The Impact of Alcohol on Ostracism

by

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Alcohol is consumed in a variety of social contexts and is generally thought to enhance social functioning (Fairbairn & Sayette, 2014). Yet relatively little research has evaluated how alcohol consumption influences unpleasant social interactions. Social exclusion, or ostracism, is an aversive experience that can prompt emotional and interpersonal turmoil across situations (Williams, 2001). Alcohol may influence both prevalence of and reactions to ostracism. Evaluation of how this negative experience relates to drinking is necessary to further understand social drinking experiences and in particular the role of alcohol when coping with ostracism.

Many laboratory studies of alcohol in social contexts have relied on confederates to create social drinking environments. Research on ostracism has also relied on experimentally manipulating interactions using confederates, in order to induce experiences of exclusion. Although such paradigms provide ideal conditions for testing causal relationships, use of tightly scripted interactions creates atypical social experiences that preclude investigation of the prevalence of naturally arising moments of ostracism or the reciprocal interpersonal influence found in unscripted interactions. The present study employed a novel, unscripted methodology that assessed naturally occurring ostracism during a social drinking interaction. The current research had three primary aims:

Aim 1: To examine the effect of alcohol on the prevalence of ostracism during face-to-face social interactions.

Aim 2: To examine the effect of alcohol on individuals' behavioral mimicry of interaction partners while being ostracized.

Aim 3: To examine the effect of alcohol on frequency of sipping while being ostracized.

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1.0 BACKGROUND AND SIGNIFICANCE

Alcohol has played a prominent role in cultural practices worldwide for centuries (Mandelbaum, 1965). Alcohol remains one of the most widely used and socially accepted drugs (Substance Abuse and Mental Health Services Administration, 2013; Anderson, 2006; Wallace Jr et al., 2002; Grønkjær, Curtis, De Crespigny, & Delmar, 2011). Its acceptance is evidenced by its pervasiveness across an array of social occasions (e.g., dinner parties, concerts, tailgating for sporting events) (Grønkjær, Curtis, De Crespigny, & Delmar, 2013; Glassman, Werch, Jobli, & Bian, 2007). Despite its status as a social drug, decades of laboratory research have primarily tested individuals consuming alcohol in isolation. Fairbairn and Sayette (2014) report that across eight alcohol reviews published in *Psychological Bulletin* since 1980, less than 5% of studies considered alcohol and its effects in social context. Even research examining the effects of alcohol on *social* anxiety has tended to test participants in isolation (e.g., Sayette & Wilson, 1991; Steele & Josephs, 1988). Ignoring social context limits the ways in which researchers can investigate social factors that likely influence typical drinking experiences.

There has been some research on alcohol that has incorporated social context, and many of these studies indicate that alcohol can enhance social experiences. For example, alcohol has been found to facilitate group bonding (Kirchner, Sayette, Cohn, Moreland, & Levine, 2006; Sayette, Creswell, et al., 2012), increase self-reported elation (Smith, Parker, & Noble, 1975), and increase communication (Lindfors & Lindman, 1987). Alcohol's effects on negative social

experiences, such as discomfort during interracial interactions (Fairbairn, Sayette, Levine, Cohn, & Creswell, 2013) and aggression toward one's interaction partner (Lang, Goeckner, Adesso, & Marlatt, 1975), also have been examined. However, there are other negative experiences that have yet to be fully explored within a social drinking context.

Social rejection and exclusion are particularly important negative social experiences that can accompany drinking. A recent analysis suggested that reduced perception of rejection may explain much of the rewarding effects of alcohol in social settings (Fairbairn & Sayette, 2014). Yet prior research examining the relation between alcohol and social rejection has often either failed to incorporate a social context or artificially manipulated the rejection experience (see *Naturally Occurring Ostracism* section below for elaboration on this issue), and results of these studies have been mixed (cf. Bacon, Cranford, & Blumenthal, 2015; Higgins & Marlatt, 1975). Incorporating social context into the study of alcohol and rejection holds promise for addressing a gap that currently exists in this literature.

1.1 OSTRACISM

Ostracism is a phenomenon that pervades human societies (Gruter & Masters, 1986). While exact definitions vary[1], it typically refers to being excluded, ignored, singled out, or isolated from social interactions (Masters, 1986; Williams, 2009). Experiences of ostracism prompt feelings of self-doubt and consequently induce emotional distress (Kelly, McDonald, & Rushby, 2012). Specifically, it is proposed that these experiences threaten four fundamental social needs:

[1] Throughout this paper, the terms social exclusion and rejection will be used interchangeably with ostracism.

belongingness, self-esteem, perceived control over one's environment, and sense of a meaningful existence (Williams, 2009). Evidence suggests ostracism worsens self-esteem (Zadro, Williams, & Richardson, 2005), mood (Gonsalkorale & Williams, 2007), anger (Chow, Tiedens, & Govan, 2008), psychological health (Hitlan, Cliffton, & DeSoto, 2006), and can severely disturb or destroy close relationships (Williams, 2001).

Due to its negative consequences, ostracism has interested researchers for decades. It can be detected in subtle forms with regard to both intensity and duration, which facilitates its investigation in laboratory settings (Williams, 2001; 2009). Ostracism has been experimentally manipulated in different ways, such as varying the extent to which participants are greeted (Zuckerman, Miserandino, and Bernieri, 1983), telling participants the degree to which group members accept them (Dittes, 1959; Snoek, 1962), and controlling participants' inclusion in conversations (Insko & Wilson, 1977; Pepitone & Wilpizeski, 1960). These experiments and others using confederates reveal particular experiences that can elicit feelings of ostracism, including receiving minimal eye contact, being abruptly excluded from a game or group discussion, or being physically distanced from peers (Williams, 2001; Smith & Williams, 2004; Carter-Sowell, Chen, & Williams, 2008; Molden, Lucas, Gardner, Dean, & Knowles, 2009; Gruter & Masters, 1986). The proposed study aimed to complement this body of research by incorporating an unscripted paradigm that observed ostracism that emerged organically.

1.2 MIMICRY AS AN ADAPTIVE RESPONSE TO OSTRACISM

While early research on ostracism focused on emotional and cognitive consequences of feeling ostracized, more recently behavioral responses to ostracism have been investigated. Specifically,

nonconscious behavioral mimicry has been identified as a functional response for excluded individuals (Lakin, Chartrand, & Arkin, 2008). People mimic a variety of their peers' behaviors such as postures, facial expressions, and food and drink consumption, often without awareness of their doing so (Chartrand & Bargh, 1999; Larsen, Engels, Souren, Granic, & Overbeek, 2010; Hermans et al., 2012). Evidence suggests people mimic behaviors of both close and less established associates (Lakin & Chartrand, 2012). Behavioral similarity increases the harmony of interactions (Chartrand et al., 2005), thus, it is unsurprising that mimicry enhances liking (Chartrand & Bargh, 1999) and closeness (Ashton-James, van Baaren, Chartrand, Decety, & Karremans, 2007) among interaction partners. In fact, individuals with a desire to affiliate may be more likely to mimic their peers (Cheng & Chartrand, 2003; Lakin & Chartrand, 2003).

Potential responses to social exclusion often conflict, as people may wish to restore their belongingness, while also limiting opportunities for their peers to further reject them. Inasmuch as excluded individuals try to address both concerns, they are likely to make inconspicuous and relatively indirect reaffiliation attempts (Molden & Maner, 2013). Subtle, nonverbal efforts to reconnect are unlikely to be overtly rejected (Lakin, Chartrand, & Arkin, 2008), providing support for behavioral mimicry as a functional response to exclusion. Lakin and Chartrand (2012) argue that since ostracism depletes self-regulatory ability, the limited cognitive resources required for behavioral mimicry make it an adaptive response for those who wish to reaffiliate after exclusion. As exclusion reduces one's sense of belonging and behavioral mimicry increases affiliation, mimicry may help to restore threatened belongingness needs after being ostracized (Lakin & Chartrand, 2012). Furthermore, increasing behavioral similarity among group members minimizes the likelihood that one will stand out, which would protect against that individual becoming a target of future ostracism (Chartrand & Bargh, 1999). Past research

suggests that individuals do respond to ostracism and failed affiliation attempts with mimicry (Lakin & Chartrand, 2003; Over & Carpenter, 2009; Lakin, Chartrand, & Arkin, 2008). The present study examined behavioral mimicry during periods of naturally occurring ostracism.

1.3 SIPPING

Recently, sipping has been utilized to index the micro-components of imitation of alcohol consumption (Larsen et al., 2010). Sipping is the route of beverage administration in nearly all human alcohol studies and is an easily monitored behavior. In the context of the proposed study, it is an ideal measure of mimicry as it can be objectively identified – as opposed to past measures of mimicry based on less established definitions and that aim to capture less precisely observed behaviors (e.g., posture; Tiedens & Fragale, 2003). Sips can also be examined to determine if individuals change their drinking rates during certain periods of social interactions. Ostracism is stressful and, independent of mimicry, individuals may consume alcohol to cope with stress (Conger, 1956). Therefore, sipping rates may increase when individuals experience ostracism. The present study explored sipping behavior in response to ostracism.

