MODERATORS OF A SELF-AWARENESS INTERVENTION FOR ALCOHOL-FACILITATED INTIMATE PARTNER AGGRESSION

by

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A Dissertation

Submitted to the Faculty of Purdue University

In Partial Fulfillment of the Requirements for the degree of

Doctor of Philosophy

Department of Psychological Sciences

West Lafayette, Indiana

August 2021

THE PURDUE UNIVERSITY GRADUATE SCHOOL

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ACKNOWLEDGMENTS

This work was supported by the National Institute on Alcohol Abuse and Alcoholism (1R01AA020578-01A1 to Christopher Eckhardt and Dominic Parrott).

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ABSTRACT

Objective: Acute alcohol intoxication has been clearly identified as a risk factor for intimate partner aggression (IPA). There is a critical need for effective IPA interventions that can be applied during episodes of acute intoxication. A self-awareness intervention for general aggression that was designed to be applied during acute intoxication could fill this gap. This intervention is grounded in objective self-awareness and alcohol myopia theories, with the main premise being that intoxicated individuals who are exposed to self-awareness cues should focus on standards of correct behavior, which will serve to inhibit aggression. The purpose of the current study was to apply this intervention to alcohol-facilitated IPA and to examine potential moderators of this effect in order to determine for whom the intervention may be most effective. Method: Participants in the current study included 133 heterosexual community couples with a history of heavy drinking and IPA. Participants took part in a two-session laboratory study investigating the efficacy of this self-awareness intervention. Participants were randomly assigned to the intervention (n = 71) or control (n = 62) condition. During the study, they consumed alcohol and participated in an aggression task ostensibly against their romantic partner. Results: Findings were inconsistent with hypotheses. There was no between-group difference in laboratory aggression, and the moderators investigated in this study did not have an impact on the intervention's efficacy. Conclusions: Present findings suggest that the self-awareness intervention may be ineffective for reducing alcohol-facilitated IPA. Potential explanations for this finding and implications for future research are discussed.

INTRODUCTION

Problematic alcohol use has been firmly established as a contributing cause of intimate partner aggression (IPA; Leonard, 2005; Leonard & Quigley, 2017). Episodes of IPA that occur during acute intoxication tend to be more severe and more likely to lead to bidirectional violence within the couple compared to IPA that occurs while both partners are sober (Murphy, Winters, O'Farrell, Fals-Stewart, & Murphy, 2005; Stuart et al., 2013; Testa, Quigley, & Leonard, 2003). Given the increased risk of injury among couples who engage in alcohol-facilitated IPA (Grisso et al., 1999; Kyriacou et al., 1999; Sharps, Campbell, Campbell, Gary, & Webster, 2001; Thompson & Kingree, 2006), the development of interventions for this high-risk population is warranted. Existing interventions for this population tend to focus on treating alcohol misuse and IPA separately, with little integration of care across treatment facilities (Klostermann, 2006; Klostermann, Kelley, Mignone, Pusateri, & Fals-Stewart, 2010). Alternatively, other treatment models focus primarily on treating alcohol misuse, with the assumption that by eliminating problematic drinking, IPA will also be reduced (Easton & Crane, 2016; Klostermann, 2006; Murphy & Ting, 2010). Outcomes of these interventions have revealed that while IPA is often reduced during periods of sobriety, reengagement in IPA often co-occurs with relapse into alcohol misuse (Easton & Crane, 2016). Thus, reductions in IPA are contingent upon the maintenance of sobriety in alcohol-focused interventions and these interventions offer no solutions for IPA when one relapses.

Given the limitations of existing interventions for alcohol-facilitated IPA, the development of interventions that are not contingent upon substance use remission, but rather that can be applied during episodes of acute alcohol intoxication, is warranted. One such line of interventions is based on the attention allocation model of alcohol myopia theory (AMT; Steele & Josephs, 1990) and objective self-awareness (OSA) theory (Silvia & Duval, 2001) and involves bringing a heightened sense of self-awareness to individuals while they are intoxicated as a means of reducing aggressive behavior. These interventions have previously been applied to general aggression and have shown moderate efficacy, with evidence suggesting that they are more efficacious for some people than others (Gallagher & Parrott, 2016; Purvis, Gallagher, & Parrott, 2016). However, it is important to note that under some circumstances, enhancing self-focused attention has been found to have undesirable effects, such as increasing accessibility of suicidal ideation (Selimbegovic & Chatard,

2013). Therefore, before implementing and disseminating a self-awareness intervention outside of the laboratory, it is necessary to determine whether this intervention could yield potentially harmful effects. *Thus, the purpose of the current study was twofold: (1) to apply a self-awareness intervention for alcohol-facilitated aggression to high-risk romantic couples under conditions of provocation and acute alcohol intoxication and (2) to examine potential moderators of the efficacy of this intervention in order to determine for whom this intervention may be most effective and for whom this intervention may have iatrogenic effects.*

Alcohol Myopia Theory

Early theoretical work posited that the pharmacological effects of alcohol reduce one's ability to perceive and interpret cues of self-awareness (Hull, 1981); however, empirical evidence has failed to support this theory (Carey, 1995; Frankenstein & Wilson, 1984; Wilson, 1983). Rather, AMT (Steele & Josephs, 1990) provides an empirically supported explanation of the effects of alcohol on cognitive control and attention allocation. AMT posits that the pharmacological effect of alcohol taxes the inebriate's cognitive resources and that the resulting impairment in cognitive processing limits the individual's ability to attend to the full range of internal or external stimuli. According to the attention-allocation model of AMT, alcohol intoxication serves to narrow one's limited attention onto the most salient cues in the environment, with less salient cues being largely ignored (Steele & Josephs, 1990). Thus, one would expect that if individuals are placed in an environment with highly salient self-awareness cues while they are intoxicated, then their attention would be narrowed onto themselves and they would experience a heightened sense of self-awareness. *In the current study, I expected the myopic effect of alcohol to narrow attention onto self-awareness cues when they were present and to thus amplify the effect of the self-awareness intervention. I expected that individuals in the control condition who were not exposed to self-awareness cues would have their attention narrowed onto the most salient cues in their environment, which took the form of provocative stimuli (i.e., verbal and physical aggression) that ostensibly came from their partner.*

The attention-allocation model of AMT has been applied to the study of aggression and predicts that aggressive behavior will be more likely to occur when aggressogenic cues are most salient to the intoxicated individual and less likely to occur when aggression-inhibiting cues are most salient (Giancola, Josephs, Parrott, & Duke, 2010). This prediction has been supported by

laboratory studies of alcohol-facilitated aggression (e.g., Giancola, Duke, & Ritz, 2011). Researchers have capitalized on the myopic properties of alcohol intoxication when designing experimental manipulations aimed at reducing alcohol-facilitated aggression. Specifically, manipulations designed to redirect attention toward aggression-inhibiting cues have been found to reduce intoxicated aggression to an even greater extent than sober aggression (Giancola & Corman, 2007). Self-awareness interventions for alcohol-facilitated aggression, mentioned previously, are designed such that attention is narrowed onto self-awareness cues, with the intention being that these cues will inhibit aggression. However, it is important to understand the potential behavioral effects of increased self-awareness before making such an assumption. OSA theory provides some insight into how people may behave when they are in a state of enhanced self-awareness (Silvia & Duval, 2001).

Objective Self-Awareness Theory

OSA theory defines objective self-awareness as a focus on oneself, or oneself being the object of one's attention and consciousness (Duval & Wicklund, 1972). The main premise behind OSA theory is that when people are in a state of self-awareness, they will begin to compare their own behavior to a standard of correct or appropriate behavior that they have either internalized or that is being imposed on them by the current situation. According to the theory, when a discrepancy is detected between one's behavior and these standards of comparison (e.g., behaving aggressively in a context that disapproves of aggressive behavior), negative affect arises. The person then becomes motivated to either change their behavior or avoid focusing on themselves, which would lead to a reduction in the salience of the discrepancy and subsequently a reduction in negative affect (Silvia & Duval, 2001).

OSA theory is considered to be one of several related yet distinct self-theories in social psychology. Another prominent self-theory, cognitive dissonance theory (Festinger, 1957), also attempts to explain people's responses to self-standard discrepancies. Cognitive dissonance theory suggests that psychological discomfort will arise when one holds two conflicting cognitions simultaneously (Harmon-Jones & Mills, 1999). When this occurs, the individual is expected to change one of these cognitions to be consistent with the other in order to reduce the tension caused by this dissonance. The theory has generally been used to describe reactions to dissonance that occur after people behave in a way that does not align with their beliefs, attitudes, or values and

suggests that individuals will alter their cognitions to match their behavior. Cognitive dissonance theory has been revised several times over the past six decades, although some researchers argue that the original version remains the most accurate iteration of the theory (Harmon-Jones & Mills, 1999).

