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Alcohol, Affect, and Aggression: An Investigation of Alcohol's Effects Following Ostracism

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Abstract

Objective: Ostracism is distressing to those who experience it and people are motivated to find ways to cope, including self-medication or aggression. However, we know little about how alcohol intoxication may affect individuals' reactions to ostracism. This study investigates predictions informed by Alcohol Myopia Theory to observe how alcohol influences changes to one's affect, basic needs fulfillment, and aggression following ostracism.

Method: Participants ($N = 97$) were randomly assigned to either consume an alcohol, placebo, or nonalcohol beverage, and then participate in a game that simulated ostracism. Following this, participants engaged in a task wherein they were able to aggress against an ostensible ostracizer. Affect and basic psychological needs were measured at baseline, post-ostracism, and post-aggression timepoints.

Results: Results indicated that all groups reacted adversely to ostracism and experienced partial recovery toward baseline for negative and positive affect and basic psychological needs. Further, alcohol facilitated recovery across these outcomes post-aggression for participants who felt more intoxicated. Alcohol, relative to the control beverages, increased ostracizer-directed aggression intensity for low trait physically aggressive, but not highly aggressive, people.

Conclusion: This randomized study provides novel preliminary evidence suggesting that alcohol enhances aggressive urges toward ostracizers in those who are not typically aggressive. Those who feel more drunk when intoxicated, compared to those who feel less so, may experience greater recovery from ostracism after aggressing toward an ostracizer hinting at potentially pleasurable effects that must be replicated in future studies.

Keywords

alcohol intoxication; ostracism; alcohol myopia; aggression; Cyberball

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Ostracism – being ignored and excluded – is a painful experience that generates impulses to engage in behaviors that serve to cope with the resulting distress. For some, that may include behaviors that can promote re-inclusion (e.g., Carter-Sowell et al., 2008); for others it may include aggression (Warburton et al., 2006); and for others, self-medication with alcohol (e.g., Rabinovitz, 2014). However, less is known about what role acute alcohol intoxication may play in a person's response to ostracism. This study represents an initial controlled investigation of alcohol's effects on psychological and aggressive reactions to ostracism to address the question of how alcohol affects responses to being excluded.

Ostracism is a robust phenomenon that elicits negative affect across cultures (Fiske & Yamamoto, 2005) and degrees of familiarity (Nezlek et al., 2012). Even ostracism from despised outgroups (Gonsalkorale & Williams, 2007) elicit such experiences. Humans are sensitive to cues indicating that their goals are impeded by others and this activates powerful emotional experiences that motivate behavior to compensate. Some examples include prosocial behavior to reestablish social connection (Maner et al., 2007) or aggression to provoke acknowledgment (Wesselmann et al., 2015).

Ostracism, Alcohol, and Behavior

Laboratory research suggests that when people feel excluded or strong negative affect, they are more likely to use alcohol to cope (Rabinovitz, 2014). However, little is known about how alcohol may act as a moderator of how people experience and react to ostracism. Does it generally help or hurt? Alcohol Myopia Theory (Steele & Josephs, 1990) posits that alcohol intoxication constricts an inebriate's general cognitive faculties and imposes an attentional bias such that only the most salient cues are processed (i.e., attentional myopia). If instigating cues are most salient, alcohol intoxication greatly increases the likelihood of aggression (Taylor et al., 1979). However, if non-aggressive cues are most salient (e.g., if distracted), inebriates are less aggressive than their intoxicated, non-distracted counterparts under the same instigating circumstances (Gallagher & Parrott, 2011). Therefore, alcohol may be conceptualized as a moderator of situational instigation rather than a self-sufficient cause of aggressive behavior. Given the provocative nature of ostracism, Alcohol Myopia Theory proposes that alcohol intoxication should enhance the salience of social rejection cues, intensify the resulting negative affect it generates, and increase the likelihood of aggression. The extent to which alcohol influences aggressive behavior is also influenced by individual characteristics such as trait aggression, though evidence for the strength of this interaction is mixed (e.g., Giancola et al., 2012). Even so, recent reviews suggest that alcohol-facilitated aggression may be most evident for those who are not typically aggressive in provocative situations (Leonard & Quigley, 2017).

Only two studies have investigated the role of alcohol intoxication on affective reactions to ostracism. One field study recruited intoxicated patrons at a bar (mean breath alcohol concentration, or BrAC = 0.066%) and had them complete an ostracism paradigm on a tablet (Hales et al., 2015). Although BrAC was unrelated to affective reactions to social inclusion or exclusion, subjective intoxication predicted dulled affective experience. Those authors interpreted these findings as potential support for Pain Overlap Theory (Eisenberger & Lieberman, 2005), or the idea that alcohol's potential for physiological analgesia may

also confer dampening effects for emotional pain. A separate laboratory-based study involved alcohol administration with a community sample of hazardous drinkers who then experienced social inclusion and exclusion in a fixed sequence (Buckingham et al., 2016). The dose of alcohol administered in this study was moderate and resulted in a mean peak BrAC of 0.050%. Their results indicated that, while ostracism significantly reduced a sense of psychological well-being, alcohol intoxication did not moderate this relationship.

The studies reviewed above are important first steps in this area and give the impression that physiological alcohol intoxication has little influence on how people react to ostracism. Instead, other factors such as subjective intoxication appear to be more influential. However, we argue that limitations in study design make this conclusion preliminary. Specifically, Hales et al. (2015) subjected participants to ostracism after pulling them away from their friend groups at a bar (ostensibly, to which they would return shortly after participation). Further, the ostracism paradigm was completed in a barroom environment full of distractions —a concern given the attentional mechanism proposed by Alcohol Myopia Theory. Finally, the experimenters lacked control over participants' level of intoxication at the time of participation.