1.4 POTENTIAL EFFECT OF ALCOHOL ON THE OSTRACISM EXPERIENCE

1.4.1 Prevalence of ostracism

Exploring the interplay between alcohol consumption and ostracism has potential to improve understanding of social drinking experiences. Researchers have recently begun to investigate the relationship between ostracism and alcohol (Hales, Williams, & Eckhardt, 2015; Bacon, Cranford, & Blumenthal, 2015; Rabinovitz, 2014; Maurage et al., 2012). Importantly, however, no prior study has examined whether alcohol influences the *occurrence* of ostracism. Prior research has established that alcohol increases social bonding (Sayette, Creswell, et al., 2012). Ostracism is a forced or involuntary break in social bonds (Masters, 1986); social bonding and ostracism therefore appear to be inversely related. Consequently, social interactions involving alcohol may be less prone to ostracism than those not involving alcohol.

1.4.2 Behavioral responses to ostracism

While social interactions may differ in their potential for ostracism depending on the presence of alcohol, alcohol may also affect behavioral *responses* exhibited by targets of ostracism. As with prevalence of ostracism, alcohol's effects on behavioral responses to ostracism have yet to be explored. Ostracism is regarded as a social stressor due to its ability to threaten social resources, such as belongingness, support, and self-esteem (Williams, 2001; Liu, Kwan, Lee, & Hui, 2013; Wu, Yim, Kwan, & Zhang, 2012). Therefore, it may be useful to consider theories of alcohol's effects on stress to inform expectations about alcohol's effect on behavioral responses to

ostracism, namely, behavioral mimicry and sip frequency. Interestingly, these theories appear to offer competing predictions about alcohol's effects.

Mimicry. Hull's (1981) self-awareness model of alcohol's effect on stress seems especially relevant to ostracism. It proposes that a tension-reducing effect of alcohol is achieved when stress is driven by negative self-evaluation. This model asserts that one's ability to encode information in terms of its self-relevance affects the degree of self-awareness. With greater self-awareness, one is more perceptive of, and more likely to respond to, self-relevant aspects of the environment. According to Hull (1981), alcohol obstructs self-relevant encoding, thereby decreasing both self-awareness and one's sensitivity to potential stressors involving adverse information about the self. To the extent that sensitivity to self-relevant information is required for individuals to adjust their behaviors to the demands of their environment, alcohol intoxication is believed to result in a decrease of adaptive behaviors (Hull, 1981). Ostracism induces stress related to negative self-evaluation (Sommer & Baumeister, 2002) and mimicry is an adaptive response to ostracism (Lakin & Chartrand, 2012). Because the self-awareness model posits alcohol should decrease sensitivity to self-relevant information, it follows that alcohol consumption should attenuate mimicry responses to ostracism.

The social attributional model (Fairbairn & Sayette, 2014) similarly predicts that alcohol would serve to decrease mimicry responses to ostracism. This approach draws from the self-awareness model and submits that the association between alcohol and positive social experiences is due to alcohol's ability to reduce fixation on social rejection, thereby facilitating access to social rewards. Also consistent with the social-attributional approach, Moberg and Curtin (2009) found that alcohol impairs one's ability to perceive social threat and that alcohol's effect is greatest when social rejection is unstable and/or self-relevant. Reasons for ostracism are

seldom entirely clear (Nezlek, Wesselmann, Wheeler, & Williams, 2012), making the threat of social rejection unstable. Therefore, the social attributional model predicts that alcohol would reduce one's perception of ostracism. Further, because perception of a stressor is necessary in order for individuals to adapt their responses to it (Gardner, Pickett, & Brewer, 2000), this model posits that alcohol consumption should reduce effort directed toward adaptive responding to ostracism (i.e., mimicry).

Alternatively, Steele, Southwick and Pagano's (1986) attention allocation model would seem to predict that one's environmental context determines the impact of alcohol on responses to ostracism. This model posits that alcohol limits one's perception to immediate cues in the environment and impairs cognitive abstracting capacity. When one is in the presence of both a stressor and a neutral or pleasant distractor, the most salient cue will dictate alcohol's effect on stress. When such a distractor is more salient than the stressor it will prevent individuals from attending to the stressor and thus, will reduce experience of stress. However, when there is no distractor or the stressor is the most salient cue, alcohol may result in greater focus on stressor-related thoughts and potentially increase associated negative affect.

Accordingly, when ostracism is the most immediate aspect of one's circumstance – which likely is often the case as social rejection is an extremely salient source of stress (Fairbairn & Sayette, 2014) – the attention allocation model suggests that an intoxicated individual will focus on being ostracized. Fixated attention on the social rejection would enhance awareness of it and seemingly facilitate increased effort at adaptive responding (i.e., increased mimicry).

Frequency of sipping. Sip mimicry may reflect individuals' attempts to reaffiliate during exclusion (Lakin & Chartrand, 2012), and thus could be considered an interpersonal coping strategy. Sip *frequency*, on the other hand, may reflect intrapersonal coping. Alcohol is often

consumed for coping purposes, as many expect alcohol to have a tension-reducing effect (Conger, 1956; Wilson, 1988; Sayette, 1999; Brown, 1985). Drinking to cope is associated with heavy levels of consumption (Cooper, Russell, & George, 1988; Farber, Khavari, & Douglass, 1980), suggesting that individuals may consume alcoholic beverages quicker (via faster sipping rate) when they encounter stressful situations with which they are trying to cope. The proposed study evaluated this possibility by examining sip frequency during moments of ostracism.

Individuals knowingly consuming non-alcoholic beverages may have comparable sip rates during periods of ostracism and periods of inclusion, as non-alcoholic beverages are not expected to reduce tension, so there may not be an incentive to consume them at a faster rate when experiencing stress. However, when individuals are aware of being ostracized they may wish to engage in an activity such as drinking (even a nonalcoholic beverage) to distract themselves from the social rejection or to appear that they are otherwise engaged. Accordingly, even individuals who are knowingly consuming non-alcoholic beverages may increase their frequency of sipping while ostracized.

For individuals consuming non-alcoholic beverages but who *believe* that they are consuming alcohol (placebo), sip rates should increase during ostracism. This may occur as a result of simply wanting to engage in an activity. In addition, it may be that individuals with access to a beverage expected to have tension-reducing effects, but who have not experienced a pharmacological-based reduction in stress, may increase their drinking rates when encountering stressful situations in attempt to mitigate the experience of stress.

The attention allocation model purports that when no distractor is present, alcohol will enhance the experience of stress. Increased experience of stress may heighten one's desire to cope with it, and the coping strategy employed may be faster drink consumption so as to more

quickly reach an intoxicated state. Accordingly, in response to ostracism, individuals consuming alcohol may be more likely to increase their rates of sipping than individuals consuming non-alcoholic beverages, even if that non-alcoholic beverage is thought to contain alcohol. In contrast, the self-awareness and social attributional models predict that experiences of ostracism would be less salient or stressful to individuals consuming alcohol than to individuals not consuming alcohol. Thus, sip rates among ostracized individuals consuming alcohol may not be greater than sip rates of individuals consuming non-alcoholic beverages.

In summary, the self-awareness, social attributional, and attention allocation models provide distinct, and in some instances, competing perspectives regarding the effects of alcohol on behavioral responses to ostracism. The present study was informed by these theories and aimed to provide data to further refine them.

1.5 NATURALLY OCCURRING OSTRACISM

As described earlier, much laboratory research on ostracism has involved testing participants as they interact with confederates. An advantage of this design is that the interactions encountered across subjects are fairly homogenous, which reduces concern that results could be confounded by nonessential variability in subjects' interaction experiences. Nevertheless, laboratory studies of ostracism thus far offer an incomplete perspective on the topic, as involvement of confederates in social interactions creates an artificial dynamic and limits the ability to detect natural effects (Fairbairn & Sayette, 2014).

Research on ostracism also is needed that does not randomly assign individuals to exclusion experiences. Although ostracism is a universal experience, its frequency likely varies

across individuals and settings. A socially awkward individual's interactions, for example, often may be painful or difficult, so an experience of ostracism in a laboratory would correspond to their typical experiences. In contrast, for a charming, socially skilled person, who is accustomed to smooth social encounters, an experience of ostracism might be experienced as puzzling and anomalous. Individual susceptibility to ostracism likely influences emotional reactions and behavioral responses to ostracism. Previous laboratory experiments have assigned individuals to ostracism experiences without regard to their typical social experiences. Thus, laboratory investigations of naturally occurring ostracism are needed to complement existing research.

Prior examinations of natural instances of ostracism have relied on surveys and narrative accounts (Williams, 2001). Unstructured laboratory social paradigms can be used to examine naturally arising ostracism and can answer questions that earlier laboratory research has been unable to address. For example, as noted above, alcohol consumption during social interactions may reduce the occurrence of ostracism, yet because past studies have randomly assigned participants to be ostracized, they could not identify factors that influence the incidence of ostracism. In addition, studies implementing structured exclusion experiences of a set duration cannot investigate how persistence of exclusion varies across individuals or situations. Incorporating unstructured social context into the study of social rejection would complement existing research that experimentally manipulates ostracism.