OSA theory differs from cognitive dissonance theory in that OSA theory seeks to predict behavior itself, while cognitive dissonance theory primarily explains how people will react to a perceived discrepancy after they engage in a behavior that conflicts with another existing cognition. Moreover, in cognitive dissonance theory, when predicting how someone will respond to such a discrepancy, the focus is on subsequent changes in cognition rather than changes in behavior (Harmon-Jones & Mills, 1999). OSA theory has been said to stand apart from cognitive dissonance theory and other self-theories because it is the only theory that specifies that a self-to-standard comparison, or a perception of dissonance, will only occur when people are in a state of self-awareness (Silvia & Duval, 2004). Therefore, OSA theory can be considered an extension of other self-theories that seeks to specifically explain how someone will behave in the face of a potential self-standard discrepancy when they are in a state of heightened self-awareness.

According to the original OSA theory as presented by Duval and Duval (1972), a standard is defined as "a mental representation of correct behavior, attitudes, and traits" (as cited in Silvia & Duval, 2001, p. 231). In other words, a standard is an internalized depiction of how one should think or behave. Standards can be developed through direct experience or exposure to cultural norms, or they can be imposed on the individual by external forces, as is the case with experimentally-induced standards. An individual can hold conflicting standards simultaneously and the salience of these standards shifts according to the individual's reference group; thus, some standards may become more accessible in particular situations. Further expansion of OSA theory specifies that if private self-awareness, or a focus on internal aspects of oneself, is induced (e.g., through the use of mirrors), individuals are led to focus on their own personal standards of behavior (Froming, Walker, & Lopyan, 1981). On the other hand, if public self-awareness, or awareness of being watched by others (e.g., through the use of an audience), is induced, then individuals will focus on perceived societal standards (Froming et al., 1981).

OSA theory provides guidelines for predicting how people will behave in the event of a discrepancy between their behavior and their standards. Duval and Duval discussed an intersection of a self-to-standard comparison system and a causal attribution system and stated that if people

are focused on themselves, they are more likely to see themselves as being the cause of the discrepancy between their behavior and the standard and they will attempt to either change their own behavior or to avoid self-focus (as cited in Silvia & Duval, 2001, p. 232). If people are unable to avoid self-focus, as they were in the current study, they are expected to change their behavior in order to achieve self-to-standard congruency (Silvia & Duval, 2001).

The earliest applications of OSA theory to aggression research found support for the theory's premise that self-awareness leads people to behave in line with salient standards (Carver, 1974; Scheier, Fenigstein, & Buss, 1974). These laboratory studies manipulated self-awareness through the presence or absence of mirrors. One study experimentally imposed a set of aggression-inhibiting standards, while the other imposed a set of aggression-supporting standards. Both of these studies supported OSA theory in that a greater degree of self-awareness led individuals to behave in line with the imposed standards. More specifically, when the standards were aggression-inhibiting, participants in the self-awareness condition behaved less aggressively than those who were in the control condition (Scheier, Fenigstein, & Buss, 1974). When the standards were aggression-supporting, participants in the self-awareness condition behaved more aggressively than those in the control condition (Carver, 1974).

Later research expanded on these studies by examining the role of emotion, particularly anger, on the association between self-awareness and aggression. In one experiment, self-awareness and provocation were manipulated, but there was no experimentally-induced standard (Scheier, 1976). Results revealed that provoked participants who were made more self-aware exhibited higher levels of anger and aggression than non-provoked participants and provoked participants who were not made self-aware. This effect was amplified for those high in self-consciousness, or a dispositional tendency to focus on oneself. The authors concluded that this moderating effect was due to people high in self-consciousness having a greater tendency to focus on their anger than those low in self-consciousness (Scheier, 1976). Another study found conflicting results, such that self-awareness reduced aggression regardless of the level of provocation experienced (Bailey, Leonard, Cranston, & Taylor, 1983). However, this study did not assess state anger throughout the experiment.

The majority of studies examining the effect of self-awareness on aggression have relied on samples of only men. When both men and women have been included in such studies, gender differences have been found for the effects of self-awareness on anger and aggression, although

these findings have not been definitive (Kinney, Smith, & Donzella, 2001). *Thus, the current study sought to expand on these earlier findings by examining how self-awareness impacted men and women's behavior when they were confronted with a conflict scenario with their romantic partner while acutely intoxicated. State anger was also assessed throughout the current experiment to ensure that the provocation had the intended effect.*

In sum, despite some conflicting findings, OSA theory and empirical evidence testing the theory largely suggest that under neutral emotional conditions, when people are made to be self-aware, they will change their behavior to be congruent with the standards to which they are being held. However, when anger is introduced, people's response to self-awareness may change and greater self-awareness could lead to a shift in focus toward the emotional experience, particularly for people who have a dispositional tendency to focus on their internal experiences.

Application of OSA Theory to the Current Study

In the current study, all participants were involved in a nearly identical situation: they were acutely intoxicated and they believed that they were engaging in a conflict scenario with their romantic partner. The only difference between conditions was the presence or absence of self-awareness cues, which would call attention to a self-standard comparison for those in the self-awareness intervention condition but not for those in the control condition. While it is likely that participants held multiple competing aggression-related standards, it was expected that the most salient standard for participants in this particular context would be a norm within their relationship to engage in aggression, or in other words, their history of aggression with their partner. Given that all participants in the current study were required to report a history of past-year IPA perpetration in order to be eligible, I was most interested in determining whether experiencing IPA from one's partner, implying the presence of bidirectional aggression within the couple, would be associated with a propensity to behave aggressively when this standard was brought to one's attention. Given that the majority of participants in the current study would have experienced infrequent minor IPA or no IPA from their partner over the past year and thus would likely be comparing their own behavior to an aggression-inhibiting standard, I expected that the overall effect of the self-awareness intervention would serve to significantly reduce aggressive behavior relative to the control condition. However, I did expect this effect to be moderated by past-year IPA victimization, such that those in the self-awareness condition who had experienced a greater

degree of victimization would behave in line with an aggression-supporting standard and thus would behave more aggressively on the laboratory aggression task compared to those who had experienced a lesser degree of victimization and compared to those in the control condition, who were perhaps less focused on this standard during the aggression task.

In addition, according to OSA theory, individuals will attempt to change their behavior to match the standard of comparison when they believe that they are responsible for the outcome of their behavior, but not when they externalize responsibility or blame to others (Silvia & Duval, 2001). This argument has been supported by recent research that found that locus of control, or "the extent to which individuals believe that the outcomes of their behavior are a function of internal factors (e.g., own behavior, personal characteristics) versus external factors (e.g., other people's behavior, situational characteristics)," moderated the effect of self-awareness on aggression (Purvis et al., 2016, p. 32). Results revealed that for those in the self-awareness condition, internal, but not external, locus of control reduced aggression; there was no effect of locus of control on aggression in the control condition. These findings suggest that self-awareness may not reduce aggression when people blame others, such as their romantic partner, for their behavior. In the current study, participants' verbalizations about themselves and their partners during the aggression task were coded in order to examine attributions they made about the causes of their own and their partners' behavior. Verbalizations of hostile attribution bias directed at one's partner were examined as a moderator of the efficacy of the self-awareness intervention. More specifically, I expected that participants who verbalized a greater number of statements reflecting hostile attribution bias would be more likely to externalize blame for their own behavior to their partner and thus would be less likely to inhibit their own aggression, compared to those who did not verbalize hostile attribution bias.

Finally, as discussed above, a tendency to focus on one's own internal experiences has been found to moderate the effect of self-awareness on aggression (Scheier, 1976). In the current study, I attempted to replicate this finding by examining anger rumination, or a dispositional tendency to dwell on one's own anger-related experiences and memories, as a potential moderator of the effect of self-awareness on aggression. More specifically, I expected that when individuals high in dispositional anger rumination were intoxicated, provoked, and made self-aware, their self-focused attention would be narrowed onto anger-inducing information rather than anger-inhibiting cues. Given the well-established relationship between anger and IPA (e.g., Birkley & Eckhardt,

2015), I predicted that individuals higher in anger rumination would behave more aggressively following the self-awareness intervention compared to those lower in anger rumination.