Buckingham and colleagues' (2016) laboratory alcohol administration design addressed some of the above limitations. However, the mean peak BrAC was 0.050% indicating a dose insufficient to potentiate aggressive behavior (Duke et al., 2011). Additionally, the pre-post experiment drop in BrAC (i.e., from 0.050 to 0.042) and the fixed sequence of the ostracism inclusion-exclusion conditions suggests that participants were on the descending limb of the BrAC curve during the ostracism manipulation. This presents a concern because, relative to those on the ascending limb, those on the descending limb may be no more or less aggressive than sober controls (Giancola & Zeichner, 1997).

Current Study

To address a number of the concerns outlined above, and to answer the calls for more research from both teams (Buckingham et al., 2016; Hales et al., 2015), the current study utilized a controlled laboratory design with an alcohol dosing strategy sufficient to achieve BrAC's in the ideal range for observing alcohol-related aggression (i.e., 0.080–0.120%; Duke et al., 2011) and keep participants on the ascending limb throughout the experimental situation. We included subjective intoxication as an exploratory variable to complement objective measures of alcohol intoxication and provide consistency with prior work (e.g., Hales et al., 2015) by observing what role it may play in the context of high physiological intoxication. Our design included three beverage conditions (i.e., Alcohol, Placebo, and Control) to delineate the influence of subjective intoxication relative to physiological intoxication on affective reactions and behavioral responses to ostracism. Importantly, we included the novel opportunity for participants to interact with an ostracizer following exclusion to examine alcohol's influence on retaliatory aggression. We also measured ostracism's impact on basic psychological needs (i.e., belonging, self-esteem, control, and meaningful existence) as an outcome typically evaluated in the ostracism literature.

The current study allowed an assessment of the ideas from Alcohol Myopia Theory, namely that alcohol, relative to other beverage conditions, will intensify the emotional and behavioral responses to ostracism. Although the general aggression literature has supported increased alcohol-related aggression for high, relative to low, dispositional aggressiveness (see Giancola, 2012) a recent review of the intimate partner aggression literature concluded that alcohol-facilitated aggression may be most evident for those who are not typically aggressive in provocative situations (Leonard & Quigley, 2017). Considering Alcohol Myopia Theory's prediction that an alcohol-induced myopic focus on salient instigating cues (i.e., ostracism) impairs inhibitory faculties, we account for trait aggressiveness to investigate whether the alcohol-aggression influence is more evident for those who are not typically aggressive. A meta-analysis has suggested that the effect of ostracism induced by the paradigm employed in this study (i.e., Cyberball; Williams et al., 2000) is equally strong for men and women (Hartgerink et al., 2015) so we do not examine gender in the current analyses. The study does not have the statistical power to settle inconsistencies in the literature, but it is nonetheless informative, and is reported as such. The following are hypotheses we derived from Alcohol Myopia Theory.

- H1: Alcohol will moderate participant affective reactions to ostracism. Specifically, we anticipate that those in the alcohol group, relative to placebo and no-alcohol control, will show greater affective reactivity in response to being ostracized and again after interacting with an ostracizer as indicated by greater changes in self-reported positive and negative affect ratings following each procedural event.
- H2: Alcohol, relative to other beverage conditions, will increase aggression toward an ostracizer during a competitive interaction and this effect will be moderated by trait physical aggressiveness. This effect will be indicated by aggressive selections of greater intensity in the alcohol group relative to the other beverage conditions and most pronounced for those low, relative to high, in trait physical aggressiveness.

Method

Participants

During an initial phone screening, potential participants ($N = 105$) were recruited from the community using flyers and online advertisements and assessed for their eligibility to participate in the study. Participants were ineligible if they self-reported that they: a) were less than 21 years of age; b) were over 230 pounds in weight (or, if over 6 feet tall and over 250 pounds) for health and safety reasons pertaining to the laboratory alcohol dose; c) had not self-administered an equal or greater quantity of alcohol in the past year than the weight-based standard dose to be administered in the laboratory; or d) reported a history of an alcohol or substance use disorder, substance-focused treatment history or interest in such treatment, or any other medical, legal, or other reason that would make alcohol consumption dangerous or unwise. The final sample consisted of otherwise healthy individuals who engaged in binge drinking (i.e., four or more drinks in a day for females; five or more drinks for males) at least once in the past year.

Participants deemed eligible from the initial phone screen (N = 97; 55.6% male, 80.4% White) were randomly assigned to one of three conditions: No-Alcohol Control (n = 34), Placebo (n = 32), or Alcohol (n = 31). Age (M = 22.68 [SD = 2.68]), gender, and race did not differ by condition, $F(1,95) = 0.42$, $p = .521$, X^2 (2, N = 97) = 0.05 $p = .974$, and Fisher's exact $p = .410$, respectively. This sample size was determined primarily based on resources available. A sensitivity power analysis was conducted based on this achieved sample size using G*Power (Faul et al., 2007), for a three-condition between-subjects one-way analysis of variance (this was selected because any interactions would be followed up with between-condition comparisons). The analysis indicated the study has 80% power to detect an effect size of $f = .32$ or greater, a relatively large effect. Given the limited power, the current investigation is considered preliminary. For their participation, participants were compensated $10/hour for their time in the study. The following protocol was approved by the Institutional Review Board of Purdue University and all participants provided written informed consent. The procedures were fully compliant with the National Institute on Alcohol Abuse and Alcoholism (NIAAA)'s most recent guidelines for alcohol research with human subjects (NIAAA, 2005).