1.6 PRESENT STUDY

The present study examined the effects of drinking alcohol on naturally arising instances of ostracism obtained from video recordings of unscripted social drinking interactions. This project

addressed three specific aims. First, we tested alcohol's effects on the prevalence of ostracism. Past research on alcohol and social bonding informed predictions of the effect of alcohol on the prevalence of ostracism (see *Aim 1 Hypothesis*). Second, we evaluated the impact of beverage condition on sip mimicry. Theories of alcohol's effects on stress informed how alcohol may affect the mimicry response to ostracism. Because these theories are pharmacologically based (rather than expectancy based), we predicted that the alcohol group would drive any difference in imitated sips observed. However, these various alcohol theories are discordant with regard to the directionality of the alcohol effect that they predict, thus, examination of this effect was exploratory. Third, we examined the impact of beverage condition on overall sip frequency during periods of ostracism. As noted earlier, both pharmacologic and expectancy-based effects were possible with regard to this effect. The limited research on this topic precluded hypothesizing one direction of the effect over another; therefore, the examination of this effect was exploratory as well.

Aim 1. To examine the effect of alcohol on the prevalence of ostracism.

Hypothesis. Periods of ostracism were expected to (a) occur less frequently and (b) be briefer among groups consuming alcohol than among groups consuming non-alcoholic beverages.

Aim 2. To examine the effect of alcohol on behavioral mimicry (i.e., sip imitation) of interaction partners while being ostracized.

Aim 3. To examine the effect of alcohol on sip frequency while being ostracized.

2.0 METHOD

The present study was drawn from a broader parent investigation of the effects of alcohol consumption in group settings (Sayette, Creswell, et al., 2012). Data were collected using unobtrusive observations of groups of individuals consuming alcoholic, placebo, or no-alcohol control beverages. The present study investigated a new set of questions related to alcohol and ostracism using newly coded data derived from videotapes of the drinking sessions.

2.1 DESIGN

The parent study employed a single factor (*drink:* alcohol, placebo, no-alcohol control) between-subjects design. Participants were randomly assigned to three-person drinking groups, which were randomly assigned to one of three drink conditions. Participants were instructed to consume their beverages over a 36-m period. There were 80 three-person groups per drink condition (240 groups in total). Interactions among three-person groups were video-recorded.

2.2 PARTICIPANTS

Healthy moderate drinkers ages 21-28 were recruited via local newspaper ads. As detailed in Sayette, Creswell, et al. (2012), participants were screened for exclusion criteria after providing informed consent. Participants were required to be within 15% of the ideal weight for their height, have no medical conditions contradicting alcohol consumption (e.g., pregnancy), and have no history of alcohol abuse or dependence as indexed by DSM-IV. Additionally, participants were required to affirm that they could comfortably consume three drinks within 30-m. The final sample of the parent study consisted of 720 participants (360 men, 360 women; 83% European American, 11% African American, 2.5% Asian, 1% Hispanic, 2.5% other). Participants reported drinking two to three times per week and consuming 4.29 (*SD* = 1.89) drinks per occasion.

2.3 PROCEDURE

The university's Institutional Review Board approved the study. Prior to screening for exclusion criteria, participants were informed that the purpose of the study was to examine alcohol's impact on cognitive performance. Those who provided informed consent and passed the screen for exclusion criteria were randomly assigned to three-person groups. Twenty groups of each gender composition (three males and zero females, two males and one female, one male and two females, zero males and three females) were assigned to each beverage condition. Prior to the start of the drink period, participants were casually and individually introduced to assure they were not previously acquainted.

During the drink consumption period, the three-person group was seated equidistantly around a circular table. Three cameras were positioned to capture each participant's face and a fourth camera was positioned to record all three participants at the same time. Participants were told the cameras were used to monitor drink consumption and that they would have 36-m to consume their drinks, prior to separating and completing several tasks (the ostensible purpose of the study). Participants were instructed to drink the beverages as steadily as possible throughout the 36-m and to avoid chugging. To aid in this process participants were told that they would receive one third of their total drink at 12-m intervals.

Participants in the control condition received cranberry-juice cocktail and were told their drinks did not contain alcohol. Participants in the alcohol and placebo conditions were told their drinks did contain alcohol and that the dose was less than the legal limit to drive. Drinks were mixed in front of the participants. The alcohol beverage was 1 part 100 proof vodka and 3.5 parts cranberry-juice cocktail, adjusted for gender effects (0.82-g/kg dose of alcohol for males and 0.74-g/kg dose of alcohol for females; Sayette, Martin, Perrott, Wertz, & Hufford, 2001). The placebo beverage was cranberry-juice cocktail in a glass smeared with vodka; a few drops of vodka were "floated" on top of the cranberry-juice to increase credibility. Participants were asked to refrain from commenting about their perceived intoxication, but were not otherwise instructed about the content or magnitude of communication that was expected during the drink period. They were ostensibly seated in the same room to facilitate drink administration and communication with the experimenter. Experimenters entered the room only to refill drinks.

After completion of the drink period, participants' BACs were measured. To help control for dosage set, participants in the placebo group were presented with randomly assigned BAC readings ranging from 0.041 g/dL to 0.043 g/dL, as the upper cutoff is about the highest credible

reading for participants in alcohol studies who have been given placebo beverages (Martin & Sayette, 1993). Participants were asked to fill out a subjective-intoxication scale (SIS) on which they rated their perceived level of intoxication from 0 (*not at all intoxicated*) to 100 (*the most intoxicated I have ever been*). This was used to verify that the placebo manipulation was effective.

Following drink period, participants completed mood and social bonding measures (Sayette, Creswell, et al., 2012) and subsequently performed cognitive tasks (Sayette, Dimoff, Levine, Moreland, & Votruba- Drzal, 2012), which were irrelevant to the current study. BAC was again assessed. Non-alcohol group participants were debriefed, paid $60, and permitted to leave. Alcohol group participants remained until their BACs were <0.025 g/dL, at which point they were debriefed, paid $60, and permitted to leave but not to drive. Before leaving, all participants were informed their behavior was videotaped and all consented to having that data analyzed.

Both individual- and group-level behavior was coded (i.e., speaking turns and sips). Observer Video-Pro software (Version 5, Noldus Information Technology, Wageningen, The Netherlands) was used to code time-locked video footage. This allowed for independent coding of data for each participant, followed by synchronization of data according to the time-stamped sequential structure of each group interaction. Coders of each participant's behavioral data were blind to beverage condition and to the behavior of other group members. For the present study, this software was used to code eye-gaze. Coders[2] were blind to beverage condition.

[2] Coding was split between three independent coders. To assess reliability, a fourth independent coder scored 1/8 of the videos that had been identified based on speaking sequences and duration.

2.4 INSTRUMENTS

2.4.1 Ostracism

There is no established precedent for identifying ostracism when it transpires organically during unscripted social interactions. Exclusion from conversation can be perceived across a variety of behavioral signals, such as being ignored during conversation and receiving minimal eye contact, which can induce feelings of ostracism (Williams, 2001; Geller, Goodstein, Silver, & Sternberg, 1974; Wirth, Sacco, Hugenberg, & Williams, 2010). Therefore, instances of ostracism were identified as periods of the interaction in which there was a dyadic conversation, such that the third group member was not speaking. Additionally, to be identified as an instance of ostracism, the third group member must have only received minimal eye gaze attention (described below) from the other group members during the period in which the other group members were engaged in dyadic conversation. Pilot coding was conducted to determine specific conditions necessary to establish a period of ostracism (see Appendix A for details).

Dyadic conversations during the interaction period were identified using speaking sequences of the group members. Speech behavior for the interactions was coded ($k = .80$) such that each speaking event greater than two seconds counted as a speaking turn (Kirchner et al., 2006; Sayette, Creswell, et al., 2012). Sequences in which there are only two individuals involved and at least two exchanges of speaking turn – that is, person A spoke, person B spoke, then person A spoke again – were identified as a dyadic conversation. Additionally, the period must have lasted greater than 90 seconds, as periods briefer than that were likely too brief to be perceived as ostracism (Appendix A).

Periods of the interaction that were identified as containing a dyadic conversation of sufficient duration were then coded for eye gaze (k = .83). Specifically, a count was calculated for the amount of times either of the individuals involved in conversation directed their eye gaze toward the face of the individual not involved in conversation. When the count of eye gaze divided by the duration of the ostracism period was less than .05 (e.g., three eye gazes during 120 seconds would equal .025) (see Appendix A), it was considered a period of ostracism. If any single eye-gaze was directed toward the uninvolved individual for more than two seconds (see Appendix A), the period was not considered one of ostracism.

Prevalence of ostracism.

Frequency of periods. Counts were created for the number of periods of ostracism each 3-person group had throughout the interaction period. This indicated how often periods of ostracism were initiated in each group. A count was created for each of the 240 interaction groups.

Average duration of periods. The average duration of the ostracism periods was calculated for each 3-person group that contained at least one ostracism period by dividing the total amount of seconds of ostracism the group had by the frequency of ostracism periods. This indicated whether groups that contained ostracism periods differed in the length of time that they sustained the exclusion and intended to provide insight regarding the impact of the different drink conditions on time to reaffiliation for ostracized individuals.

2.4.2 Sips

In accordance with past operationalization of sipping, a sip was defined as a touch of one's glass to the lips (Higgins & Marlatt, 1975). Multiple independent coders scored the video recordings. Agreement on number of sips (π = .90) was very good (Altman, 1991).

Imitative sips. A subject's sip was coded as imitative if it occurred within five[3] seconds of an interaction partner's sip, derived from Larsen et al. (2010).

[3] Larsen and colleagues (2010) examined imitative sips and allowed the time to imitation interval to vary between 5, 10 and 15 seconds. Their findings did not differ when using different intervals. The more conservative cutoff of five seconds was chosen in the present study to reduce the likelihood of non-imitative sips being classified as imitative.

