardson, & McQuillin, 2011). Further, one cross-sectional study identified self-regulation as a moderator of indirect aggression and an alcohol-related construct (i.e., alcohol aggression expectancies; Sheehan & Lau-Barraco, 2013). Specifically, stronger endorsement of the belief that alcohol causes aggression predicted more frequent engagement in indirectly aggressive behavior but only among those who also reported lower regulatory skills. These studies highlight that regulatory control over one's behavior may be an important variable to consider when assessing indirect aggression.

Overall, prior studies suggest that individuals who have lower levels of self-regulation, and thus lack the ability to control their impulses, exhibit more frequent direct (Giancola, 2004; Giancola et al., 2012) and indirect aggression (Sheehan & Lau-Barraco, 2013) related to drinking. Therefore, higher self-regulation may serve as a protective factor, with individuals higher in this trait being less likely to engage in impulsive behaviors, including aggression. This regulation also may contribute to the relationship between CAB consumption and aggression. As experimental findings suggest CAB consumption leads to reduced behavioral control (Marczinski, Fillmore, Bardgett, & Howard, 2011), drinking CABs may increase the likelihood of engaging in impulsive behaviors, even more so than drinking alcohol alone. Thus, it is possible that these lower levels of self-regulation may limit the ability to deter aggressive responses, resulting in more frequent aggression.

1.4 Study purpose

The present study had three aims. First, we sought to examine the association between alcohol use and indirect aggression. We hypothesized that greater alcohol consumption would be associated with more frequent acts of indirect aggression. Second, we investigated the association between CAB use and indirect aggression. We hypothesized that greater CAB consumption would be associated with more frequent engagement in indirect aggression. Third, we examined self-regulation as a moderator in the relationship between (a) *alcohol use* and indirect aggression and (b) *CAB use* and indirect aggression. It was hypothesized that heavier alcohol and CAB use would be positively related to indirect aggression only among those lower in self-regulation. As individuals with greater dispositional aggression may be predisposed to behave aggressively (Eckhardt & Crane, 2008), we controlled for this variable in all analyses. We also controlled for typical alcohol use in analyses focusing on CAB use as to examine the unique effect of CAB use above other types of alcohol (i.e., aims 2 and 3b).

2. Material and methods

2.1 Participants

Participants were 733 (67.6% female) undergraduate students who reported consuming at least one alcoholic drink in the previous month. Students were recruited from a research pool at a large-size public southeast university. Mean age of participants was 20.21 ($SD = 3.56$) years with ages ranging from 18 to 47 years old. Participants were 47.9% Caucasian, 37.9% African American, 5.5% Hispanic, 2.5% Asian, .8% Native Hawaiian or Pacific Islander, and 4.9% identified as “Other.” Among all participants, the average number of non-caffeinated alcohol drinks consumed was 11.05 ($SD = 9.98$) drinks per week. When considering only participants who do not consume non-caffeinated alcohol, the average number of non-caffeinated alcohol drinks per week was 9.18 ($SD = 9.49$). Approximately half of the sample (56.3%) reported consuming at least one CAB per week. Among only participants who consumed CABs, the total number of alcohol drinks per week was 20.36 (i.e., 12.49 non-caffeinated alcohol drinks and 7.87 CABs).

2.2 Procedure

Students volunteered to participate in the current study via the university's online psychology research pool. Eligibility criteria included being (1) at least 18 years of age and (2) consuming at least one alcoholic drink in the previous month. Data collection was administered by trained research assistants in a computer lab on campus. Data were collected in groups of approximately 20 participants. After providing informed consent, participants completed computerized surveys that took approximately one hour to complete. Participants received research credit in exchange for participation. This study was approved by a human subjects research committee and APA ethical guidelines were followed (APA, 2010).

2.3 Measures

2.3.1 Alcohol and CAB consumption—The Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) assessed alcohol and CAB use separately. Regarding

alcohol consumption, participants reported the number of non-caffeinated alcoholic drinks typically consumed each day during a typical week over the previous three months. A separate, modified DDQ asked about typical CAB use (e.g., Red Bull and vodka, rum and Coke) during a typical week (e.g., Lau-Barraco & Linden, 2014; Lau-Barraco, Milletich, & Linden, 2014). The DDQ has adequate convergent validity with self-report measures of alcohol-related problems (Collins, Bradizza, & Vincent, 2007; Collins, Koutsky, & Izzo, 2000; Collins & Lapp, 1992). Current study responses were summed to create separate indices of total weekly alcohol quantity and total weekly CAB quantity.