Procedure

Participants deemed initially eligible from a phone screen were scheduled for the laboratory session. They were told that the purpose of the study was to examine the effect of alcohol on reaction time and mental visualization under social conditions, and that those randomly assigned to the alcohol condition would receive a dose of alcohol mixed with orange juice equivalent to approximately 3–4 mixed drinks, depending on their height and weight. Additionally, they were informed that their participation may require between 2–8 hours (compensated at $10/hr) depending on their beverage condition, as those who receive alcohol would need time to metabolize the dose and reach a safe BrAC level below 0.030% before dismissal. Due to the possibility of receiving alcohol, all participants were required to have arranged transportation to and from the laboratory.

Upon arrival to the laboratory, participants were seated along with two confederates of the study. These confederates served as the ostensible participants and "competitors" in the ostracism and aggression tasks, respectively. Confederates were always either male-female or female-female confederate pairs named "Sam" and "Alex." Although ostracism is equally distressing regardless of whether the ostracizer is of the same or opposite gender (e.g., Bolling et al., 2016), the "competitor" in the aggression paradigm (always named "Alex") always matched the participant. The experimenter greeted all three and escorted each to separate rooms.

Initial eligibility was confirmed before consenting into the study, including a baseline BrAC reading of 0.000%, denial of alcohol or drug use for the past 24 hours and food or drink for the past 4 hours, two negative urine pregnancy screen for females, and pre-arranged transportation home from the laboratory. Height and weight measurements were taken for the beverage dosing calculation. Participants then rejoined the study confederates in a larger laboratory room for briefing on the study procedures. They were informed that they would complete the paradigms for ostracism and aggression (described as "mental visualization"

and “competitive reaction time” tasks, respectively) as a group, but in separate rooms, linked through networked computers. The group was informed of their randomized beverage condition assignment. If the participant had been randomized to the Alcohol or Placebo condition, the group was informed that they would receive beverages containing alcohol and orange juice; if randomized to the Control condition, the group was informed that they would be receiving only orange juice. After the briefing, one study confederate was escorted back to their experiment room before the participant to maintain the impression of confederate authenticity.

Once the participant was back in their experiment room, they completed the Aggression Questionnaire and baseline Affect and Basic Needs Measure on the computer using Inquisit software (Millisecond Software, 2004). As participants were completing these questionnaires, the experimenter prepared their beverages. Questionnaires complete, participants were administered their first of two beverages; the second was administered 10 minutes after the first to control for rate of drinking and prevent emesis.

After Alcohol participants reached a BrAC of 0.080% (or a period of 25 minutes after the first beverage for yoked Placebo and No-Alcohol Control participants), the experimenter collected pre-ostracism BrAC readings and subjective intoxication ratings for all conditions. Next, the experimenter left the room and participants were ostracized using Cyberball (Williams et al., 2000). When Cyberball ended, participants completed their post-ostracism Affect and Basic Needs Measure alone on the computer before starting the aggression paradigm (i.e., the TAP) with the confederate “Alex” as their ostensible opponent. Following the TAP, participants completed their post-aggression Affect and Basic Needs Measure alone on the computer. When participants indicated that they were finished, the experimenter returned and collected post-aggression BrAC readings and subjective intoxication ratings.

At the conclusion of the experiment, participants were asked a series of questions to assess their suspicion of the true purpose of the study. Specifically, they were asked if the tasks were good measures of reaction time and how they felt about their own performance as well as that of the other participants. Then, participants in the Placebo and Control conditions were debriefed and given psychoeducational materials about alcohol consumption, risky drinking behavior, and local substance-focused treatment resources. Participants in the Alcohol condition were debriefed in multiple stages (Gallagher & Parrott, 2011). These participants were partially debriefed immediately following the conclusion of the aggression measure and provided with a small meal and entertainment until their BrAC reached 0.030% at which point they were debriefed fully. All participants were explicitly informed of the experiment’s aims as well as the true nature of the ostracism and aggression tasks. Participants were compensated and dismissed.

Materials

Aggression Questionnaire (Buss & Perry, 1992).—This 29-item instrument consists of subscales that measure four aspects of aggressiveness: Physical Aggression, Verbal Aggression, Anger, and Hostility. The current study used the 9-item Physical Aggression scale that measures a person’s tendency to use physical aggression across situations. This scale consists of items such as (e.g., “Once in a while I can’t control the urge to strike

another person") and ratings were made from 1 ("Extremely uncharacteristic of me") to 5 ("Extremely characteristic of me"; α = .71).

Affect and Basic Needs Measures.—Participants reported their levels of positive and negative affect as well as basic psychological needs (belonging, self-esteem, control, and meaningful existence) on three occasions: baseline (prior to ostracism), post-ostracism (reflexive; immediately following ostracism), and post-aggression (reflective; immediately following the aggression paradigm). Negative affect and positive affect were measured with four-item scales (i.e., "bad," "unfriendly," "angry," and "sad"; "good," "friendly," "pleasant," "happy," respectively). Basic psychological needs were measured with the Need Threat Scale (Williams, 2009). This scale is a 12-item composite with 3 items measuring each of the four basic needs threatened by ostracism with reverse-coding where appropriate (e.g., belonging, "I felt rejected", self-esteem, "I felt good about myself", control, "I felt powerful", and meaningful existence, "I felt non-existent"). Following research in this area (Williams, 2009), the 12 items were averaged together to form a single composite index of basic needs satisfaction (α range = .84 – .91). For affect and basic needs scales, each item was rated using a scale of 1 ("Not at all") to 5 ("Extremely") and the scale score represents the mean of the scale items.