3.0 RESULTS

3.1 DATA PROCESSING

All analyses were conducted using IBM SPSS Statistics 24 and HLM 7. Data analysis involving descriptive statistics or using an ANOVA framework were conducted using SPSS 24. Analyses accounting for interdependence of data were conducted using HLM 7.

Across the 240 interaction groups, there were 2,298 periods that were identified as fulfilling the previously defined speaking criteria for ostracism periods. Of these periods, 2,286[4] were coded for eye gaze to determine if they also met the previously defined eye gaze criteria – both speaking and eye gaze criteria had to be fulfilled for a period to be identified as an ostracism period. Of the periods coded, 67 periods (across 52 unique three-person groups) met criteria for ostracism. Data from these periods were used in the Aim 1 analyses.

Aims 2 and 3 examined behavioral responses that had the potential to be influenced by the time of the interaction in which they occurred (e.g., prior to drink refill) and the status of the target of ostracism (i.e., being the first or second individual ostracized in the group). Thus, periods that had potential to be influenced by these factors were removed from aim 2 and 3 analyses (see Appendix B for more details). Of the 67 periods included for aim 1, 11 periods

[4] 12 of the 2,298 dyadic conversation periods were unsuccessfully coded (i.e., the wrong subject's eye gaze was coded, the wrong part of the interaction was coded, or the period was unintentionally skipped by the coders).

were excluded from aims 2 and 3 limiting these analyses to 56 periods (across 44 unique individuals).

3.2 AIM 1 – PREVALENCE OF OSTRACISM

Aim 1 tested the impact of alcohol on the prevalence of ostracism periods during unstructured social interactions. A complete, orthogonal set of contrast codes was used to represent drink condition (alcohol/placebo/control), which allowed for testing of the *a priori* hypotheses. See top of Table 1 for descriptive statistics.

Table 1. **Descriptive Statistics of Outcome Variables and Covariates by Drink Condition and Aim**

Variable	*Alc.* (M, SD)	*Plac.* (M, SD)	*Cont.* (M, SD)	*Total* (M, SD)
Aim1				
Ost Period Frequency[†]	0.29 (0.60)	0.28 (0.73)	0.28 (0.50)	0.28 (0.62)
Ost Period Duration (seconds)	198.96 (127.03)	225.77 (88.03)	240.00 (142.83)	222.28 (124.73)
Aim 2				
Target Imitative Sips during Ost Period	0.32 (.48)	0.81 (.98)	0.81 (1.25)	0.64 (0.98)
Number of Ost Periods	1.26 (0.45)	1.38 (0.62)	1.10 (0.30)	1.23 (0.47)
Source Sips during Ost Period	4.26 (3.09)	5.31 (4.08)	6.24 (5.72)	5.30 (4.50)
Target Imitative Sips during Non-Ost Period	1.68 (1.06)	3.50 (2.45)	1.71 (1.90)	2.21 (2.00)
Source Sips during Non-Ost Period	23.32 (7.17)	23.75 (6.43)	23.48 (10.54)	23.50 (8.28)
Aim 3				
Target Sips during Ost Period	2.37 (1.61)	4.00 (2.66)	3.48 (2.91)	3.25 (2.51)
Number of Ost Periods	1.26 (0.45)	1.38 (0.62)	1.10 (0.30)	1.23 (0.47)

Duration of Ost Period	208.50 (119.12)	208.62 (105.91)	255.61 (158.40)	226.20 (131.74)
Target Sips during Non-Ost Period	11.21 (4.70)	15.19 (7.09)	10.81 (7.14)	12.20 (6.57)
Total Duration of Ost	298.87 (130.84)	353.79 (155.13)	335.63 (285.63)	328.35 (205.77)

Note. Alc. = alcohol condition; Plac. = placebo condition; Cont. = control condition; Ost = Ostracism.

†Ostracism Period Frequency calculations were based on all interaction groups, regardless of whether the group's interaction included an ostracism period (e.g., ".29" in column 1, row 1 represents the 23 ostracism periods in the alcohol condition divided by the 80 groups in the alcohol condition). All other calculations were limited to groups (aim 1 period duration) that or individuals (aims 2 and 3) who experienced ostracism.

3.2.1 Frequency of ostracism periods

There were 23 episodes of ostracism in the alcohol condition, 22 in the placebo condition, and 22 in the control condition. Results of Levene's test were not significant (F (2, 237) = .36, p = .70), indicating there were not significant differences in frequency of ostracism period variances across beverage conditions. Results of a one-way ANOVA revealed there was not a significant main effect of drink condition on frequency of ostracism periods (F (2, 237) = .01, p = .99, d = 0.00). Contrast results reinforced the conclusion that all three beverage conditions generated similar numbers of ostracism periods. Specifically, neither of the two contrast codes (see Appendix C) – one comparing the alcohol group to the mean of the control and placebo groups (t(237) = 0.15, p = .88, d = 0.02) and the other comparing the control and placebo groups (t(237) = 0.00, p = 1.0, d = 0.00) to each other – was significant.

3.2.2 Duration of ostracism periods

The average duration of ostracism episodes was 198.96-s in the alcohol condition, 225.77-s in the placebo condition, and 240.00-s in the control condition. Results of Levene's test were not significant (F (2, 46) = 2.25, p = .12), indicating there were not significant differences in duration of ostracism period variances across beverage conditions. Results of a one-way ANOVA revealed there was not a significant main effect of drink condition on duration of ostracism periods (F (2, 46) = .49, p = .61, d = 0.29). Neither of the two contrast codes (see Appendix C) – one comparing the alcohol group to the mean of the control and placebo groups (t(46) = -0.89, p = .38, d = 0.28) and the other comparing the control and placebo groups to each other (t(46) = -0.31, p = .76, d = 0.12) – was significant.

3.3 AIMS 2 AND 3 – BEHAVIORAL RESPONSES TO OSTRACISM

3.3.1 Aim 2 – mimicry

The following analytic procedure was used to examine the impact of alcohol on frequency of imitative sips taken by targets of ostracism during periods of ostracism.

HLM. Because there were multiple periods of ostracism nested within some individuals[5], behavioral responses during each period of ostracism were analyzed using hierarchical linear modeling to account for interdependence of within-subjects data. Individual-level sip imitation by targets during periods of ostracism was examined using two-level models.

[5] 11 of the 46 targets of ostracism experienced multiple periods of being ostracized.

Level one accounted for the number of the ostracism period (i.e., whether it was the first, second, or in one case the third period of ostracism an individual experienced as the target) and the number of sips taken by the sources of ostracism during the ostracism period. The latter covariate accounted for differences in the amount of opportunities targets of ostracism had to imitate sips. Level two accounted for drink condition. Additionally, imitative sip frequency by targets during periods of non-ostracism and the number of sips taken by the sources of ostracism during periods of non-ostracism were added as covariates to level two. The imitative sip frequency during non-ostracism variable acted as a baseline frequency to control for amount of imitative sipping that occurred when ostracism was not a factor. Number of sips taken by sources of ostracism during periods of non-ostracism accounted for differences in the amount of opportunities targets had to imitate sips during periods of non-ostracism. See Table 1 (middle) for descriptive statistics of outcome variables and covariates.

Two variables were coded to represent drink condition contrasts (see Appendix C).[6] One variable compared the alcohol group to the mean of the control and placebo groups and the second variable compared the control and placebo groups to each other. The equation for the model was as follows:

$$\textit{Target Ostracized Imitative Sips} = B_{00} + B_{01}\text{TargetNonOstImitativeSips} + B_{02}\text{SourceNonOstSips} + B_{03}\text{AlcNoAlcContrast} + B_{04}\text{PlaceboControlContrast} + B_{10}\text{PeriodNumber} + B_{20}\text{SourceOstSips} + r_{0j} + e_{ti}$$

[6] While this approach differs slightly from the dummy code plan outlined in my proposal, it is in accordance with past analyses of the parent dataset (e.g., Fairbairn et al., 2013). Importantly, the originally proposed and the presently described approaches were both conducted and yielded consistent results. The present document presents aim 2 and 3 results from the analyses that were modeled after the traditionally accepted approach that has been used in past analyses of this dataset.

Neither the alcohol contrast variable (B = -0.23, t(39) = -0.88, p = .39, d = -0.03) nor the placebo-control contrast variable (B = <0.01, t(39) = 0.02, p = .98, d = -0.02) was significant. See Table 2 for full model results.

Table 2. **Effect of Alcohol on Imitative Sipping (Aim 2) HLM Summary**

Fixed Effect	*B*	*t-ratio*	*p-value*
Number of Ost Period	-0.19	-1.26	0.24
Source during Sips Ost Period	0.17	6.82	< 0.01
Target Imitative Sips during Non-Ost Period	0.09	1.45	0.16
Source Sips during Non-Ost Period	-0.01	-0.88	0.39
Alcohol-No Alcohol Contrast	-0.23	-1.01	0.32
Placebo-Control Contrast	<0.01	0.02	0.98

Note. Ost = Ostracism.

3.3.2 Aim 3 – frequency of sipping

The following analytic procedure was used to examine the impact of alcohol on frequency of all sips taken by targets of ostracism during periods of ostracism.