The Current Study

The purpose of the current study was to extend past research by applying a self-awareness intervention for alcohol-facilitated aggression to romantic couples and to examine moderators of this intervention's efficacy. While prior examinations of a similar intervention have been conducted, this is the first time this type of intervention has been applied to aggression within intimate relationships. In addition, past research suggests that increasing self-awareness does not always reduce aggressive behavior and that in some cases, increasing self-awareness may actually yield iatrogenic effects. Therefore, the current study sought to examine the three primary factors that OSA theory suggests will impact the effect of self-awareness on alcohol-facilitated aggression: standards to which one compares one's behavior (i.e., a standard within the couple to engage in IPA or victimization from one's partner), attribution biases about the cause and effect of one's behavior (i.e., partner-directed hostile attribution bias), and traits that may serve to override the aggression-inhibiting effect of self-awareness and potentiate the use of aggression (i.e., anger rumination). These questions were addressed using a sample of high-risk community adults who were under the influence of alcohol while ostensibly competing against their romantic partner in a shock-based aggression task, the Taylor Aggression Paradigm (TAP; Taylor, 1967).

As an exploratory aim, the I^3 model (Finkel et al., 2018) was employed to examine the potential multiplicative effect of the three moderators described above. The purpose of conducting this analysis was to determine the effect of the self-awareness intervention on a particularly high-risk portion of the sample. As mentioned earlier, enhancing self-awareness has been found to have deleterious effects under some circumstances (Carver, 1974; Selimbegovic & Chatard, 2013). While I predicted that the intervention would be merely ineffective for individuals with high levels of any single moderator, such that those individuals would display similar rates of aggression as the control group, there was a possibility that for individuals who were high on all three moderators, the intervention could increase aggression even beyond that displayed by individuals in the control condition. I^3 model posits that aggression is most likely to occur when particular combinations of factors are present. More specifically, aggression is most likely when impellors, instigators, and disinhibitors are high and inhibiting factors are low (Finkel & Hall, 2018). In the current study, all

participants were exposed to a disinhibitor (i.e., alcohol intoxication) and an instigator (i.e., provocation). I expected that the self-awareness intervention itself would serve as an inhibitor and that the strength of its inhibiting effect would outweigh the aggressogenic effects of alcohol and provocation. The three moderators are best understood as impelling factors, and I predicted that their interactive effect would not simply outweigh the inhibiting effect of the self-awareness condition, but rather, based on OSA theory, would be amplified by the self-awareness intervention and would thus lead to a higher level of aggression compared to the control condition. I tested this hypothesis in order to examine whether this intervention could potentially be harmful for this high-risk portion of the population. Given our relatively modest sample size, results from this analysis should be interpreted with caution.

I tested the following hypotheses:

1. There would be a significant main effect of intervention condition on aggression during a laboratory aggression task (i.e., TAP), such that individuals in the self-awareness intervention condition would exhibit less TAP aggression than those in the control condition.
2. There would be a significant interaction between intervention condition and past-year IPA victimization, such that individuals in the intervention condition who reported lower levels of IPA victimization from their current partner would exhibit significantly less TAP aggression than individuals in the control condition. I expected that individuals in the intervention condition who reported higher levels of IPA victimization would not differ from the control group in the level of TAP aggression they displayed.
3. There would be a significant interaction between intervention condition and hostile attribution bias, such that individuals in the intervention condition who verbalized fewer statements reflecting hostile attribution bias would exhibit significantly less TAP aggression than individuals in the control group. I expected that individuals in the intervention condition who verbalized a greater degree of hostile attribution bias would not differ from the control group in TAP aggression.
4. There would be a significant interaction between intervention condition and anger rumination, such that individuals in the intervention condition who were lower in

anger rumination would exhibit significantly less TAP aggression relative to individuals in the control group. I hypothesized that individuals in the intervention condition who were higher in anger rumination would not differ from the control group in TAP aggression.

5. I predicted that there would be a 4-way interaction among intervention condition, IPA victimization, hostile attribution bias, and anger rumination. More specifically, I predicted that individuals in the self-awareness condition with high levels of all three moderators would exhibit a greater degree of TAP aggression, with the multiplicative effect of the three moderators having a greater impact than any one factor alone.

METHOD

Participants

Couples in a committed romantic heterosexual relationship were recruited from two U.S. metropolitan cities through print and online advertisements to participate in a larger study of alcohol-facilitated IPA. To be eligible, couples were required to have been dating for at least one month, to be at least 21 years of age, and to identify English as their native language. Couples were excluded if either partner reported a serious head injury, a medical or psychiatric condition in which alcohol is medically contraindicated, or a desire to seek treatment for alcohol use. Couples were also excluded if the female partner tested positive on a urine pregnancy test. At least one partner – termed the index participant – was required to meet two additional eligibility criteria: (1) report consumption of an average of at least five (for men) or four (for women) alcoholic beverages at least twice per month during the past year; and (2) report past-year perpetration of psychological or minor physical IPA toward their current partner via self- or partner- report on the Revised Conflict Tactics Scale (CTS2; Straus, Hamby, Boney-McCoy, & Sugarman, 1996).

Telephone screening preliminarily identified 341 eligible couples who then presented to the laboratory for session 1. Reassessment of eligibility criteria and exclusion of participants who endorsed a non-heterosexual identity or reported perpetrating severe physical IPA resulted in 165 eligible couples who presented to Session 2. Thirty couples were excluded from analyses for various reasons (e.g., failing to meet eligibility criteria during session 2, not being deceived, technical errors, not reaching the appropriate BrAC, not consenting to the deception). Two additional index participants were excluded from the current analyses due to failing to complete the Taylor Aggression Paradigm. This left a final sample of 133 index participants. Please see Figure 1 for further information about the flow of participants through the study and Table 1 for demographic information for the final sample. This study was approved by Purdue University and Georgia State University's (GSU) Institutional Review Boards.

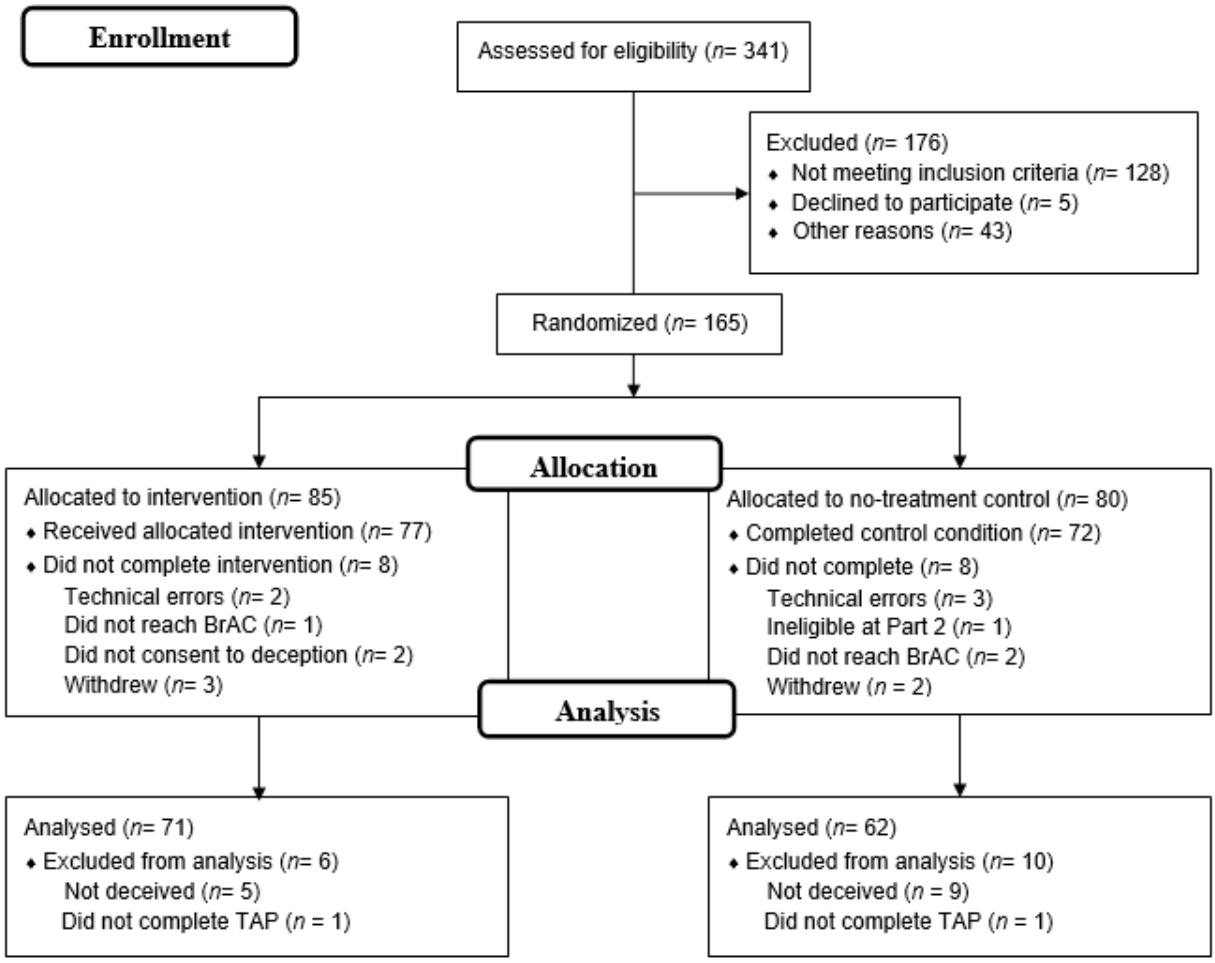


Figure 1. CONSORT flow diagram. *n* = number of couples.