Breath-alcohol concentration.—Breath alcohol concentration (BrAC) was assessed with the AlcoSensor IV from Intoximeters, Inc.

Subjective intoxication.—As earlier research found that subjective intoxication played an important role in predicting alcohol's effects following ostracism (Hales et al., 2015), we also included a measure in our study. Following each BrAC measurement, the experimenter asked the participant, "On a scale of '1' to '10'—with '1' being sober and '10' being completely drunk—how intoxicated do you feel right now?"

Cyberball.—Cyberball (Williams et al., 2000) was used for the ostracism paradigm. Participants were told that the purpose of the task is to practice their mental visualization skills, and they are to mentally picture where they are playing, with whom, the weather conditions, etc. For this study, all players experienced the ostracism condition of Cyberball in which they received the ball only once and then watched as the other two avatars threw the ball back and forth for 29 tosses—about 2 minutes. Following Cyberball, participants also rated the extent to which they felt 1) ignored and 2) excluded (Spearman-Brown split half reliability = .88), and also estimated the percentage of ball tosses they received. These were only measured once, so comparisons are not possible, but mean-levels can suggest whether the game was registered as an ostracism experience.

Taylor Aggression Paradigm.—The Taylor Aggression Paradigm (Taylor, 1967) is a competitive reaction time task used to measure aggressive behavior. In the white noise version of the task, participants select the intensity (0–10 scale) and duration (0–10 scale) of a sound blast to be administered via headphones to their opponent if the participant should win that trial (e.g., Anderson & Dill, 2000). The sequence was standardized so that all participants lose 13 of the 25 trials. From the perspective of the study aims, we were not concerned with participant reaction time on these trials, but instead with the intensity,

or volume, of the sound blasts that they delivered to their opponent. Sound blast intensity was interpreted as a measure of overt aggression (Bushman, 2002; Verona et al., 2007). We did not specify a priori which measure would constitute a primary index of aggression or whether they would be combined. A review of the literature (e.g., Elson et al., 2014) suggests that *intensity* is the most relevant to our research interests, and thus we focus on that in the reported analysis.

Beverage administration.—Participants randomly assigned to the Alcohol condition were given a mix of both alcohol and orange juice. They were administered two drinks consisting of an overall dose of 0.99 g/kg (males) or 0.90 g/kg (females) per body weight of 95% ethanol mixed in a 1:5 ratio with Tropicana orange juice (Giancola, 2002). Participants in the Placebo condition received a beverage of equal volume consisting of orange juice with ethanol spritzed on the rim of the glasses to give the aroma and taste of receiving alcohol. This condition was necessary to examine any effect that participants' expectations of alcohol consumption had on their subsequent affect and basic needs measures and aggression toward an ostracizer. Participants in the Control condition received a beverage of equal volume consisting solely of orange juice and were told explicitly that they were not receiving any alcohol.

Results

Manipulation Checks and Preliminary Analyses

Participants generally felt ignored and excluded, with a high response to the Ignored/Excluded items (overall $M = 3.99$ out of 5, $SD = 1.11$; significantly higher than scale midpoint, one-sample t-test, $t(96) = 8.76$, $p < .001$, $d = .89$). There were no significant differences across conditions, $F(2, 94) = 1.34$, $p = .268$, $\eta_p^2 = .03$. Similarly, participants correctly reported receiving a low percentage of ball tosses (overall $M = 7.00$, $SD = 4.604$, significantly lower than a fair inclusion rate of 33%, one-sample t-test, $t(96) = -55.61$, $p < .001$, $d = -5.64$) and there were no significant differences across conditions, $F(2, 94) = 1.02$, $p = .364$, $\eta_p^2 = .02$. Subjective intoxication differed significantly across conditions, with those in the Alcohol condition ($M = 5.48$, $SD = 1.45$) feeling more intoxicated than those in the Placebo condition ($M = 2.42$, $SD = 1.41$), and all participants in the Control condition reporting the scale minimum of "1", $F(2, 90) = 123.93$, $p < .001$, $\eta_p^2 = .73$. Breathalyzer readings for the Alcohol condition showed BrAC's consistently above 0.080% throughout the experimental procedure (pre-ostracism, $M = 0.099\%$ [$SD = 0.025$]; post-aggression, $M = 0.093\%$ [$SD = 0.020$]). This indicates that, overall, participants were on the ascending limb of the BrAC curve during the ostracism paradigm and reached peak absorption within the 0.080–0.120% range by the conclusion of the aggression paradigm.

H1: Alcohol Will Moderate Affective Reactions to Ostracism

A set of 3 × 3 mixed analyses of variance, with *stage* (baseline v. post-ostracism v. post-aggression) as a within-subjects factor, and beverage condition (Alcohol v. Placebo v. Control) as a between-subjects factor showed that participants responded to ostracism in a typical fashion, and that these responses were not significantly moderated by condition (see Table 1 for means and standard deviations).