HLM. As with the analysis of ostracized mimicry, hierarchical linear modeling was used to analyze sip frequency to account for interdependence of within-subjects data. Individual-level sip frequency of targets during periods of ostracism was examined using two-level models. Level one accounted for the number of the period and the duration of the ostracism period. Duration of ostracism was a necessary covariate as it reflected the length of the opportunity targets had to display the outcome of interest. Level two accounted for drink condition. Additionally, total sip frequency (imitative plus non-imitative) of targets during periods of non-ostracism, as well as total duration of periods in which targets were ostracized, were entered as covariates. Total sip frequency of targets during periods of non-ostracism served to control for base rates of sipping (sipping that occurred without respect to ostracism). Total duration of

periods in which targets were ostracized was entered as a covariate, as more ostracism would necessarily result in less time available to sip during periods of non-ostracism, which could confound the covariate of total sip frequency during non-ostracism periods. See Table 1 (bottom) for descriptive statistics of outcome variables and covariates.

The same drink condition contrast-coding scheme described above for aim 2 was used to analyze sip frequency. The equation for the model was as follows:

$$\textit{Target Ostracized Sips} = B_{00} + B_{01}\text{TotalOstracismDuration} + B_{02}\text{TargetNonOstSips} + B_{03}\text{AlcNoAlcContrast} + B_{04}\text{PlaceboControlContrast} + B_{10}\text{PeriodNumber} + B_{20}\text{OstPeriodDuration} + r_{0j} + e_{ti}$$

Neither the alcohol contrast variable (B = -0.75, $t(39)$ = -1.48, p = .15, d = 0.04) nor the placebo-control contrast variable (B = 0.23, $t(39)$ = 0.42, p = .68, d = -0.03) was significant. See Table 3 for full model results.

Table 3. **Effect of Alcohol on Sip Frequency (Aim 3) HLM Summary**

Fixed Effect	*B*	*t-ratio*	*p-value*
Number of Ost Period	-0.24	-0.70	0.50
Duration of Ost Period	0.01	6.38	< 0.01
Target Sips during Non-Ost Period	0.20	3.99	< 0.01
Total Duration of Ost	<0.01	3.51	< 0.01
Alcohol-No Alcohol Contrast	-0.75	-1.48	0.15
Placebo-Control Contrast	0.23	0.42	0.68

4.0 DISCUSSION

The present study sought to explore the interplay between alcohol consumption and the experience of ostracism. The primary aim was to assess alcohol's effect on the prevalence of ostracism. It was hypothesized that periods of ostracism would (a) occur less frequently and (b) be briefer among groups consuming alcohol than among groups consuming non-alcoholic beverages. Results did not support either of these hypotheses, as neither the frequency nor duration of ostracism periods differed significantly between the alcohol and no-alcohol conditions.

The present study also had two secondary, exploratory aims to assess the effect of alcohol on behavioral responses to ostracism. Specifically, these aims were to examine the effect of beverage condition on both behavioral mimicry (i.e., sip imitation) of interaction partners while being ostracized and total sip frequency while being ostracized. Results did not reveal significant beverage condition effects on either behavioral response outcome variable.

Prior to definitively concluding that alcohol has no effect on either prevalence of ostracism or behavioral responses to ostracism, however, the lack of significant findings in the present study should be considered with respect to certain statistical and methodological limitations.

4.1 METHODOLOGICAL CONSIDERATIONS

4.1.1 Statistical power limitations

Pilot coding of 30 group interactions (see Appendix A) informed power analyses for the primary and secondary aims. The anticipated sample size was estimated to power detection of medium-sized effects. Unfortunately, both the achieved sample size and observed effect sizes were smaller than anticipated, (doubly) limiting our ability to detect significant effects across all aims. Specifically, for aim 1 there were 67 ostracism periods across 52 interaction groups, compared to the anticipated 176 periods across 96 groups. Furthermore, the aim 1 beverage condition effect sizes were small (prevalence of ostracism: d = 0.00; duration of ostracism: d = 0.30). A post-hoc power analysis suggested that the effect size for the duration of ostracism analysis[7] would have needed to be large (d = 0.88) in order to detect a significant beverage condition effect with the sample size that was achieved. Thus, the present data suggesting a small effect of alcohol on the duration of ostracism periods could not be adequately tested given the low number of ostracism periods identified in the study.

For aims 2 and 3 there were 44 targets (11 targets had multiple periods), compared to the anticipated 88 targets. All of the aim 2 and 3 beverage condition effect sizes also were small (aim 2 alcohol-no alcohol contrast: d = -0.03; aim 2 placebo-control contrast: d = -0.02; aim 3 alcohol-no alcohol contrast: d = 0.04; aim 3 placebo-control contrast: d = -0.03). Post-hoc power analyses suggested that the effect sizes for aims 2 and 3 analyses would have needed to be

[7] The analysis of prevalence of ostracism was based on all interaction groups; thus, the achieved sample size matched that which was anticipated. Therefore, the medium effect size that was anticipated to be necessary for detection of an effect was in accordance with what was required, but not present, in the prevalence of ostracism analysis.

large (d > 0.8) to detect significant beverage condition effects with the sample size that was achieved. Consideration of the achieved sample sizes and effect sizes suggests that the present study was underpowered to detect beverage condition effects.

A study with more ostracism episodes than what was observed here would have provided adequate power to detect small-sized effects (the magnitude reported in this study). Though highly speculative, the average duration of ostracism was lower in the alcohol group, which (if with greater power this were found to be significantly different from the other drink conditions) would suggest that perhaps alcohol helps to facilitate reaffiliation in some way and consequently limits the persistence of ostracism experiences. With regard to behavioral responses, results of the drink contrasts suggest that there was less (albeit not significantly) mimicry and general sipping among targets of ostracism who consumed alcohol. If a study with more ostracism episodes were to find a significant drink effect in the same direction, it would indicate that intoxicated individuals may be less aware of or concerned about their rejection (as suggested by the self-awareness and social attributional models) and thus engage in less attempts to reaffiliate or cope. While it is worthwhile to consider potential interpretations of the small effects observed for the purpose of planning future studies, the results in the present study were indeed non-significant and we strongly caution against drawing definitive conclusions based on these results.

4.1.2 Methodological limitations

In addition to low power, certain methodological limitations may have reduced the likelihood of detecting significant effects. For example, in utilizing a novel design that examined naturally occurring instances of ostracism, some of the control (e.g., homogeneity across ostracizers) that exists in manipulated ostracism studies was necessarily lost. Furthermore, the experiences of

ostracism examined in the present study may have been subtler than those in studies specifically designed to induce feelings of ostracism. This may have reduced the likelihood that the behaviors of targets in the present study would be altered by the ostracism experience. Less control and the potential for less intense ostracism experiences are unavoidable consequences of exploring ostracism experiences as they derive from unstructured social interactions.

Another limitation is that participants were instructed to consume their beverages as steadily as possible throughout the drinking period, which could have constrained the variability in sipping[8]. Indeed, results suggested that there was a significant, positive relationship between target sipping during non-ostracism and target sipping during ostracism periods ($B = 0.20$, $t(39) = 3.99$, $p < .001$, $d = 1.17$), which suggests that there was at least some consistency in sipping across these different periods of the interaction. However, we cannot determine if this is a direct result of the beverage consumption instructions. Furthermore, target sipping during non-ostracism did not explain all of the variance in target sipping during ostracism periods. Therefore, it would be premature to rule out future examinations of sipping during ostracism, but the potential limitation of beverage consumption instructions should be considered in such examinations, as this may have impeded detection of a beverage condition effect in the present study.

The limitation of the low frequency with which ostracism occurred should be considered with respect to the methodology employed. Namely, the present study sought to identify naturally occurring ostracism experiences within the context of an unstructured social interaction in a laboratory. The setting of the social interaction may have cued participants to think about the

[8] It should be noted that prior examination of sip frequencies (aggregated across all participants) throughout the interaction period revealed that sip frequencies do vary across the interaction period.

experiment and experimenters, which inadvertently may have prompted participants to behave in certain ways that reduced the likelihood of ostracism occurring. Past research has suggested that subjects are often apprehensive about experimenters evaluating their behaviors, particularly in terms of socio-emotional adjustment. Because of this, subjects may adjust their behaviors in ways that are socially desirable (Weber & Cook, 1972). Being a source of ostracism requires one to be exclusionary, which could reasonably be perceived as rude (Bozin & Yoder, 2008). If the laboratory setting of the present study cued thoughts about the experimenters, then concern about being perceived in a negative way may have minimized participants' likelihood to ostracize a group member. Perhaps a more naturalistic setting would have less potential to impact participants' behaviors in such a way.

4.2 FUTURE DIRECTIONS

Despite the lack of significant findings in the present study, several points emerge that have implications for future research on both ostracism and alcohol use.

A strength of the present study was that the length of the drinking period was substantially longer than that of most alcohol administration studies, which facilitated observation and analysis of more experiences and behaviors. Despite this length, future research may benefit from observing an even longer interaction, which would more closely resemble durations of natural drinking occasions. Additionally, examining social drinking interactions in a more naturalistic setting (e.g., bar) may be useful as experimental cues would be minimal, which could reduce demand characteristics and socially desirable responding. It also would be useful

to test the impact of alcohol on ostracism across the entire BAC curve and not just during the initial 36-minutes of a drinking episode.