2.3.2 Alcohol-related indirect aggression—The Indirect Aggression Scale-Aggressor (IAS-A; Forrest, Eatough, & Shevlin, 2005) was adapted to measure alcohol-related indirect aggression. This 25-item measure asks participants to report how often they engaged in particular indirectly aggressive behaviors in the previous 12 months (e.g., “Intentionally embarrassed them around others”), with answer options ranging from *1 = never* to *5 = regularly*. The current study adapted the IAS-A to measure self-reported indirect aggression as it related to drinking. Specifically, participants were asked to “Please read the below statements and mark down how often you engaged in each of the following behaviors *after consuming alcohol*.” Answer options were summed to create a composite score with higher scores representing more frequent alcohol-related indirect aggression. The composite score of the original IAS has been found to have high internal reliability among college students (IA: $\alpha = .94$; Grimaldi, Napper, & LaBrie, 2014). Current study total scores ranged from 24.59 to 94 ($M = 37.23$, $SD = 16.48$). Reliability was $\alpha = .97$.

2.3.4 Self-regulation—Self-regulation was measured using the Short Self-Regulation Questionnaire (SSRQ; Carey, Neal, & Collins, 2004). The SSRQ is a 31-item questionnaire that asks participants to report the degree to which they agree with statements about their regulatory state (e.g., “I set a goal for myself and keep track of my progress”). Responses range from *1 = strongly disagree* to *5 = strongly agree*. Answer options were averaged to create a composite score with higher scores indicating greater self-regulation. The SSRQ is highly correlated with the longer SRQ and has shown convergent validity with impaired control and impulsivity among college students (Neal & Carey, 2005). Current study total scores ranged from 1.77 to 5 ($M = 3.71$, $SD = .57$). Reliability was $\alpha = .83$.

2.3.5 Dispositional aggression—Dispositional aggression was measured using the Buss-Perry Aggression Questionnaire (BPAQ; Buss & Perry, 1992). The BPAQ is a 29-item questionnaire that asks participants to report the degree to which statements are characteristic of them (e.g., “When frustrated, I let my irritation show”). Responses range from *1 = extremely unlike me* to *7 = extremely like me*. Answer options were summed to create a composite score with higher scores indicating greater dispositional aggression. The BPAQ has been shown to have excellent psychometric properties in college student samples (Tremblay & Ewart, 2005) and is predictive of alcohol-related aggression (Giancola et al., 2005). Total scores ranged from 29 to 203 ($M = 88.30$, $SD = 31.34$). Reliability was $\alpha = .93$.

3. Results

Data were cleaned and statistical assumptions were addressed. Eight outliers on the DDQ-alcohol, four outliers on the DDQ-CAB, and four outliers on the IAQ were Winsorized to the next highest data point (Barnett & Lewis, 1994). Little's MCAR test revealed that missing data were missing completely at random, $\chi^2(22089) = 5245.33, p = 1.00$, and were handled via estimation maximization in SPSS. Dispositional aggression was included as a covariate in all analyses and in analyses regarding CAB use, typical alcohol use also was included as a covariate. All predictors (i.e., alcohol, CAB use) and moderators (i.e., self-regulation) were centered to reduce the effects of multicollinearity. See Table 1 for intercorrelations among variables.

3.1 Regression analyses

To examine aims 1 and 2, the associations of alcohol use on indirect aggression and CAB use on indirect aggression, hierarchical linear regression models were conducted. For the first analysis, dispositional aggression was entered into the model at Step 1, and alcohol use was entered at Step 2. Results revealed that greater alcohol consumption was associated with more frequent acts of indirect aggression after controlling for dispositional aggression (see Table 2). To examine the association of CABs and indirect aggression, dispositional aggression and typical alcohol use were entered at Step 1, and CAB use was entered at Step 2. Greater CAB use was found to be related to more frequent indirect aggression after controlling for dispositional aggression and typical alcohol use (see Table 2).