All three outcome measures showed significant main effects of measurement occasion, weakest $F(2, 188) = 49.83$, $p < .001$, $\eta_p^2 = .35$. Comparing between specific measurement occasions, compared to baseline, participants felt significantly worse on all three measures following ostracism, weakest $t(188) = 8.73$, $p < .001$, $d = 1.14$. Following the aggression task, participants reported significantly better outcomes relative to post-ostracism, weakest $t(188) = -7.12$, $p < .001$, $d = -0.75$, but this recovery appears to be incomplete, as all three outcome measures continued to be significantly lower relative to the initial baseline measurement, weakest $t(188) = 2.82$, $p = .018$, $d = 0.35$. In no case was the interaction between measurement occasion and alcohol condition significant, strongest $F(4, 188) = 2.06$, $p = .088$, $\eta_p^2 = .04$.

Positive Affect.—Overall, positive affect varied significantly depending on measurement occasion, main effect, $F(2, 188) = 84.87$, $p < .001$, $\eta_p^2 = .47$. Compared to baseline, positive affect decreased following exclusion, $t(188) = -11.20$, $p < .001$, $d = -1.43$, and increased significantly following the aggression task, $t(188) = 7.99$, $p < .001$, $d = 0.78$, but not all the way back to baseline $t(188) = -6.08$, $p < .001$, $d = -0.62$. The stage x beverage condition interaction was not significant, $F(4, 188) = 2.06$, $p = .088$, $\eta_p^2 = .04$.

Subjective intoxication.—We did not directly randomize participant's level of subjective intoxication, but this did vary as a byproduct of randomized beverage condition. To probe whether this individual variation is more predictive under *actual* versus *placebic* alcohol conditions, we performed the following exploratory analysis. We conducted a set of regression analyses predicting each outcome from condition, subjective intoxication, and their interaction, controlling for baseline measures (Process macro; model 1; Hayes, 2013). These tests were conducted both for post-ostracism and post-aggression responses to assess recovery (controlling for both baseline and post-ostracism responses). For participants in the Placebo condition, level of drunkenness was uniformly reported as feeling sober and not associated with improved recovery for any outcome. By exploring whether subjective intoxication moderates the effect of Alcohol or Placebo condition, this analysis asks whether actual alcohol intoxication has effects only among those who report feeling highly intoxicated.

Subjective intoxication did not interact with beverage condition to predict any of the three outcomes post-ostracism (all Fs < 1). However, it did significantly interact with condition in predicting the amount of recovery of positive affect (i.e., scores in the post-aggression stage controlling for earlier measures), $b = 0.28$, $t(52) = 2.73$, $p = .009$ (see Figure 1), negative affect, $b = -0.28$, $t(52) = -2.36$, $p = .022$, and basic needs, $b = 0.18$, $t(52) = 2.56$, $p = .013$. For participants in the Placebo condition, feeling drunk was not associated with improved recovery for any outcome, strongest simple effect, $b = -0.10$, $t(52) = -1.40$, $p = .167$. But for those who were actually intoxicated (Alcohol condition), feeling more drunk was associated with significantly greater post-aggression reductions in negative affect and recovery of positive affect and basic needs (simple effects, $b = -0.21$, $t(52) = -2.49$, $p = .016$; $b = 0.18$, $t(52) = 2.50$, $p = .016$; and $b = 0.13$, $t(52) = 2.64$, $p = .011$, respectively).

H2: Trait Physical Aggressiveness Will Moderate the Effect of Alcohol on Aggression.

Aggression selection means by beverage condition are presented in Table 2. Regression analyses did not show a main effect for beverage condition on ostracism-directed aggression, $F(2, 94) = 2.98$, $p = .056$, $\eta_p^2 = .06$. However, beverage condition interacted with participant Physical Aggression to predict aggressive behavior, $F(2, 91) = 3.75$, $p = .027$, $R\Delta^2 = .07$ (see Figure 2). Simple effects tests showed that alcohol, relative to the other conditions, did not significantly increase noise blast intensity in those who were high (+ 1 *SD*) in Physical Aggression, $F(2, 91) = .07$, $p = .936$; alcohol v. control $b = -.26$, $t(91) = -.36$, $p = .720$. However, at low levels of Physical Aggression (− 1 *SD*), alcohol increased the intensity of noise blasts compared to the control beverages, $b = 2.07$, $t(91) = 2.71$, $p = .008$.

Discussion

The current study represents an initial investigation of whether acute alcohol intoxication may play a role in affective and aggressive responses to ostracism. Although we hypothesized that intoxicated participants would experience greater change in negative and positive affect as a reaction to being ostracized due to Alcohol Myopia Theory's prediction that alcohol increases the salience (i.e., myopia) of the exclusion situation, our results did not support this. Instead, all participants, regardless of beverage condition, reacted to ostracism adversely as indicated by reductions in positive affect and basic needs fulfillment as well as increased negative affect. This effect is consistent with prior research investigating lower-dose alcohol-involved reactions to ostracism (i.e., Buckingham et al., 2016; Hales et al., 2015) and potentially speaks to the potency of the ostracism paradigm (i.e., Cyberball).