While the present study failed to yield support for the impact of alcohol on ostracism, this dataset has the potential to yield interesting social psychological information about the experience of ostracism more generally[9]. For example, certain personality or demographic characteristics may predispose individuals to being ostracized, and only research examining naturally occurring ostracism (rather than experiences that are randomly assigned) are suited to explore what those characteristics may be. Similarly, the present study's paradigm can facilitate examination of the interaction period directly preceding the initiation of ostracism, which could provide information about behaviors that promote exclusionary experiences. Furthermore, we have the potential to examine other measures of mimicry (e.g., facial expressions, postures) that were arguably less likely to be influenced by experimental instructions than was the measure of sip mimicry. This could be examined either with or without respect to drink conditions. We plan to proceed with investigations of questions such as these in the present dataset.

Unstructured social interactions should continue to be considered when studying ostracism. As ostracism research has largely been limited to manipulated ostracism experiences, this field of research in particular would benefit from convergent methods (i.e., examination of manipulated as well as naturally arising ostracism) to produce a more comprehensive and ecologically valid set of findings. Future studies could expand the use of the unstructured social paradigm from exploring ostracism among strangers to examining it among other social

[9] By collapsing across drink conditions, we will have more power to investigate such questions.

relationships (e.g., romantic partners, platonic friendships, professional colleagues). Such research would contribute to a more comprehensive perspective on the ostracism experience.

4.3 SUMMARY

The present study offered a unique approach to research on social drinking experiences and on ostracism. We sought to build upon past findings that alcohol enhances social interactions through increasing bonding (Sayette, Creswell, et al. 2012), by exploring whether alcohol also helps to reduce the occurrence of a negative social interaction experience – ostracism. We also examined drink effects on behavioral responses by targets of ostracism in an attempt to explain a mechanism through which alcohol may influence the experience of ostracism. We anticipated uncovering a larger number of ostracism episodes and, in turn, anticipated having more power to detect effects. The limited power raised challenges regarding interpretation of the nonsignficant, though in some instances small, drink effects on both the prevalence of, and behavioral responses to, ostracism.

Despite the absence of clear-cut findings, we maintain that the impact of alcohol on ostracism is an important topic for researchers to explore, particularly within the context of unstructured social interactions. The current study revealed that there might be challenges to investigating natural ostracism experiences (e.g., they may arise infrequently in certain settings). This may partially explain why the field of ostracism research has relied on manipulated ostracism experiences up to this point. It is our plan to continue to explore general questions about the ostracism experience within this dataset. In doing so, we hope to promote the use of unstructured interactions in future ostracism research.

APPENDIX A

PILOT CODING

Across 30 interaction groups, periods containing dyadic conversations were identified, and then those periods were examined to determine if the interaction appeared to exhibit ostracism. Out of 325 dyadic conversation periods examined, 30[10] periods appeared to exhibit ostracism (to varying degrees), while 295 periods did not. Frequency and duration of eye gaze directed toward the individual not involved in conversation were reviewed, to determine if there were differences in these variables between periods that seemed to exhibit ostracism and those that did not. Due to the time and discretion involved in coding eye gaze, 63[11] of the 295 dyadic conversation periods that did not seem to exhibit ostracism were coded for comparison to the 30 ostracism periods. Additionally, duration of the periods was compared between those periods that seemed to exhibit ostracism and those that did not, to identify a threshold for duration of periods in which ostracism seems to occur. This initial coding informed how ostracism periods were identified across all interaction groups for final analyses. Furthermore, it informed the estimation of final sample and cluster sizes for use in conducting power analyses.

[10] The 30 ostracism instances occurred across 14 interaction groups.
[11] The 63 non-ostracism instances were sampled from nine interaction groups.

A.1 IDENTIFICATION OF OSTRACISM PERIODS

A.1.1 Duration of ostracism period

Pilot coding revealed that 80% of dyadic-conversation periods that seemed to exhibit ostracism lasted more than 90 seconds, whereas only 14% of dyadic-conversation periods that did not seem to exhibit ostracism reached that threshold. If the threshold were raised to 120 seconds, the percentages would change to 50% and 11% respectively, suggesting many instances that seem like ostracism would be lost. Conversely, using a more liberal threshold of 60 seconds, the percentages would change to 93% and 50%, respectively, which would result in many false positives being analyzed as ostracism instances.

A.1.2 Proportion eye gaze directed to target

Pilot coding revealed that the proportion of frequency of eye gaze directed toward the non-speaking individual divided by the length of the ostracism period is <.05 in 90% of seemingly ostracism periods, whereas it is <.05 in only 5% of the seemingly non-ostracism periods. If the proportion cutoff were raised to .075, the percentages would change to 96% and 8%, respectively. If the proportion cutoff were .025, the percentages would change to 36% and 0%, respectively.

A.1.3 Length of eye gaze directed to target

Pilot coding revealed that the non-speaking individual did not receive a single eye-gaze greater than two seconds in 97% of the periods that appeared to exhibit ostracism and in 59% of the videos that did not seem to exhibit ostracism. For not receiving a single eye-gaze for more than three seconds, the percentage for the seemingly ostracism periods remained the same, but the latter percentage changed to 81%, which would result in more false positives but no additional true ostracism periods being included. For not receiving a single eye-gaze for more than one second, the percentages were 80% and 29%, respectively.

A.2 ESTIMATION OF SAMPLE AND CLUSTER SIZES

A.2.1 Sample size

For the power analysis for aim one, the sample size was estimated using data from pilot coding. In pilot coding, 30 of 240 interaction groups were examined. Across the 30 groups, 22 ostracism periods were identified and met the necessary conditions (noted above). Since the amount of groups pilot coded was 1/8 of the total groups that would be coded for final analyses, 22 was multiplied by eight to estimate the final sample size (i.e., number of periods of ostracism) that would be available for analysis in aim one. Thus, the anticipated sample size for aim one was 176 periods.

A.2.2 Amount and size of clusters

Power analysis for aims two and three required an estimation of the amount and size of clusters. Clusters refer to individuals and cluster size refers to the amount of ostracized periods nested within an individual (i.e., the amount of times an individual was ostracized). Across the 30 interaction groups that were pilot coded, there were 11 clusters after removing any individual who was ostracized subsequent to another individual in their interaction group, as only the behavioral responses of the first ostracized individual in an interaction group were to be analyzed (as noted in Aims 2 and 3 – Behavioral responses to ostracism).

Size of clusters ranged from 1-5, with two being the average amount of times an ostracized individual experienced ostracism during the interaction. Therefore, two was used as the cluster size value for calculating power for aims two and three.

APPENDIX B

B.1 CRITICAL PERIOD OF SOCIAL INTERACTION

As in prior analyses (e.g., Sayette, Creswell, et al., 2012) only the last 24-m of the 36-min drink period for all groups were analyzed, to permit time to absorb at least some alcohol. In addition, approximately 3.25-m during these 24-m were excluded. Specifically, the 1-m periods that preceded drink refill (at minute 24) and end of drink period (at minute 36) were removed from analyses for aims 2 and 3, in order to avoid analyzing sipping behavior driven primarily by the effort to finish the drink at the end of each 12-m drinking interval. Additionally, times during which experimenters entered the experimental room to refill drinks (about 85 seconds not encompassed by the 1-m periods already excluded) were not used, as the dynamics of the interaction necessarily change during those moments.

Any instance of ostracism that began prior to the 1-m period preceding drink refill or the end of the drink period and continued into that minute was counted and included in analyses for the first aim. However, during these periods participants likely may be sipping primarily to empty their glasses rather than to cope with ostracism. Thus, all behavioral (i.e., sipping) data from the parts of ostracism episodes that bled into these 1-m intervals were removed from analyses for aims 2 and 3. Durations of ostracism episodes that bled into these1-m intervals were recalculated (i.e., the duration of the part of each episode that persisted into these intervals

was removed). Only those episodes that still met the 90-s duration minimum and the proportion of eye gaze directed to target criteria after recalculation were retained for aim 2 and 3 analyses.

B.2 OSTRACISM TARGET SELECTION

Pilot coding revealed that of groups exhibiting ostracism, a small amount[12] contained multiple targets of ostracism. That is, within some groups, at least two periods of ostracism occurred during the interaction and the individual who was being ostracized (i.e., the target) differed between the periods. It is possible that an individual who switches from initially being a source of ostracism to subsequently being a target of it would respond differently than an individual who only has been a target. The latter individual may not be as surprised by the ostracism as the former, who has gone from a position of relative power to being ignored and perhaps lacking control (Williams, 2001). Conversely, holding initial power may prove protective against negative emotional reactions for individuals who later become targets (Kuehn, Chen, & Gordon, 2015). Due to the potential for unique behavioral responses by individuals who are not the first target of ostracism, as well as the infrequency with which multiple targets presented in the same group, only behavioral data of the first individual who was ostracized in a group that contained multiple targets were retained for aim 2 and 3 analyses. Behavioral responses of any ostracized individuals other than the first target of ostracism were removed.

[12] Two of the 14 groups that appeared to exhibit ostracism contained instances that involved different targets.