In order to examine the unique variance in indirect aggression accounted for by alcohol versus CAB use, two sets of hierarchical linear regressions were conducted. In the first analysis, dispositional aggression was entered into the model at Step 1, alcohol was entered at Step 2 and CAB use was entered at Step 3; and in the second analysis, dispositional aggression was entered into the model at Step 1, CAB use was entered at Step 2 and alcohol was entered at Step 3. Results showed that both alcohol, $\beta = .13, SE = 0.06, p < .001$, and CAB use, $\beta = .09, SE = 0.09, p = .008$, significantly predicted alcohol-related indirect aggression, while controlling for dispositional aggression. In examining their relative effect sizes, the first analysis showed that alcohol explained approximately 2.3% of the variance in indirect aggression and CAB use explained an additional 0.6%. Results of the second analysis showed that CAB use explained approximately 1.7% of the variance in alcohol-related indirect aggression and alcohol use explained an additional 1.2%.

3.2 Moderation analyses¹

Moderation analyses using linear regression (Baron & Kenny, 1986) tested the influence of self-regulation on the relationships between (a) *alcohol consumption* and indirect aggression and (b) *CAB consumption* and indirect aggression. Results revealed that self-regulation significantly moderated the association between alcohol consumption and indirect aggression (see Table 3). Simple slope analyses indicated that for those with lower self-

¹To examine the potential influence of including participants exceeding typical college age (i.e., >25 years), a different moderation analysis was conducted that included only 18 to 25-year-olds. Findings were consistent regardless of the age restriction.

regulation (i.e., one *SD* below the mean), greater alcohol use predicted more frequent indirect aggression, $\beta = .36$, $SE = 0.06$, $p < .001$. For those higher in self-regulation (i.e., one *SD* above the mean), alcohol use was unrelated to indirect aggression, $\beta = .06$, $SE = .08$, $p = .418$ (see Figure 1). Additionally, self-regulation moderated the association between CAB use and indirect aggression (see Table 3). Simple slope analyses indicated that for those with lower self-regulation, heavier CAB use significantly predicted more frequent indirect aggression, $\beta = .46$, $SE = 0.11$, $p < .001$. For those higher in self-regulation, CAB use was unrelated to indirect aggression, $\beta = -.19$, $SE = 0.12$, $p = .113$ (see Figure 2). Importantly, moderation remained significant when only including participants who reported consuming CABs, $\beta = -.17$, $SE = 0.18$, $p < .001$.

4. Discussion

The current study sought to extend our understanding of the link between aggression and drinking behavior by investigating alcohol-related indirect aggression. First, we examined the relationship between alcohol consumption and indirect aggression while controlling for dispositional aggression. Second, we examined the association between CAB consumption and indirect aggression, beyond typical alcohol use and dispositional aggression. Finally, we investigated trait self-regulation as a moderator of the relationships between alcoholic and CABs and indirect aggression.

As hypothesized, findings showed that individuals who reported consuming more alcohol also reported engaging in more indirect aggression. Thus, even after controlling for dispositional aggression, there was a significant relationship between drinking and committing indirectly aggressive acts against others, albeit the effect is in the small range (semi-partial $r^2 = .02$; Ferguson, 2009). Given the strength of the relationship between dispositional aggression and aggression (Eckhardt & Crane, 2008; Giancola, 2002; Smucker Barnwell et al., 2006), the fact that alcohol consumption is associated with indirect aggression after controlling for dispositional aggression is notable.

While research has identified alcohol as a precursor of physical and verbal aggression (Eckhardt & Crane, 2008; Giancola, 2002; Giancola et al., 2005; Giancola et al., 2012; Leonard, Collins, & Quigley, 2003), evidence linking alcohol consumption and indirect aggression is limited. Although only a small percentage of the variance in indirect aggression was explained by alcohol use, the observed relationship in our study extends prior research by highlighting that heavier alcohol use is associated with an increased likelihood of engaging in a covert form of aggressive behavior. Indirect aggression, which has shown to affect victims socially, resulting in social withdrawal, feelings of ostracism, reduced sense of belonging, and future social maladjustment (Archer & Coyne, 2005), may be particularly harmful during college (Freeman, Anderman, & Jensen, 2007; Hagerty, Williams, Coyne, & Early, 1996; Hausmann, Schofield, & Woods, 2007). Additionally, as noted, indirect victimization could increase the likelihood of aggressive retaliation (Owens et al., 2000; Twenge et al., 2001). Thus, in settings where aggressors and victims may continue to consume alcohol, including a party or bar environment, the victim could become angered and respond with aggression, potentially escalating the likelihood of violence.