Similarly, we hypothesized that intoxicated participants would evidence alcohol-facilitated change in negative and positive affect from post-ostracism to post-aggression timepoints through a myopic focus on situational cues. This hypothesis was partially supported as intoxicated participants who felt more intoxicated, relative to other conditions, experienced significantly greater recovery across the affective and basic needs outcomes. The novel design of our study allowed participants the opportunity to aggress toward one of their ostracizers. As ostracism can elicit aggression intended to demand attention from ostracizers (e.g., Warburton et al., 2006) and lashing out helps rejected individuals repair one's mood by increasing positive affect (Chester & DeWall, 2017), our results suggest that alcohol may facilitate recovery from affective and psychological injury following ostracism through enhanced focus (i.e., myopia) on potentially pleasurable aspects of retaliatory aggression. However, it is possible that aggression toward a non-ostracizer may also function similarly and should be explored in future research.

Our second hypothesis anticipated that, consistent with Alcohol Myopia Theory, alcohol intoxication would increase aggression toward an ostracizer overall and exert the greatest effect for those low, relative to high, in trait physical aggression. Our results partially supported this hypothesis. Although we did not observe a main effect for beverage condition, it interacted with trait physical aggression as anticipated. In light of Alcohol Myopia Theory, we may interpret this finding to mean that intoxication increased aggression through enhanced focus on situational instigating cues that may otherwise be dismissed by those who are not typically aggressive.

Limitations

The generalizability of the study results may be limited by the low ecological validity of the laboratory environment. Certainly, there are contextual differences between a university laboratory and a barroom or house party, including expectations for social conventions and the effects of alcohol. Even so, we consider the high internal validity to be a strength, particularly when alcohol's effects on behavior may operate via an attentional mechanism (Steele & Josephs, 1988) and complements the external validity of earlier field research (Hales et al., 2015).

We did not include a direct manipulation check to assess whether participants in the Placebo condition were aware that they did not receive a high dose of alcohol. Without an explicit check, it is more difficult to determine whether the placebo condition fully produced the conditions necessary to observe potential alcohol expectancy effects. For this reason, future research using a placebo design would benefit from direct inquiry or funneled debriefing process. Even so, a non-trivial proportion (28%) of those in the Placebo condition selected subjective intoxication ratings above the scale minimum, with a group mean significantly greater than the control but lower than the alcohol group—a pattern comparable to other placebo-controlled alcohol administration studies (e.g., Abbey et al., 2003; Testa et al., 2006). Additionally, no participants reported suspicion of a placebo when asked about the study's purpose. Taken together, these data suggest that the placebo condition was at least partially successful; participants believed that they received an alcoholic beverage and evidenced some variability in the extent to which they felt intoxicated.

Our study's alcohol dose produced peak BrAC's in the ideal range to observe alcohol's effects on aggression (pre-ostracism BrAC, $M = 0.099\%$; post-aggression, $M = 0.093\%$). However, prior alcohol-aggression research has shown increased aggression for those who are on the ascending, but not descending limb of the BrAC curve (Giancola & Zeichner, 1997) and our values indicate that participants achieved peak BrAC at some point near the end of the experiment. Measuring BrAC following ostracism or before the aggression paradigm would have required contact with the experimenter and we did not want to potentially interfere with the ostracism manipulation by doing so. Future alcohol-aggression research should consider means of assessing BrAC curve status more frequently and with minimal interpersonal contact to alleviate concerns about participants on the descending limb during an aggression paradigm.

Our sample consisted largely of social-drinking college-age students. As approximately 44.4% of college students engage in binge drinking to reach study-approximate levels of intoxication, ours is certainly a relevant sample. Even so, it will be important to replicate the current findings in samples of more hazardous drinkers.

While prior research has not supported gender differences in participant responses to the Cyberball ostracism paradigm (Hartgerink et al., 2015), studies with much larger samples have indicated a medium effect ($d = .51$) for alcohol-facilitated aggression in men and small effect ($d = .29$) in women (Giancola et al., 2009). A limitation of the current study is that it is underpowered to detect potential gender differences. Future studies investigating

alcohol-related aggression instigated by ostracism should strive to recruit samples large enough to account for potential differences across gender.

Research Implications

The results raised an important question: all groups experienced recovery after aggression but why was alcohol-facilitated recovery observed only for those who felt more intoxicated? Alcohol Myopia Theory predicts alcohol's effects are driven by the pharmacological effects of alcohol intoxication so any observed effects should be driven by the dose alone. However, alcohol appeared to facilitate recovery of affect and psychological well-being, potentially through increased salience of pleasurable aspects of retaliatory aggression toward an ostracizer, but only for those who feel more intoxicated. The nature of this interaction is intriguing and must be replicated in future research. Another aspect that must be explored is the variability in how people respond phenomenologically to alcohol, which may be due in part to differences in alcohol tolerance, or, familiarity with alcohol intoxication (Hiltunen, 1997). Those with relatively higher alcohol tolerance tend to feel less intoxicated at the same alcohol dose (Portans et al., 1989). Also, those with a higher tolerance tend to have more developed compensatory strategies to counteract the consequences of intoxication (Fillmore & Vogel-Sprott, 1996). Should we therefore expect that cognitive consequences of alcohol intoxication (i.e., myopia) are most evident in those who feel more intoxicated from a high alcohol dose as they are potentially less tolerant and lack robust compensatory strategies? Future research will need to carefully investigate the correspondence among physiological alcohol tolerance, subjective intoxication, and alcohol myopia in predicting behavioral responses to instigating stimuli to parse the heterogeneity in the literature regarding alcohol's effects on human experience.