Table 1. Participant Demographics

	% / *M* (*SD*)		
	GSU (*n* = 95)	Purdue (*n* = 38)	Fisher's 2-tailed *p*/*t* (*df*)
Female	53.7	42.1	.254
Marital Status			.100
Single	50.1	36.8	
Married	16.8	26.3	
Unmarried, cohabiting	30.5	26.3	
Divorced/Separated	2.1	10.5	
Race			.225
White/Caucasian	44.7	47.4	
Black/African-American	41.2	28.9	
Other/Multiracial	14.1	23.4	
Hispanic			
Annual Income	7.5	10.5	.483
.031			
<$10k	15.8	21.1	
$10-20k	14.7	31.6	*
$20-30k	21.1	21.1	
$30-40k	7.4	13.2	
$40-50k	10.5	2.6	
>$50k	30.5	10.4	*
Age	27.81 (6.91)	28.32 (8.66)	-.35 (131)
Length of Relationship (months)	47.21 (42.14)	56.53 (86.11)	-.64 (44.27)
Years of Education	15.66 (2.70)	13.29 (1.35)	6.72 (124.34)***

Note. *M* = Mean, *SD* = Standard Deviation.

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

Materials and Procedure

Session 1

Couples were brought into the laboratory on two separate days to complete session 1 and session 2 of the study. During session 1, each partner was taken to a separate testing room to be consented. Both partners then completed a battery of self-report questionnaires, including measures assessing their past-year IPA victimization and perpetration as well as their dispositional anger rumination. The questionnaires used to measure these constructs are described below.

Past-year IPA victimization and perpetration. The Revised Conflict Tactics Scale (CTS2; Straus et al., 1996) is a 78-item self-report measure that assesses past-year physical, psychological, and sexual aggression perpetration and victimization within one's intimate relationship as well as the use of negotiation and reasoning to deal with relationship conflicts. In the present study, the CTS2 was used to determine eligibility to participate as an "index participant." Participants who were identified as having perpetrated at least one act of psychological or minor physical aggression, in addition to meeting the other inclusion criteria, were deemed eligible to be an index participant.

In addition, the 5-item minor physical and the 8-item psychological/verbal IPA subscales were used to assess the frequency of victimization within the past year. One item from the minor physical IPA subscale is "Has your partner thrown something at you that could hurt?" An example item from the psychological IPA subscale is "Has your partner shouted or yelled at you?" The CTS2 is a widely used instrument and has shown strong internal consistency and evidence of construct and discriminant validity (Straus et al., 1996).

Past-year IPA victimization scores were calculated using a variety scoring method, given that several advantages of this method have been cited in the literature. The data produced by variety scoring are typically less skewed, are less likely to violate assumptions of normality, show stronger internal consistency, and are less likely to be severely impacted by retrospective reporting biases compared to data produced by a frequency scoring method (Shorey, Brasfield, Febres, Cornelius, & Stuart, 2012; Taft et al., 2016). Response options for the CTS2 range from 0 (never in the past year) to 6 (more than twenty times in the past year) for each item. Each of the 13 items

included in the current analyses were recoded to reflect whether that particular behavior did (1) or did not (0) occur in the past year. Consistent with previous studies and in order to minimize the effect of underreporting, maximum scores for each of the 13 items were calculated based on the higher report from either partner (Taft et al., 2010; Taft et al., 2016). In other words, if either partner reported that the behavior had occurred during the past year, that item was coded as 1. If both partners agreed that the behavior had not occurred during the past year, that item was coded as 0. The maximum scores for the 13 items were then summed to create a total IPA victimization score ranging from 0 to 13.

The extent of partners' agreement on the index participants' past-year IPA perpetration and victimization was calculated using Yule's Y (LaMotte, Taft, Reardon, & Miller, 2014). Overall, partner agreement ranged from slight to moderate. More specifically, results indicated slight agreement for severe psychological IPA perpetration (Yule's Y = 0.06); fair agreement for total psychological IPA perpetration (Yule's Y = 0.25), minor psychological IPA perpetration (Yule's Y = 0.25), minor physical IPA perpetration (Yule's Y = 0.34), severe psychological IPA victimization (Yule's Y = 0.37), and minor physical IPA victimization (Yule's Y = 0.39); and moderate agreement for total psychological IPA victimization (Yule's Y = 0.49) and minor psychological IPA victimization (Yule's Y = 0.52).

Anger rumination. The 19-item Anger Rumination Scale (ARS; Sukhodolsky, Golub, & Cromwell, 1999) was used to assess anger rumination, or a tendency to dwell on anger episodes and anger-inducing situations. The ARS is composed of four subscales assessing angry afterthoughts, thoughts of revenge, angry memories, and understanding of causes. The ARS can be calculated by summing the scores for each subscale separately or by summing the scores for all 19 items. For the current study, I was interested in global anger rumination rather than the subprocesses that make up this construct. In addition, all analyses involving the ARS were run with the full scale and each subscale separately, and the results did not significantly differ. Therefore, the full scale was used in the presented analyses. The response format for each item consists of a 4-point Likert scale, in which participants endorse their level of agreement with

internal consistency and test-retest reliability as well as good convergent and discriminant validity (Sukhodolsky et al., 1999). This scale demonstrated strong internal consistency ($\alpha = .92$) in the current study.

Session 2

Couples who remained eligible for the study after completing session 1 were scheduled to return to the laboratory on a later date for session 2. Couples who were deemed ineligible for session 2 were provided with psychoeducational materials and referral information for alcohol misuse and IPA and were compensated $10 per hour for their time.

Before couples arrived at the laboratory for session 2, index participants were randomly assigned to the self-awareness intervention condition ($n = 71$; 36 men, 35 women) or to the no-treatment control condition ($n = 62$; 30 men, 32 women).

Self-awareness intervention. In order to construct the self-awareness intervention, the environmental stimuli in the index participants' lab room were manipulated. Two large mirrors were placed directly behind the computer that the participant used throughout the experiment (i.e., directly in front of the participant) and to the left of the participant's chair. Two small surveillance cameras and one large video camera were pointed directly at the participant. The video camera was connected to a TV monitor that was placed next to the participant and showed a continuous live feed of the participant throughout the session. In addition, posters with the phrase "What does my behavior say about me?" were hung on the walls of the participant's room and a beverage coaster with the phrase "Who am I?" was placed under the participant's beverage. In the no-treatment control condition, the video camera and posters were removed from the room, participants received blank coasters, and the mirrors and surveillance cameras were covered with curtains. In order to maintain deception, the presence or absence of self-awareness cues was not acknowledged by the experimenters during the experimental session. If participants asked about the cues, the experimenters stated that they were part of another study.

Upon arrival to the laboratory, each partner was reconsented separately and then both partners were brought together to be provided with instructions for the experimental session. Participants were instructed that they would be consuming an alcoholic beverage and then competing against each other in a competitive reaction time task. They were told that throughout

the task, they would be able to administer shocks to their partner when they won trials and would receive shocks from their partner when they lost trials.

The partner was then escorted to his or her testing room to ostensibly consume his or her alcoholic beverage. In reality, the partner was debriefed at this time and was asked to provide consent for the experimenters to continue the experiment with the index participant. The partner was then compensated and dismissed from the laboratory. Upon receiving consent from the partner to continue with the experiment, the index participant received his or her alcoholic beverage. Two partners did not consent to this deception and thus the experiment was ended for these couples at this time.