With regard to CAB use, our findings indicated that heavier CAB use was associated positively with indirect aggression, even after considering one's typical alcohol use and dispositional aggression. Similar to the relationship between alcohol and indirect aggression, the strength of the relationship between CABs and indirect aggression is considered a small effect (Ferguson, 2009). Nevertheless, considering analyses controlled for both alcohol consumption and dispositional aggression, a small yet significant effect is meaningful. Specifically, despite accounting for a small portion of variance, greater consumption of CABs was linked with more frequent indirectly aggressive behaviors, above the influence of how much alcohol one typically consumes and their typical aggressive behavior. Research has long supported the association between alcohol consumption and aggressive behavior (Eckhardt & Crane, 2008; Giancola, 2002; Giancola et al., 2005; Giancola et al., 2012; Smucker Barnwell et al., 2006), however this is the first study to examine the unique effects of CAB consumption, demonstrating that there is a risky beverage that is associated with aggression beyond that of typical alcohol consumption. While prior investigations have found links between CAB use and direct aggression (Jones et al., 2012; Woolsey et al., 2010), none have examined its association with indirect aggression. Because these relationships exist beyond alcohol use, there may be a unique aspect of drinking CABs that contributes to indirect aggression. Indeed, findings revealed that beyond one's typical alcohol use, CAB use accounted for unique variance in indirect aggression. Drinking CABs can reduce feelings of intoxication without reducing actual intoxication (Marczinski & Fillmore, 2006) and inhibit behavioral control (Marczinski et al., 2011); thus, perhaps the addition of caffeine increases one's impulsivity, resulting in uncharacteristic behavior, such as aggression.

The final aim was to investigate the role of self-regulation on the relationships between use and indirect aggression. The theory of self-regulation (Baumeister et al., 2006; DeWall et al., 2007) posits that individuals with lower regulatory control are less able to control urges, and consequently, are more likely to engage in impulsive behaviors including consuming more alcohol and responding to frustration with physical aggression. Based on this theory, we hypothesized that greater alcohol and CAB use would be associated with more frequent acts of indirect aggression but only among those who reported lower levels of self-regulation. Study results supported these hypotheses. That is, above one's dispositional aggression, self-regulation moderated the relationships between use and indirect aggression, indicating greater alcohol and CAB use were related to greater indirect aggression only among individuals with lower regulation of their thoughts, emotions, and behavior. One reason for the lack of association among those higher in self-regulation could be that they are better able to weigh potential costs and benefits of engaging in aggression before refraining, whereas individuals with lower self-regulation may be enticed by the immediate gratification without considering the potential impact on the victim (see Archer & Coyne, 2005 for a review). Thus, perpetrators may lack the control necessary to refrain from indirect aggression when drinking. The role of self-regulation is consistent with the theory of self-regulation as a protective construct (DeWall et al., 2007; Gottfredson & Hirschi, 1990; Quinn & Fromme, 2010) as well as previous experimental research investigating alcohol-only consumption and directly aggressive behavior (Giancola et al., 2012). Although cross-sectional, our study found self-regulation to contribute substantially to alcohol-related

indirect aggression when considering alcohol and CAB use, semi-partial $r^2 = .09$ and $.08$, respectively, and serve as a moderating variable for both alcohol and CAB consumption in accounting for indirect aggression. Given the heightened propensity for adverse consequences associated with CABs, it appears that self-regulation may be a particularly relevant factor to consider among individuals who consume CABs.

Given the protective effects of self-regulation, alcohol interventions incorporating self-regulation skills training may be particularly helpful for those who drink. Training programs offering routine self-regulation exercises have shown to decrease a variety of adverse health behaviors, including alcohol use, caffeine consumption, and aggressive acts (Baumeister et al., 2006; Hagger, Wood, Stiff, & Chatzisarantis, 2009; Maes & Karoly, 2005). Extant self-regulation literature suggests that the development of self-regulation in one area, such as physical exercise, may affect many domains. Meaning, alcohol interventions offering a general self-regulation practice could impact alcohol and CABs as well as various aggressive behaviors. As heavier CAB consumption is linked to impulsive behavior, self-regulation programs may be beneficial in reducing negative consequences experienced by this high-risk group.