Another important question raised by the results is: what role do dispositional characteristics play in acute risk for alcohol-related behavioral outcomes? The literature is mixed regarding the direction of conditional effects shared between trait aggressiveness and alcohol intoxication, with some showing alcohol-facilitated aggression only for highly-aggressive people (e.g., Giancola et al., 2012) generally and others observing this relationship only when situational instigation is low relative to high (Miller et al., 2009). Leonard and Quigley (2017)'s recent review of the alcohol-aggression literature concluded that a threshold model may be the most appropriate conceptualization such that individual characteristics (e.g., trait aggressiveness) influence which cues may be salient at baseline and alcohol's influence on behavior should depend, at least in part, on these traits. So, alcohol's effects on a behavior of interest (e.g., aggression) should be most evident in those who are below the threshold for that behavior when sober. To our knowledge, ours is the first study to indicate this threshold pattern such that alcohol increased aggression in low, but not high, trait aggressive individuals when situational instigation is uniform (i.e., all ostracized) but there is much more work to be done to parse the heterogeneity in alcohol-related aggression.

Clinical Implications

The results of this preliminary study suggest that alcohol may enhance the significance of provocation to increase aggressive urges in those who are not typically aggressive. Conversely, alcohol intoxication appears to do little for those who tend to be aggressive

anyway; this aggressive tendency leaves little opportunity for alcohol to have any effect. If replicated, these findings have important implications for targeted interventions. For example, alcohol-focused harm reduction may be a more appropriate intervention for someone with low trait aggression while the aggressiveness itself may be the target for those who are characteristically aggressive.

This study represents an important next step for understanding who is at risk for alcohol-facilitated aggression following ostracism. The results raise questions that should be addressed going forward as they have different implications for risk assessment and intervention for alcohol-facilitated aggression. As stated above, these findings will need to be replicated in heavy-drinking samples to delineate the influence of other alcohol-related factors on intoxicated aggression and affect recovery. Continued identification of dynamic aggression risk parameters in the context of ostracism and acute alcohol intoxication will get us closer to understanding who is at greatest risk, under which conditions, and what intervention or prevention efforts may be most appropriate.

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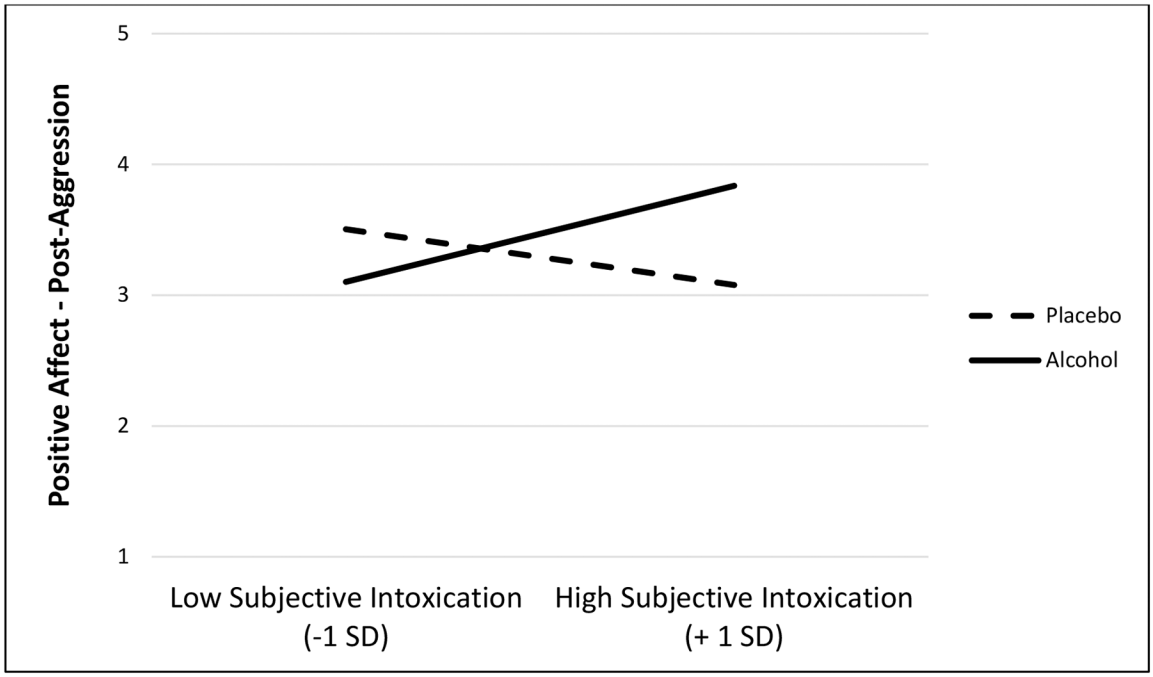

Figure 1.

The relationship between subjective intoxication and post-aggression positive affect in the Placebo and Alcohol conditions. Scale range: 1 to 5. Control group is omitted because they (correctly) reported the subjective intoxication scale minimum. Covariates: Baseline positive affect and post-ostracism positive affect. Interaction, $b = 0.28$, $t(52) = 2.73$, $p = .009$. Effect in Placebo condition, $b = -.10$, $t(52) = -1.40$, $p = .167$. Effect in Alcohol condition, $b = 0.18$, $t(52) = 2.50$, $p = .016$.