State anger. State affect was measured using a short form of the Positive and Negative Affect Schedule (PANAS; Watson & Clark, 1988) at three time points throughout the experimental manipulation: immediately prior to consuming the alcoholic beverage, immediately after provocation, and immediately after the official TAP. The short form of the PANAS used in this study included 15 items assessing state anger, negative affect, and positive affect. Participants were asked to rate on a scale from 1 ("Not at all intense") to 7 ("Extremely intense") the extent to which they were currently experiencing each particular emotion. The five-item state anger subscale was used in the current analyses. The PANAS has demonstrated high internal consistency as well as good convergent validity in a large sample of adults from the general population (Crawford & Henry, 2004).

Beverage administration. All index participants received an alcoholic beverage during session 2. Participants received a dose of 0.99 g/kg (men) or 0.90 g/kg (women) body weight of 95% alcohol USP mixed at a 1:5 ratio with Tropicana orange juice. This dose has been reliably found to produce BrAC levels between 0.08% and 0.12% (Duke, Giancola, Morris, Holt, & Gunn, 2011). All participants were given 20 minutes to consume their beverage, and all participants were explicitly told that they were receiving alcohol.

After consuming their beverage, the index participant underwent a pain threshold assessment to determine the maximum shock level he or she could tolerate. This assessment involved the administration of 1-second duration shocks in an incremental stepwise intensity method from the lowest available shock setting, which is imperceptible, until the shocks reached a reportedly painful level. Participants informed the experimenter when they were first able to feel

a shock and when the shocks became painful. All shocks were administered through two electrodes attached to the participant's index and middle fingers of the nondominant hand. After the participant's pain threshold was determined and he or she reached a BrAC of at least 0.075%, the participant completed a task that served as provocation, ostensibly from the participant's partner.

Provocation and laboratory aggression task. To test study hypotheses, it was necessary to expose participants to conditions that would maximize the likelihood of eliciting anger in an ostensible interaction with their partner. As such, a practice round of a modified version (Giancola & Zeichner, 1995) of the Taylor Aggression Paradigm (TAP; Taylor, 1967) was used as provocation. While the full version of the TAP provides a measure of direct physical aggression against the participant's partner, the practice TAP is designed to create an adversarial interaction wherein participants experience heightened anger (Parrott, Zeichner, & Stephens, 2003). The hardware for the task was developed by Coulbourn Instruments (Allentown, PA) and the computer software was developed by Vibranz Creative Group (Lexington, KY).

The task was presented to participants as a reaction time competition in which they would engage against their romantic partner. Participants were seated in front of a computer with a keyboard. Participants were told that for each trial, a series of prompts would appear on the computer screen instructing them first to press and hold down the spacebar and then to release the spacebar as quickly as they could. Participants were told that whoever released the spacebar faster would win the trial. Participants were informed that they would be required to administer a shock to their partner when they won a trial and that they would receive a shock from their partner when they lost a trial. The numbers "1" through "10" on the computer keyboard were labeled from "low" to "high" to indicate varying levels of shock. Trials during the practice round were rigged so that participants lost a disproportionate number of trials (i.e., 4 out of 6 trials) and received physical (i.e., moderate intensity shocks) and verbal (i.e., written negative feedback) provocation from their "partner."

Once the index participant reached a BrAC of at least 0.08%, he or she completed the full version of the TAP. The "official" trials were also rigged, and the index participant received shocks that were one second in duration and ranged from 90% to 100% of their highest tolerated shock intensity (i.e., shock levels 9 and 10). All participants received the same sequence of winning (n = 10) and losing (n = 10) trials. Consistent with prior studies (Carlson, Marcus-Newhall, & Miller,

1990; Eckhardt et al., under review), physical IPA was defined as the average of the standardized scores for the intensity and duration of shocks administered throughout the 10 winning trials of the TAP.

Measure of hostile attribution bias. An audio recorder was used to record each participant's verbalizations during the official TAP. A modified version of the Articulated Thoughts in Simulated Situations paradigm (ATSS; Davison, Robins, & Johnson, 1983) was used to code these verbalizations. Before participants began the TAP, the experimenter provided them with the following instructions: "Remember, we want to know what you are thinking as the task goes on. So, we encourage you to 'talk out loud' and let us know your thoughts. You can say whatever you want about your performance, your partner, or what you are thinking about at that moment. You won't be able to hear each other – the intercom has been turned off between your rooms."

The duration and content of each ATSS verbalization was coded using the Observer XT 11.0 software package. Two trained raters transcribed and coded each articulation reflecting the verbalization of aggressive cognitions throughout the duration of the TAP. ATSS statements reflecting hostile attribution bias were defined as any statement in which the index participant blamed the cause of an event on the malicious and hostile intentions of the partner (e.g., "She meant for this happen just to get back at me"). The number of hostile attribution verbalizations were summed across the twenty trials of the TAP for one overall score, with higher scores reflecting a higher degree of hostile attribution bias.

Upon completion of the full TAP, BrAC was measured again and participants were escorted to a separate room where they were interviewed to assess the credibility of the manipulation and then debriefed. Participants remained in the laboratory until their BrAC fell below 0.03%, at which point they were debriefed again, compensated, and escorted out of the laboratory to prearranged transportation.

Data Analytic Plan

The following data analytic plan was preregistered on Open Science Framework Registries1. All analyses were conducted in SPSS version 26. Independent samples t-tests were used to examine differences between study sites on the following variables: anger rumination, past-year IPA victimization and perpetration, TAP aggression, and several demographic variables (i.e., age, years of education, relationship length). In addition, Fisher's Exact Test was used to examine differences between study sites on the following categorical variables: hostile attribution bias, gender, marital status, race, ethnicity, and income. Fisher's Exact Test was used in place of the chi-square test because Fisher's Exact Test is more appropriate for small sample sizes and for analyses in which the expected frequencies are small (i.e., < 5; Howell, 2013). Descriptive statistics and bivariate correlations were conducted to test for normality and multicollinearity between variables. Particular attention was paid to the correlation between hostile attribution bias and anger rumination, as these variables have been found to be moderately correlated in past studies (e.g., Quan et al., 2019; Wang et al., 2018).

Hierarchical linear regression was used to test all five hypotheses. Observed power for each regression model was calculated using G*Power (Faul, Erdfelder, Lang, & Buchner, 2007) and can be found in Tables 3 through 7. To test hypothesis 1 (i.e., the main effect of the self-awareness intervention on TAP aggression), intervention condition was first dummy coded (control condition = 0, self-awareness condition = 1). The majority of past studies examining the impact of self-awareness on alcohol-facilitated and sober aggression have relied on samples of only men. In addition, there were significant differences on key variables between the participant samples at the two study sites. Therefore, I dummy-coded gender (0 = men, 1 = women) and study site (GSU = 0, Purdue = 1) and examined these variables as possible moderators of the effect of the self-awareness intervention on TAP aggression. Two interaction terms were created by obtaining the cross-products of (1) the gender and intervention variables and (2) the study site and intervention variables. Intervention condition, gender, and site were entered into the first step of the model and the two-way interaction terms were entered into the second step of the model.

To test hypothesis 2, the moderator variable (i.e., IPA victimization) was first mean centered. Two- and three-way interaction terms were created by obtaining the cross-products of

[1]Massa, A. (2020, March 17). Moderators of a Self-Awareness Intervention for Alcohol-Facilitated Intimate Partner Aggression. Retrieved from osf.io/ks6ur

the dummy-coded intervention condition variable, the mean centered IPA victimization variable, and the dummy-coded study site variable. In order to isolate the effect of IPA victimization while controlling for one's own perpetration, IPA perpetration was mean centered and was entered alone in the first step of the model. Intervention condition, IPA victimization, and study site were then entered in step 2 to test for main effects. The 2-way interaction terms were entered in step 3, and the 3-way interaction term was entered in step 4.

Hierarchical linear regression was again used to test hypothesis 3. Before running this model, the moderator variable (i.e., anger rumination) was mean centered. Intervention condition, anger rumination, and study site were entered in the first step to examine main effects. The two 2-way interaction terms were entered in the second step to examine the moderating effects of anger rumination and study site. The 3-way interaction term was entered in the third step.

To test whether hypothesis 4, the moderating effect of hostile attribution bias was examined. There was a low base rate of hostile attribution bias verbalizations in the current study, with scores ranging from 0-1. Thus, this variable was treated as a dummy-coded variable (0 = verbalizations absent; 1 = verbalization present). Two- and three-way interaction terms were created by obtaining the cross-products of the dummy-coded intervention condition, hostile attribution bias, and study site variables.