Several methodological limitations should be noted. First, as our population of interest consisted of college students, the current results may not generalize to other populations. Second, our study consisted largely of female participants (67.6%), which may impact the generalizability of our results to men. However, exploratory analyses revealed that findings did not differ when gender was included as a control variable. Third, the use of self-reported drinking may have resulted in biased reporting due to social desirability. Previous research has, however, indicated that such self-report methods are reliable and valid (Del Boca & Darkes, 2003). Fourth, the current study defined CAB use as *any* type of caffeine (e.g., soda or energy drinks) mixed with alcohol. Because the caffeine content can vary widely across different types of caffeinated beverages, future research may benefit from teasing apart the different types of caffeine mixers instead of grouping all types of caffeine together as one construct. Finally, our study was cross-sectional, limiting our ability to make any causal conclusions. Future research may wish to collect event-level data through the use of ecological momentary assessment (EMA) or daily diary investigation. Such methodology would provide an understanding of the temporal relationships or daily-level processes of alcohol use, CAB use, and engagement in indirect aggression.

5. Conclusions

The current study added to the existing literature on alcohol-related aggression by demonstrating that greater alcohol and CAB consumption may potentiate the likelihood of engaging in indirect aggression. Findings also reveal that alcohol use, including CAB use, may not unconditionally predict aggression but facilitate aggression among those unable to resist impulses. Given the protective role of self-regulation, findings indicate that college students who drink may benefit from alcohol intervention programs that promote self-regulatory control.

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Highlights

- Tested associations between alcohol and caffeinated alcohol and indirect aggression.
- Self-regulation moderated study relationships.
- Regulation strengthening techniques are suggested for college at-risk drinkers.

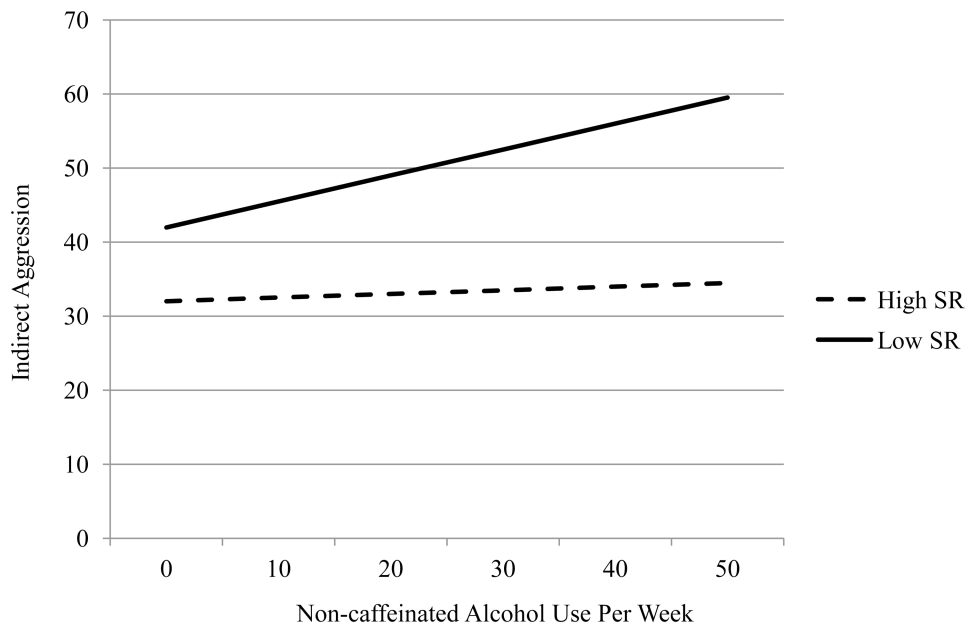


Figure 1. Self-regulation (SR) as a moderator of the association between alcohol use and indirect aggression.