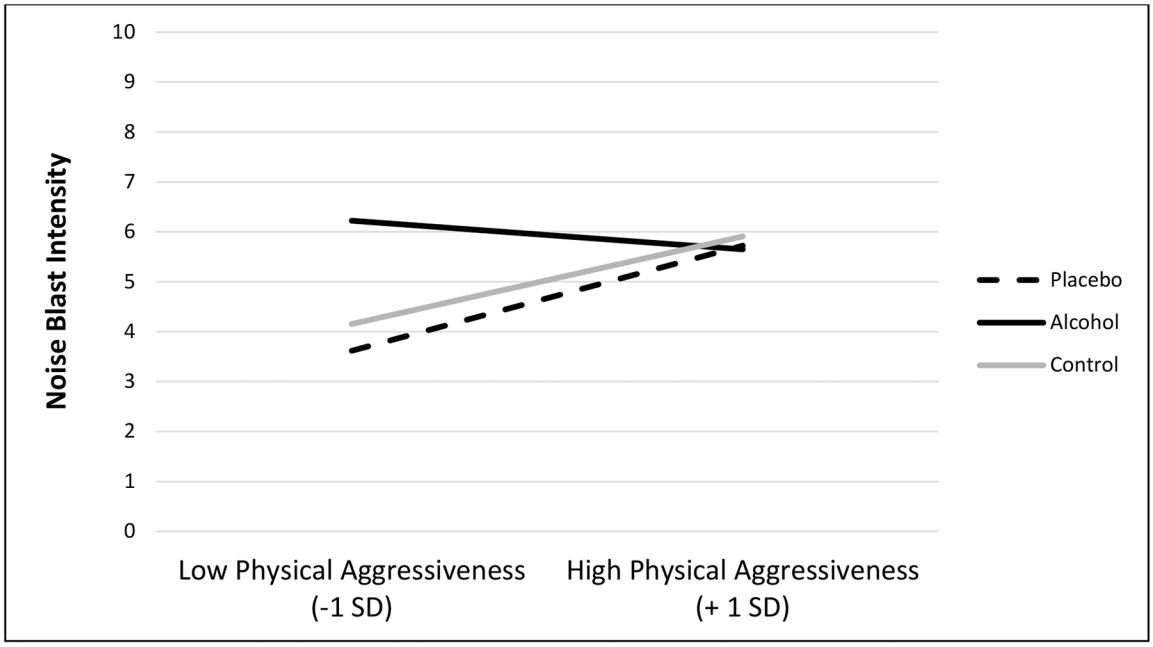

Figure 2.

The effect of beverage condition at low and high levels of Physical Aggression. Measure range: 0 to 10. Interaction, $F(2, 91) = 3.75$, $p = .027$, $R\Delta^2 = .07$. Simple effect at low (−1 *SD*) of Physical Aggression, $b = 2.07$, $t(91) = 2.71$, $p = .008$. No effect of beverage condition at high levels of Physical Aggression, $F(2, 91) = .07$, $p = .936$.

Table 1.

Means and standard deviations for dependent variables (positive affect, negative affect, and basic psychological needs) by beverage condition across measurement occasions.

	Negative Affect			Positive Affect			Basic Psychological Needs		
	Baseline	**Post-ostracism**	**Post-aggression**	**Baseline**	**Post-ostracism**	**Post-aggression**	**Baseline**	**Post-ostracism**	**Post-aggression**
Condition:									
Control (n = 34)	1.57_{a} (.56)	2.29_{a} (.91)	1.64_{a} (.79)	4.04_{a} (.67)	3.00_{a} (.82)	3.53_{ab} (.84)	4.14_{a} (.55)	2.64_{a} (.76)	4.06_{a} (.53)
Placebo (n = 32)	1.43_{a} (.60)	2.13_{a} (.83)	1.71_{a} (.78)	3.91_{a} (.65)	2.95_{a} (.80)	3.41_{a} (.66)	4.17_{a} (41)	2.79_{a} (.64)	3.90_{a} (.41)
Alcohol (n = 31)	1.37_{a} (.45)	2.54_{a} (1.14)	1.59_{a} (.66)	4.17_{a} (.53)	2.85_{a} (1.16)	3.86_{b} (.81)	4.24_{a} (.43)	2.57_{a} (.98)	4.11_{a} (.49)
Total	1.46_{1} (.54)	2.32_{2} (.97)	1.68_{3} (.74)	4.04_{1} (.62)	2.94_{2} (.93)	3.60_{3} (.79)	4.18_{1} (.47)	2.67_{2} (.80)	4.02_{3} (.48)
Stage x Condition Interaction	$F(4, 188) = 2.02$, $p = .093$, $\eta_p^2 = .04$			$F(4, 188) = 2.06$, $p = .088$, $\eta_p^2 = .04$			$F(4, 188) = 1.55$, $p = .190$, $\eta_p^2 = .03$		

Note: Ratings were made on a scale from 1 to 5. Standard deviations appear in parenthesis. Within columns, means not sharing subscripted letter are significantly different, $p < .05$. Within the Total row, means not sharing a subscripted number are significantly different, $p < .05$.

Table 2.

Means and standard deviations for aggression by condition.

	Intensity	Duration
Condition		
Control (n = 34)	4.96_{ab} (2.13)	4.85a (1.93)
Placebo (n = 32)	4.64_{a} (2.31)	4.76a (2.40)
Alcohol (n = 31)	5.88_{b} (1.72)	5.60a (1.91)
Omnibus test:	$F(2, 94) = 2.98$, $p = .056$, $\eta_p^2 = .06$	$F(2, 94) = 1.53$, $p = .222$, $\eta_p^2 = .03$

Note: Responses were made on a scale from 0 to 10. Standard deviations appear in parenthesis. Within columns, means not sharing subscripted letter are significantly different, Tukey post hoc $p < .10$.