APPENDIX C

C.1 AIM 1 CONTRAST CODES

The following contrast coding was used for aim 1 analyses: contrast 1 – alcohol condition = 1.0, placebo condition = -0.5, control condition= -0.5; contrast 2 - alcohol condition = 0.0, placebo condition = 1.0, control condition = -1.0. These contrast codes were used for both the ostracism period frequency analysis and ostracism period duration analysis

C.2 AIM 2 AND AIM 3 CONTRAST VARIABLES

For the *alcohol-no alcohol contrast* variable, the following values were assigned to each drink condition: alcohol condition = 0.50, placebo condition = -0.25, control condition = -0.25. For the *placebo-control contrast* variable, the following values were assigned to each drink condition: alcohol condition = 0.0, placebo condition = 0.50, control condition = -0.50. These variables were consistent between analyses for aims 2 and 3.

BIBLIOGRAPHY

Bibliography entry. Single-spaced within entries. Usually ‘hanging’ from the second line on, like this.

Abuse, S. (2013). Results from the 2012 National Survey on Drug Use and Health: Summary of National Findings (No. NSDUH Series H-46, HHS Publication No.(SMA) 13–4795). *Rockville, MD: Substance Abuse and Mental Health Services Administration*.

Altman, D. G. (1991). *Practical statistics for medical research*. Chapman and Hall.

Anderson, P., & Anderson, P. (2006). Global use of alcohol, drugs and tobacco. *Drug and Alcohol Review*, *25*(6), 489-502.

Ashton-James, C., Van Baaren, R. B., Chartrand, T. L., Decety, J., & Karremans, J. (2007). Mimicry and me: The impact of mimicry on self-construal. *Social Cognition*, *25*(4), 518-535.

Bacon, A. K., Cranford, A. N., & Blumenthal, H. (2015). Effects of ostracism and sex on alcohol consumption in a clinical laboratory setting. *Psychology of Addictive Behaviors*, *29*(3), 664.

Bozin, M. A., & Yoder, J. D. (2008). Social status, not gender alone, is implicated in different reactions by women and men to social ostracism. *Sex Roles*, 58(9-10), 713-720.

Brown, S. A. (1985). Expectancies versus background in the prediction of college drinking patterns. *Journal of Consulting and Clinical Psychology*, *53*(1), 123-130.

Cameron, O. G., Liepman, M. R., Curtis, G. C., & Thyer, B. A. (1987). Ethanol retards desensitisation of simple phobias in non-alcoholics. *The British Journal of Psychiatry*, *150*(6), 845-849.

Carter-Sowell, A. R., Chen, Z., & Williams, K. D. (2008). Ostracism increases social susceptibility. *Social Influence*, *3*(3), 143-153.

Chartrand, T. L., & Bargh, J. A. (1999). The chameleon effect: The perception–behavior link and social interaction. *Journal of Personality and Social Psychology*, *76*(6), 893-910.

Chartrand, T. L., Maddux, W. W., & Lakin, J. L. (2005). Beyond the perception-behavior link: The ubiquitous utility and motivational moderators of nonconscious mimicry. *The new unconscious*, 334-361

Chartrand, T. L., & Van Baaren, R. (2009). Human mimicry. *Advances in Experimental Social Psychology*, *41*, 219-274.

Cheng, C. M., & Chartrand, T. L. (2003). Self-monitoring without awareness: using mimicry as a nonconscious affiliation strategy. *Journal of Personality and Social Psychology*, *85*(6), 1170-1179.

Chow, R. M., Tiedens, L. Z., & Govan, C. L. (2008). Excluded emotions: The role of anger in antisocial responses to ostracism. *Journal of Experimental Social Psychology*, *44*(3), 896-903.

Conger, J. J. (1956). Reinforcement theory and the dynamics of alcoholism. *Quarterly Journal of Studies on Alcohol*, *17*, 296-305.

Cooper, M. L., Russell, M., & George, W. H. (1988). Coping, expectancies, and alcohol abuse: a test of social learning formulations. *Journal of Abnormal Psychology*, *97*(2), 218-230.

Crocker, J., & Major, B. (1989). Social stigma and self-esteem: The self-protective properties of stigma. *Psychological Review*, *96*, 608– 630.

Crocker, J., Voelkl, K., Testa, M., & Major, B. (1991). Social stigma: The affective consequences of attributional ambiguity. *Journal of Personality and Social Psychology*, *60*, 218–228.

Dittes, J. E. (1959). Attractiveness of group as function of self-esteem and acceptance by group. *The Journal of Abnormal and Social Psychology*, *59*(1), 77-82.

Fairbairn, C. E., & Sayette, M. A. (2013). The effect of alcohol on emotional inertia: a test of alcohol myopia. *Journal of Abnormal Psychology*, *122*(3), 770-781.

Fairbairn, C. E., Sayette, M. A., Levine, J. M., Cohn, J. F., & Creswell, K. G. (2013). The effects of alcohol on the emotional displays of Whites in interracial groups. *Emotion*, *13*(3), 468-477.

Fairbairn, C. E., & Sayette, M. A. (2014). A social-attributional analysis of alcohol response. *Psychological Bulletin*, *140*(5), 1361-1382.

Farber, P. D., Khavari, K. A., & Douglass, F. M. (1980). A factor analytic study of reasons for drinking: Empirical validation of positive and negative reinforcement dimensions. *Journal of Consulting and Clinical Psychology*, *48*(6), 780-781.

Ferris, D. L., Brown, D. J., Berry, J. W., & Lian, H. (2008). The development and validation of the Workplace Ostracism Scale. *Journal of Applied Psychology*, *93*(6), 1348-1366.

Gardner, W. L., Pickett, C. L., & Brewer, M. B. (2000). Social exclusion and selective memory: How the need to belong influences memory for social events. *Personality and Social Psychology Bulletin*, *26*(4), 486-496.

Geller, D. M., Goodstein, L., Silver, M., & Sternberg, W. C. (1974). On being ignored: The effects of the violation of implicit rules of social interaction. *Sociometry, 37*, 541-556.

Glassman, T., Werch, C. E., Jobli, E., & Bian, H. (2007). Alcohol-related fan behavior on college football game day. *Journal of American College Health*, *56*(3), 255-260.

Gonsalkorale, K., & Williams, K. D. (2007). The KKK won't let me play: Ostracism even by a despised outgroup hurts. *European Journal of Social Psychology*, *37*(6), 1176-1186.

Grønkjær, M., Curtis, T., De Crespigny, C., & Delmar, C. (2011). Acceptance and expectance: Cultural norms for alcohol use in Denmark. *International Journal of Qualitative Studies on Health and Well-being*, *6*(4), 1-11.

Grønkjær, M., Curtis, T., De Crespigny, C., & Delmar, C. (2013). Drinking contexts and the legitimacy of alcohol use: Findings from a focus group study on alcohol use in Denmark. *Scandinavian Journal of Public Health*, *41*(3), 221-229.

Gruter, M., & Masters, R. D. (1986). Ostracism as a social and biological phenomenon: An introduction. *Ethology and Sociobiology*, *7*(3), 149-158.

Hales, A. H., Williams, K. D., & Eckhardt, C. I. (2015). A participant walks into a bar…: Subjective intoxication buffers ostracism's negative effects. *Social Psychology*, *46*(3), 157-166.

Hermans, R. C., Lichtwarck-Aschoff, A., Bevelander, K. E., Herman, C. P., Larsen, J. K., & Engels, R. C. (2012). Mimicry of food intake: the dynamic interplay between eating companions. *PloS One*, *7*(2), e31027.

Higgins, R. L., & Marlatt, G. A. (1975). Fear of interpersonal evaluation as a determinant of alcohol consumption in male social drinkers. *Journal of Abnormal Psychology*, *84*(6), 644-651.

Hirschi, T. (1969). A control theory of delinquency. *Criminology Theory: Selected Classic Readings*, 289-305.

Hitlan, R. T., Cliffton, R. J., & DeSoto, M. C. (2006). Perceived exclusion in the workplace: The moderating effects of gender on work-related attitudes and psychological health. *North American Journal of Psychology*, *8*(2), 217-236.

Hull, J. G. (1981). A self-awareness model of the causes and effects of alcohol consumption. *Journal of Abnormal Psychology*, *90*(6), 586-600.

Insko, C. A., & Wilson, M. (1977). Interpersonal attraction as a function of social interaction. *Journal of Personality and social Psychology*, *35*(12), 903-911.

Kelly, M., McDonald, S., & Rushby, J. (2012). All alone with sweaty palms—Physiological arousal and ostracism. *International Journal of Psychophysiology*, *83*(3), 309-314.

Kuehn, M. M., Chen, S., & Gordon, A. M. (2015). Having a Thicker Skin Social Power Buffers the Negative Effects of Social Rejection. *Social Psychological and Personality Science*, *6*, 701-709.

Kirchner, T. R., Sayette, M. A., Cohn, J. F., Moreland, R. L., & Levine, J. M. (2006). Effects of alcohol on group formation among male social drinkers. *Journal of Studies on Alcohol*, *67*, 785-793.

Kushner, M. G., Mackenzie, T. B., Fiszdon, J., Valentiner, D. P., Foa, E., Anderson, N., & Wangensteen, D. (1996). The effects of alcohol consumption on laboratory-induced panic and state anxiety. *Archives of General Psychiatry*, *53*(3), 264-270.

Lakin, J.L., & Chartrand, T.L. (2003). Using nonconscious behavioral mimicry to create affiliation and rapport. *Psychological Science*, 14, 334–339.

Lakin, J. L., Chartrand, T. L., & Arkin, R. M. (2008). I am too just like you nonconscious mimicry as an automatic behavioral response to social exclusion. *Psychological Science*, *19*(8), 816-822.