To test hypothesis 5, I first created six 2-way interaction terms for all possible combinations of the intervention condition and the three moderators. I then created three 3-way interaction terms between the moderator variables and intervention condition, followed by one 4-way interaction term between the intervention condition and all three moderators. Intervention condition and the three moderators were entered into step one of the model. The 2-way interaction terms were entered in step 2, all 3-way interaction terms were entered in step 3, and the 4-way interaction term was entered in step 4.

Simple slopes analysis was used to decompose all significant interactions. I examined the effect of the intervention condition on TAP aggression at high (+1 SD) and low (-1 SD) levels of each moderator.

RESULTS

Preliminary Analyses

Descriptive statistics were conducted on the full sample to examine average scores on each of the key variables (see Table 2). Collapsing across site, gender, and intervention condition, the mean shock intensity delivered during the TAP was fairly high (M = 7.01, SD = 2.61). On average, participants reported experiencing (M = 3.86, SD = 2.21) and perpetrating (M = 3.95, SD = 2.16) about 4 types of IPA in the past year. One outlier was detected on the ARS and this value was winsorized to reduce the impact of this extreme score. Participants reported a moderate degree of anger rumination (M = 29.46, SD = 9.28). ARS scores were positively skewed (skewness = 1.23, kurtosis = 1.19), and thus this variable was square root transformed before being used in subsequent analyses. Only 7 participants made any verbalizations during the TAP that reflected hostile attribution bias. Of those who did make such a verbalization, the highest number of verbalizations was 1.

I examined differences in these key variables by gender using independent samples t-tests and Fisher's Exact Tests (two-tailed). Women's past-year IPA perpetration (M = 4.61, SD = 2.34) was significantly higher than men's perpetration (M = 3.29, SD = 1.74), $t(120.17) = 3.67$, $p < .001$, 95% CI [-2.029, -.607]. Women's anger rumination scores (M = 30.95, SD = 10.06) were higher than men's (M = 27.97, SD = 8.23) at a trend level, $t(130) = 1.87$, $p = .064$, 95% CI [-6.151, .181]. There was no significant difference between men and women in TAP aggression, $t(131) = 1.62$, $p = .108$, 95% CI [-.477, .047], IPA victimization, $t(130) = .31$, $p = .754$, 95% CI [-.642, .885], or hostile attribution bias verbalizations, $p = .72$. Given the observed gender differences, gender was controlled for in the analyses involving the ARS variable.

Differences by testing site and intervention condition were examined for each of the key variables and several demographic variables using independent samples t-tests and Fisher's Exact Test. The only difference found on the key variables was that participants at Purdue had higher TAP aggression scores than participants at GSU, $t(131) = 4.115$, $p < .001$, 95% CI [-.855, -.292]. Given this finding, site was included as a moderator in all main analyses. Participants at GSU reported, on average, higher levels of education and income compared to participants at Purdue

(see Table 1). No significant differences were found for any key or demographic variables between intervention conditions.

Pearson correlations were used to assess bivariate associations between each of the key variables (see Table 2). Results indicated that there was no evidence of multicollinearity between the dependent variable and any of the predictor variables or between any two predictor variables. Of note, the dependent variable (i.e., TAP aggression) was not significantly correlated with any of the predictor variables.

Table 2. Descriptive Statistics and Pearson Correlations (N = 133)

Measure	1	2	3	4	5	6	7
1. TAP Aggression	–						
2. TAP Intensity	.77***	–					
3. TAP Duration	.74***	.17*	–				
4. ARS[1]	.05	.13	-.03	–			
5. Hostile Attributions	-.04	-.05	-.03	-.04	–		
6. IPA Victimization	.11	.18*	.01	.28**	.06	–	
7. IPA Perpetration	.07	.14	-.01	.29**	-.04	.69***	–
Mean	.00	7.01	1305.13	29.46	.05	3.86	3.95
SD	.77	2.61	1711.28	9.28	.22	2.21	2.16

Note. TAP Aggression = average of the standardized intensity and duration scores across the 10 winning trials of the TAP; TAP Intensity = average intensity of shocks delivered during the TAP; TAP Duration = average duration of shocks delivered during the TAP; ARS = Anger Rumination Scale; Hostile Attributions = number of verbalizations reflection hostile attribution bias during the TAP; IPA Victimization = dyadic max score for index participants' past-year psychological and minor physical IPA victimization; IPA Perpetration = dyadic max score for index participants' past-year psychological and minor physical IPA perpetration.

*p < .05, **p < .01, ***p < .001; [1]one participant did not complete the ARS and thus was excluded from analyses using this variable.

Manipulation Checks

Breath Alcohol Content

All participants (100%) had a BrAC reading of 0.00% at the beginning of session 2. On average, participants' BrAC increased from pre-TAP (M = 0.09%, SD = 0.02%) to post-TAP (M = 0.11%, SD = 0.02%), providing evidence that overall, participants were on the ascending limb of alcohol intoxication during the TAP. However, 7 (5.3%) participants had a BrAC reading below 0.08% before beginning the official TAP. In addition, thirteen (9.8%) participants experienced a decline in BrAC during the official TAP. All analyses were run separately with and without these twenty participants and results did not substantially differ. Therefore, all 133 participants were retained in the final analyses.

State Anger

Two participants failed to complete one or more of the measures of state anger and thus were excluded from the following analyses. Using a mixed model repeated measures ANOVA, I found that state anger significantly increased across the course of the experiment, $F(2,258) = 5.73$, $p = .004$, partial $\eta^2 = .04$. State anger at time 2 (M = 6.29, SD = 3.27) was higher than state anger at time 1 (M = 5.68, SD = 2.04), $t(130) = 2.02$, $p = .050$. State anger at time 3 (M = 6.77, SD = 4.35) was higher than state anger at time 2, $t(130) = 2.02$, $p = .043$. There was no significant effect of intervention condition on anger scores across the experiment, $F(1, 129) = .11$, $p = .74$, partial $\eta^2 = .001$, nor was there a time point x intervention condition interaction, $F(2, 258) = .26$, $p = .77$, partial $\eta^2 = .002$.

Main Effect of Intervention

Hierarchical linear regression was used to examine the main effect of intervention condition on TAP aggression, in addition to the moderating effects of site and gender (Hypothesis 1; see Table 3). In step one, TAP aggression was regressed on intervention condition, gender, and site. The model was significant, $F(3, 129) = 7.50$, $p < .001$, $R2 = .15$, MSE = .52. The main effect of intervention condition was not significant, $\beta = -.05$, $t(129) = -.66$, $p = .51$, 95% CI [-.330, .165]. The main effect of gender was significant, such that TAP aggression scores were higher for women

than for men, β = .18, $t(129) = 2.15$, $p = .033$, 95% CI [.022, .517]. The main effect of site was also significant, such that TAP aggression scores were higher for participants at Purdue compared to GSU, β = .35, $t(129) = 4.30$, $p < .001$, 95% CI [.323, .872].

Table 3. Hierarchical Linear Regression Results: Hypothesis 1

Variable	*B*	*SE*	β	R^2	ΔR^2	Power
Step 1				.15***		.97
(Constant)	-.26*	.12				
Condition	-.08	.13	-.05			
Gender	.27	.13	.18*			
Site	.60	.14	.35***			
Step 2				.16	.01	.17
(Constant)	-.16	.16				
Condition	-.26	.20	-.17			
Gender	.09	.19	.06			
Site	.56	.20	.33**			
Condition*Gender	.32	.25	.19			
Condition*Site	.03	.28	.91			

Note. *$p < .01$, **$p < .01$, ***$p < .001$.

The two 2-way interaction terms (i.e., intervention condition*gender, intervention condition*site) were added to the second step of the model. This step did not significantly change the variance accounted for by the model, $\Delta F(2, 127) = .81$, $p = .445$, $\Delta R^2 = .01$, MSE = .52. In addition, neither interaction was significant. These findings suggest that the effect of the intervention on TAP aggression did not vary by gender or testing site.

Moderation Analyses

Hypothesis 2

Hierarchical linear regression was used to examine the moderating effect of IPA victimization on TAP aggression, controlling for IPA perpetration (see Table 4). The moderating effect of site was also examined in this model. IPA perpetration was entered in step 1 as a covariate. Intervention condition, IPA victimization, and site were added in step 2. The model was significant, $\Delta F(3, 127) = 6.39$, $p < .001$, $\Delta R^2 = .13$, MSE = .53. Only the main effect of site was significant, $\beta = .34$, $t(127) = 4.14$, $p < .001$, 95% CI [.307, .870], such that TAP aggression was higher for participants at Purdue compared to GSU. The three 2-way interactions between intervention condition, victimization, and site were entered in step 3 of the model. None of the 2-way interaction terms were significant, and this step did not significantly contribute to the variance accounted for by the model. In step 4, the 3-way interaction among condition, victimization, and site was added to the model. The overall model was trending towards significance, $\Delta F(1, 123) = 2.79$, $p = .098$, $\Delta R^2 = .02$, MSE = .53. The 3-way interaction term was also trending towards significance, $\beta = -.23$, $t(123) = -1.67$, $p = .098$, 95% CI [-.510, .043].