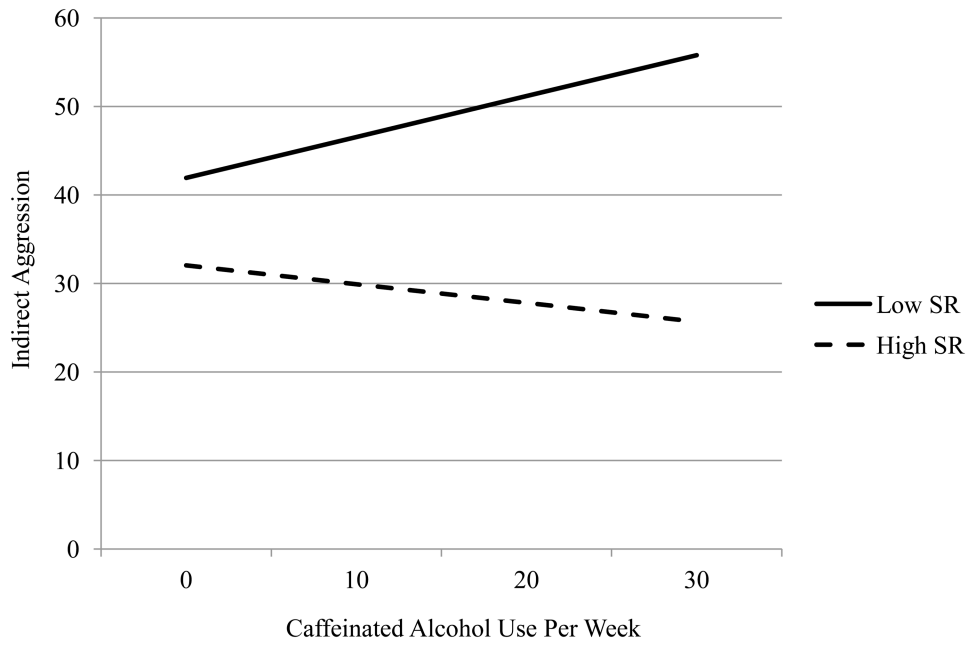


Figure 2. Self-regulation (SR) as a moderator of the association between caffeinated alcohol use and indirect aggression.

Table 1

Correlations, Means, and Standard Deviations of Variables

Variable	1	2	3	4	M	SD
1. Alcohol Use Quantity	--				11.05	9.98
2. CAB Use Quantity	.36**	--			4.44	6.45
3. Self-regulation	-.10*	-.11*	--		3.71	.57
4. Dispositional Aggression	.18**	.10*	-.22**	--	88.30	31.34
5. Indirect Aggression	.23**	.18**	-.39**	.45**	37.22	16.48

Note. CAB = Caffeinated Alcohol Beverage.

* $p < .01$.

** $p < .001$.

Table 2
Summary of Hierarchical Linear Regression Analyses Predicting Indirect Aggression

Step	Variable	β	B	SE (B)	s^2r^2	Adj. R^2	R^2
<i>Alcohol Use</i>							
1	Dispositional Aggression	.42	0.22	0.02	.17	.199	--
2	Alcohol Use Quantity	.16	0.26	0.06	.02	.222	.024 ^{***}
<i>CAB Use</i>							
1	Dispositional Aggression	.42	0.22	0.02	.17		
	Alcohol Use Quantity	.13	0.21	0.06	.01	.222	--
2	CAB Use Quantity	.09	0.24	0.09	.01	.228	.007 [*]

Note. All predictor variables are centered. CAB = Caffeinated Alcoholic Beverage.

* $p < .01$.

*** $p < .001$.

Table 3
Summary of Moderation Analyses Predicting Indirect Aggression

Step	Variable	β	B	SE (B)	s^2r^2	Adj. R^2	R^2
<i>Alcohol Use</i>							
1	Dispositional Aggression	.36	0.19**	0.02	.12	.199	--
2	Alcohol Use Quantity	.13	0.21**	0.05	.02		
	Self-regulation	-.30	-8.66**	0.91	.09	.306	.109**
3	Alcohol \times Self-regulation	-.09	-0.25*	0.09	.01	.313	.008*
<i>CAB Use</i>							
1	Dispositional Aggression	.36	0.19**	0.02	.12		
	Alcohol Use Quantity	.11	0.19*	0.05	.01	.222	--
2	CAB Use Quantity	.05	0.14	0.08	.00		
	Self-regulation	-.30	-8.59**	0.90	.08	.310	.089**
3	CAB \times Self-regulation	-.13	-0.57**	0.14	.02	.325	.016

Note. All predictor variables are centered. CAB = Caffeinated Alcoholic Beverage. Gender was explored as an additional covariate and results did not differ as a function of gender. Gender was thus removed from analyses.

* $p < .01$.

** $p < .001$.