Lakin, J. L., & Chartrand, T. L. (2012). Behavioral mimicry as an affiliative response to social exclusion. In C. N. deWall (Ed.), *The Oxford Handbook of Social Exclusion* (pp. 266-274). New York, NY: Oxford University Press.

Lang, A. R., Goeckner, D. J., Adesso, V. J., & Marlatt, G. A. (1975). Effects of alcohol on aggression in male social drinkers. *Journal of Abnormal Psychology*, *84*(5), 508-518.

Larsen, H., Engels, R. C., Souren, P. M., Granic, I., & Overbeek, G. (2010). Peer influence in a micro-perspective: Imitation of alcoholic and non-alcoholic beverages. *Addictive Behaviors*, 35(1), 49-52.

Lindfors, B., & Lindman, R. (1987). Alcohol and previous acquaintance: Mood and social interactions in small groups. *Scandinavian Journal of Psychology*, *28*(3), 211-219.

Liu, J., Kwan, H. K., Lee, C., & Hui, C. (2013). Work-to-Family Spillover Effects of Workplace Ostracism: The Role of Work-Home Segmentation Preferences. *Human Resource Management*, *52*(1), 75-93.

Mandelbaum, D. G. (1965). Alcohol and culture. *Current Anthropology*, 281-293.

Martin, C., & Sayette, M. A. (1993). Experimental design in alco- hol administration research: Limitations and alternatives in the manipulation of dosage-set. *Journal of Studies on Alcohol*, *54*, 750–761.

Masters, R. D. (1986). Ostracism, voice, and exit: The biology of social participation. *Ethology and Sociobiology*, *7*(3), 379-395.

Maurage, P., Joassin, F., Philippot, P., Heeren, A., Vermeulen, N., Mahau, P., ... & de Timary, P. (2012). Disrupted regulation of social exclusion in alcohol-dependence: an fMRI study. *Neuropsychopharmacology*, *37*(9), 2067-2075.

Mendes, W. B., Major, B., McCoy, S., & Blascovich, J. (2008). How attributional ambiguity shapes physiological and emotional responses to social rejection and acceptance. *Journal of Personality and Social Psychology, 94,* 278–291.

Moberg, C. A., & Curtin, J. J. (2009). Alcohol selectively reduces anxiety but not fear: Startle response during unpredictable versus predictable threat. *Journal of Abnormal Psychology, 118,* 335–347.

Molden, D. C., Lucas, G. M., Gardner, W. L., Dean, K., & Knowles, M. L. (2009). Motivations for prevention or promotion following social exclusion: being rejected versus being ignored. *Journal of Personality and Social Psychology*, *96*(2), 415-431.

Molden, D. C., & Maner, J. K. (2013). How and when exclusion motivates social reconnection. In C. N. DeWall (Ed.). *The Oxford Handbook of Social Exclusion* (pp. 121-132). Oxford University Press.

Mooney, D. K., Fromme, K., Kivlahan, D. R., & Marlatt, G. A. (1987). Correlates of alcohol consumption: Sex, age, and expectancies relate differentially to quantity and frequency. *Addictive Behaviors*, *12*(3), 235-240.

Nathan, P. E., & O'Brien, J. S. (1971). An experimental analysis of the behavior of alcoholics and nonalcoholics during prolonged experimental drinking: A necessary precursor of behavior therapy?. *Behavior Therapy*, *2*(4), 455-476.

Nezlek, J. B., Wesselmann, E. D., Wheeler, L., & Williams, K. D. (2012). Ostracism in everyday life. *Group Dynamics: Theory, Research, and Practice*, *16*(2), 91-104.

Over, H., & Carpenter, M. (2009). Priming third-party ostracism increases affiliative imitation in children. *Developmental Science*, *12*(3), F1-F8.

Pepitone, A., & Wilpizeski, C. (1960). Some consequences of experimental rejection. *The Journal of Abnormal and Social Psychology*, *60*(3), 359-364.

Rabinovitz, S. (2014). Drowning your sorrows? Social exclusion and anger effects on alcohol drinking. *Addiction Research & Theory*, *22*(5), 363-370.

Sayette, M. A. (1993). An appraisal-disruption model of alcohol's effects on stress responses in social drinkers. *Psychological Bulletin*, *114*(3), 459-476.

Sayette, M. A., Creswell, K. G., Dimoff, J. D., Fairbairn, C. E., Cohn, J. F., Heckman, B. W., Kirchner, T. R., Levine, J.M., & Moreland, R. L. (2012). Alcohol and Group Formation A Multimodal Investigation of the Effects of Alcohol on Emotion and Social Bonding. *Psychological Science*, *23*(8), 869–878.

Sayette, M. A., Dimoff, J. D., Levine, J. M., Moreland, R. L., & Votruba-Drzal, E. (2012). The effects of alcohol and dosage-set on risk-seeking behavior in groups and individuals. *Psychology of Addictive Behaviors*, *26*(2), 194-200.

Sayette, M. A., Martin, C. S., Perrott, M. A., Wertz, J. M., & Hufford, M. R. (2001). A test of the appraisal-disruption model of alcohol and stress. *Journal of Studies on Alcohol*, *62*, 247–256.

Sayette, M. A., & Wilson, G. T. (1991). Intoxication and exposure to stress: Effects of temporal patterning. *Journal of Abnormal Psychology*, *100*(1), 56-62.

Sher, K. J. (1987). Stress response dampening. In H. T. Blane & K. E. Leonard (Eds.), *Psychological Theories of Drinking and Alcoholism* (pp. 227-271). New York: Guilford Press.

Smith, R. C., Parker, E. S., & Noble, E. P. (1975). Alcohol and affect in dyadic social interaction. *Psychosomatic Medicine*, *37*(1), 25-40.

Smith, A., & Williams, K. D. (2004). RU There? Ostracism by Cell Phone Text Messages. *Group Dynamics: Theory, Research, and Practice*, *8*(4), 291-301.

Snoek, J. D. (1962). Some effects of rejection upon attraction to a group. *The Journal of Abnormal and Social Psychology*, *64*(3), 175-182.

Sommer, K. L., & Baumeister, R. F. (2002). Self-evaluation, persistence, and performance following implicit rejection: The role of trait self-esteem. *Personality and Social Psychology Bulletin*, *28*(7), 926-938.

Steele, C. M., Southwick, L., & Pagano, R. (1986). Drinking your troubles away: The role of activity in mediating alcohol's reduction of psychological stress. *Journal of Abnormal Psychology*, *95*(2), 173-180.

Steele, C. M., & Josephs, R. A. (1988). Drinking your troubles away: II. An attention-allocation model of alcohol's effect on psychological stress. *Journal of abnormal psychology*, *97*(2), 196-205.

Tiedens, L. Z., & Fragale, A. R. (2003). Power moves: complementarity in dominant and submissive nonverbal behavior. *Journal of personality and social psychology*, *84*(3), 558-568.

Tran, G. Q., Haaga, D. A., & Chambless, D. L. (1997). Expecting that alcohol use will reduce social anxiety moderates the relation between social anxiety and alcohol consumption. *Cognitive Therapy and Research*, *21*(5), 535-553.

Wallace Jr, J. M., Bachman, J. G., O'Malley, P. M., Johnston, L. D., Schulenberg, J. E., & Cooper, S. M. (2002). Tobacco, alcohol, and illicit drug use: racial and ethnic differences among US high school seniors, 1976-2000. *Public Health Reports*, *117*(Suppl 1), S67.

Weber, S. J., & Cook, T. D. (1972). Subject effects in laboratory research: An examination of subject roles, demand characteristics, and valid inference. *Psychological Bulletin*, *77*(4), 273.

Williams, K. D. (2001). *Ostracism: The power of silence*. Guilford Press.

Williams, K. D. (2009). Ostracism: A temporal need-threat model. *Advances in Experimental Social Psychology*, *41*, 275-314.

Wilson, G. T. (1988). Alcohol and anxiety. *Behaviour Research and Therapy*, *26*(5), 369-381.

Wilson, G. T., & Abrams, D. (1977). Effects of alcohol on social anxiety and physiological arousal: Cognitive versus pharmacological processes. *Cognitive Therapy and Research, 1*, 195–210.

Wirth, J. H., Sacco, D. F., Hugenberg, K., & Williams, K. D. (2010). Eye gaze as relational evaluation: Averted eye gaze leads to feelings of ostracism and relational devaluation. *Personality and Social Psychology Bulletin, 36*, 869–882.

Wu, L. Z., Yim, F. H. K., Kwan, H. K., & Zhang, X. (2012). Coping with workplace ostracism: The roles of ingratiation and political skill in employee psychological distress. *Journal of Management Studies*, *49*(1), 178-199.

Yankofsky, L., Wilson, G. T., Adler, J. L., Hay, W. M., & Vrana, S. (1986). The effect of alcohol on self-evaluation and perception of negative interpersonal feedback. *Journal of Studies on Alcohol*, *47*(1), 26-33.

Zadro, L., Williams, K. D., & Richardson, R. (2005). Riding the 'O'train: Comparing the effects of ostracism and verbal dispute on targets and sources. *Group Processes & Intergroup Relations*, *8*(2), 125-143.

Zuckerman, M., Miserandino, M., & Bernieri, F. (1983). Civil inattention exists—in elevators. *Personality and Social Psychology Bulletin*, *9*(4), 578-586.