To clarify this interaction, I examined the effect of IPA victimization on TAP aggression among those in the intervention versus control conditions and for those at GSU versus Purdue (see Figure 2). For Purdue participants, the association between IPA victimization and TAP aggression was stronger for individuals in the control condition compared to those in the intervention condition, at a trend level ($B = -.22$, $p = .07$). More specifically, the effect of condition on TAP aggression was stronger at high ($B = -.65$, $p = .097$) compared to mean ($B = -.20$, $p = .42$) and low ($B = .24$, $p = .43$) levels of victimization. No such effect was found for participants at GSU.

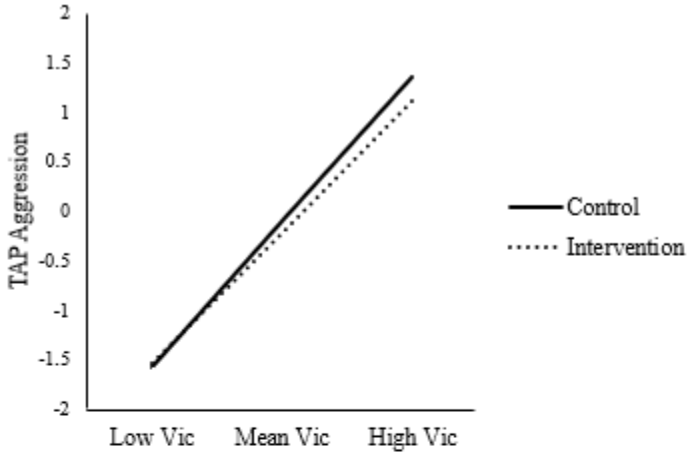
Table 4. Hierarchical Linear Regression Results: Hypothesis 2

Variable	*B*	*SE*	β	R^2	ΔR^2	Power
Step 1				.004		.11
(Constant)	-.002	.07				
IPA Perp	-.12	.03	.07			
Step 2				.14	.13***	.97
(Constant)	-.12	.10				
IPA Perp	.002	.04	.01			
Condition	-.09	.13	-.06			
IPA Vic	.05	.04	.13			
Site	.59	.14	.34***			
Step 3				.14	.006	.10
(Constant)	-.12	.12				
IPA perp	-.003	.04	-.01			
Condition	-.09	.15	-.06			
IPA Vic	.06	.05	.18			
Site	.62	.21	.36**			
Condition*Vic	-.04	.06	-.09			
Condition*Site	-.02	.29	-.01			
Vic*Site	.04	.07	.05			
Step 4				.16	.02	.36
(Constant)	-.11	.11				
IPA Perp	-.009	.04	-.02			
Condition	-.10	.15	-.07			
IPA Vic	.04	.06	.11			
Site	.67	.21	.39**			
Condition*Vic	.01	.07	.02			
Condition*Site	-.07	.29	-.03			
Vic*Site	.17	.11	.23			

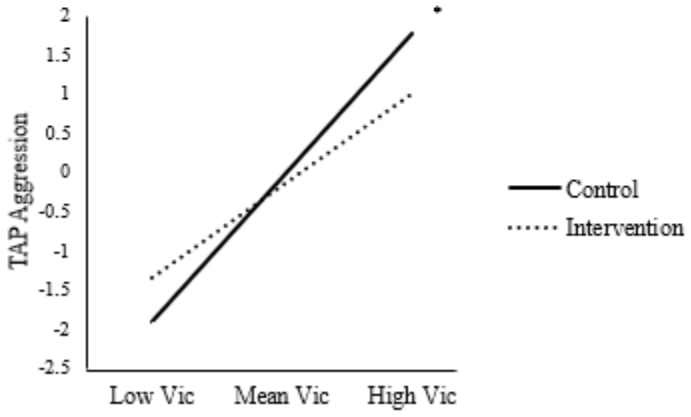
Table 4 continued

Variable	*B*	*SE*	β	R^2	ΔR^2	Power
Condition*Vic*Site	-.23	.14	-.23[t]			

Note. [t]$p < .10$, *$p < .01$, **$p < .01$, ***$p < .001$.



a) Moderating effect of IPA victimization at GSU



b) Moderating effect of IPA victimization at Purdue

Figure 2. Simple slopes analysis: Hypothesis 2; *p = .07.

Hypothesis 3

Hierarchical linear regression was used to examine the moderating effect of hostile attribution bias on TAP aggression (see Table 5). The moderating effect of site was also examined in this model. In the first step, TAP aggression was regressed on intervention condition, hostile attribution bias, and site to examine main effects. The model was significant, $F(3, 129) = 5.38$, $p = .001$, $R2 = .12$, MSE = .54. Only the main effect of site was significant, $\beta = .33$, $t(129) = 4.00$, $p < .001$, 95% CI [.285, .842], such that participants at Purdue displayed more aggression than those at GSU. The three 2-way interactions between intervention condition, hostile attributions, and site were entered in step 3 of the model. None of the 2-way interaction terms were significant, and this step did not significantly contribute to the variance accounted for by the model, $\Delta F(1, 126) = .09$, $p = .97$, $\Delta R^2 = .002$, MSE = .54. Given the small number of participants who had made a hostile attribution verbalization, the 3-way interaction among condition, hostile attribution bias, and site was not able to be analyzed.

Table 5. Hierarchical Linear Regression Results: Hypothesis 3

Variable	*B*	*SE*	β	R^2	ΔR^2	Power
Step 1				.12**		.95
(Constant)	-.11	.11				
Condition	-.09	.13	-.06			
Hostile Att.	-.06	.28	-.02			
Site	.56	.14	.33***			
Step 2				.12	.001	.07
(Constant)	-.09	.12				
Condition	-.12	.16	-.08			
Hostile Att.	-.16	.44	-.05			
Site	.53	.20	.31*			
Condition*Hostile	.25	.62	.06			
Hostile*Site	-.33	.88	-.04			
Condition*Site	.09	.29	.04			

Note. *$p < .01$, **$p < .01$, ***$p < .001$.

Hypothesis 4

Hierarchical linear regression was used to examine the moderating effect of anger rumination on TAP aggression (see Table 6). The moderating effect of site was also examined. Given the significant difference in ARS between men and women, I controlled for gender by adding it as a covariate in the first step of the model. In the second step, TAP aggression was regressed on intervention condition, anger rumination, and site to examine main effects. The model was significant, $\Delta F(3, 127) = 6.43$, $p = .001$, $\Delta R^2 = .13$, $MSE = .52$. Only the main effects of gender, $\beta = .18$, $t(127) = 2.11$, $p = .037$, 95% CI [.017, .525], and site, $\beta = .35$, $t(127) = 4.28$, $p < .001$, 95% CI [.325, .885], were significant. Women and participants at Purdue exhibited higher levels of TAP aggression compared to men and participants at GSU, respectively. The three 2-way interactions between intervention condition, anger rumination, and site were entered in step 3 of the model. None of the 2-way interaction terms were significant, and this step did not significantly contribute to the variance accounted for by the model, $\Delta F(1, 124) = .28$, $p = .84$, $\Delta R^2 = .006$, $MSE = .53$. The three-way interaction among condition, anger rumination, and site was entered in the final step of the model. The interaction term was not significant and this step did not significantly contribute to the variance accounted for by the model, $\Delta F(1, 123) = 1.44$, $p = .23$, $\Delta R^2 = .01$, $MSE = .53$.

Hypothesis 5

Hierarchical linear regression was intended to examine the effect of a 4-way interaction among intervention condition, IPA victimization, anger rumination, and hostile attribution bias on TAP aggression (see Table 7). Step 1, $F(4, 127) = .65$, $p = .63$, $R2 = .02$, MSE = .60, step 2, $\Delta F(6, 121) = .48$, $p = .82$, $\Delta R^2 = .02$, MSE = .62, and step 3, $\Delta F(4, 117) = .09$, $p = .99$, $\Delta R^2 = .003$, MSE = .64, of this model were nonsignificant. In addition, given the small number of participants who verbalized hostile attribution biases during the TAP, the 4-way interaction term was not able to be analyzed. However, none of the variables entered into this model were significant and it is likely that the 4-way interaction term would also be nonsignificant.

Table 6. Hierarchical Linear Regression Results: Hypothesis 4

Variable	*B*	*SE*	β	R^2	ΔR^2	Power
Step 1				.02		.35
(Constant	-.11	.09				
Gender	.21	.13	.14			
Step 2				.15	.13***	.97
(Constant)	-.26*	.12				
Gender	.27	.13	.18*			
Condition	-.08	.13	-.05			
ARS	.01	.08	.01			
Site	.61	.14	.35***			
Step 3				.15	.006	.10
(Constant)	-.25	.14				
Gender	.25	.13	.17			
Condition	-.09	.15	-.06			
ARS	-.07	.13	-.08			
Site	.60	.21	.35**			
Condition*ARS	.09	.16	.07			
ARS*Site	.14	.18	.08			
Condition*Site	.01	.29	.004			
Step 4				.16	.01	.21
(Constant)	-.25	.14				
Gender	.25	.13	.16			
Condition	-.09	.15	-.06			
ARS	-.004	.15	-.004			
Site	.62	.21	.36**			
Condition*ARS	-.03	.19	-.02			
ARS*Site	-.07	.26	-.04			

Table 6 continued

Variable	*B*	*SE*	β	R^2	ΔR^2	Power
Condition*Site	.01	.29	.01			
Condition*ARS*Site	.43	.36	.16			

Note. *$p < .01$, **$p < .01$, ***$p < .001$.

Table 7. Hierarchical Linear Regression Results: Hypothesis 5

Variable	*B*	*SE*	β	R^2	ΔR^2	Power
Step 1				.02		.22
(Constant)	.07	.10				
Condition	-.12	.14	-.08			
ARS	.01	.09	.01			
Vic	.04	.03	.11			
Hostile Att.	-.17	.30	-.05			
Step 2				.04	.02	.20
(Constant)	.07	.11				
Condition	-.15	.14	-.10			
ARS	-.09	.14	-.09			
Vic	.04	.05	.11			
Hostile Att.	-.19	.51	-.05			
Condition*ARS	.15	.19	.12			
Condition*Vic	-.02	.07	-.04			
Condition*Hostile	.06	.80	.01			
ARS*Vic	.05	.04	.12			
ARS*Hostile	-.25	.50	-.06			
Vic*Hostile	.02	.11	.02			
Step 3				.05	.003	.07
(Constant)	.07	.11				
Condition	-.15	.15	-.10			
ARS	-.08	.15	-.09			
Vic	.04	.05	.11			
Hostile Att.	-.29	.60	-.08			
Condition*ARS	.14	.20	.11			
Condition*Vic	-.02	.07	-.03			
Condition*Hostile	1.96	3.72	.44			

Table 7. continued

Variable	*B*	*SE*	β	R^2	ΔR^2	Power
ARS*Vic	.05	.06	.11			
ARS*Hostile	-.23	.52	-.06			
Vic*Hostile	.52	1.38	.46			
ARS*Vic*Hostile	-.30	1.19	-.11			
Condition*ARS*Hos	2.66	5.42	.36			
Condition*Vic*Hos	-7.38	1.86	-.65			
Cond*ARS*Vic	.01	.09	.01			

Note. The 4-way interaction among intervention condition, ARS, victimization, and hostile attribution bias could not be calculated.

*$p < .01$, **$p < .01$, ***$p < .001$.

DISCUSSION

The current study sought to extend past research by applying an existing self-awareness intervention for alcohol-facilitated general aggression to alcohol-facilitated IPA. Contrary to past findings, the intervention did not reduce aggressive behavior in the present sample. In addition, although the theoretical basis of the intervention suggested that the intervention would be less effective for individuals with higher levels of anger rumination, hostile attribution bias, and IPA victimization, these predictions were not supported. In fact, for participants at one of the testing sites (i.e., Purdue), the effect of the self-awareness intervention in reducing aggression was stronger for individuals with high compared to low levels of IPA victimization. This finding could suggest that the intervention buffered against the effect of IPA victimization on aggression. This finding is contrary to hypothesis 2, which stated that when individuals' attention was drawn to themselves, this would lead them to compare their behavior during the TAP to a standard of correct behavior; for individuals with higher levels of IPA victimization, this standard was expected to be aggression-promoting. However, it is not surprising that individuals who experienced greater amounts of IPA from their partners aggressed against their partners at an overall higher rate than individuals who experienced less IPA from their partners, given prior findings that IPA victimization and IPA perpetration are highly correlated (e.g., Stith, Smith, Penn, Ward, & Tritt, 2004).

There was also a significant effect of testing site on TAP aggression. Participants at the site with higher levels of TAP aggression (i.e., Purdue) reported lower annual income and a lower level of education than individuals at GSU. This finding is also not surprising, given past research that has found income and education level to be negatively correlated with aggression perpetration (Capaldi, Knoble, Shortt, & Kim, 2012; Stith et al., 2004). However, while the testing rooms at each site were intended to be identical, it is possible that there were potential unintended differences in the testing environments that could have contributed to this difference.

Overall, the results of the current study did not align with a priori hypotheses. I outline several possible explanations for the lack of significant findings and implications for future research in the following sections.

Analysis of the Self-Awareness Intervention

The self-awareness intervention tested in the current study was grounded in two main theories: OSA theory and AMT. According to the attention-allocation model of AMT, acute alcohol intoxication serves to narrow attention onto the most salient cues in the environment (Steele & Josephs, 1990). Applying this model to the current study, participants' attention was expected to be narrowed onto the most salient cues in the testing room. The study was designed such that self-awareness cues (e.g., mirrors, video cameras) were intended to be the most prominent cues in the intervention condition testing room, while provocative cues (e.g., shocks from the partner) were intended to be the most salient cues in the control condition testing room. Based on OSA theory, it was expected that if participants' attention was narrowed onto self-awareness cues, this would lead to a self-standard comparison, which would serve to inhibit aggression (Silvia & Duval, 2001). Therefore, I had expected individuals in the self-awareness condition to exhibit less aggression than those in the control condition. In order for the intervention to have had the hypothesized effect, several assumptions needed to be met.

The first major assumption was that alcohol intoxication would restrict the scope of attention for all participants, leading them to focus on the most salient cues in the testing room. This assumption has been supported in prior tests of AMT, which have found that alcohol narrows attention onto highly salient cues. For example, intoxicated individuals with a history of heavy drinking have shown an attentional bias toward aggression-related words compared to neutral words (Massa, Subramani, Eckhardt, & Parrott, 2019). Redirecting attention away from an upcoming stressful event (i.e., giving a speech) and onto a distracting task has been found to reduce anxiety in intoxicated but not sober individuals, suggesting that the distraction was sufficient to capture the intoxicated individuals' attention (Giancola et al., 2010). Converging evidence has also been found in situations involving risky sex and drinking and driving (Giancola et al., 2010). However, these prior studies have relied on indirect measures of attentional narrowing and do not allow for conclusive evidence that alcohol indeed restricts attentional capacity. In the current study, participants' attention allocation during the TAP was not assessed, and thus it is unknown what the focus of participants' attention truly was during the aggression task.

The second major assumption was that the self-awareness cues in the intervention condition testing room would be more salient to participants than the provocative cues. This assumption was supported by past tests of this intervention, which were nearly identical to the

current study in terms of methodology, and which found that self-awareness cues inhibited alcohol-facilitated provoked aggression (Bailey et al., 1983; Gallagher & Parrott, 2016; Purvis et al., 2016). Other studies in which alcohol was not administered also yielded results that suggested that self-awareness cues captured attention, given that there were differences in aggressive behavior between the self-awareness and control conditions (Carver, 1974; 1975; Scheier et al., 1974).

However, two major differences between the current study and studies that found an attention-capturing effect of self-awareness cues exist. First, the current study was the first application of this intervention to aggression against romantic partners, and thus it was the first study in which the target of aggression during the laboratory task was a romantic partner. In all preceding studies, the target of aggression was a confederate (i.e., stranger). Second, all participants in the current study had a recent history of aggressing against the target. In all preceding studies, the participants had not previously encountered the target and were not required to have a history of aggressing against anyone in the past. These key differences in the relationship between the participant and the target and in the participant's history of aggression could have led to a difference in the relative salience of the self-awareness cues versus provocative cues than was observed in prior studies.

It is possible that the salience of the self-awareness cues outweighed the salience of the provocative cues for individuals who did not have a prior history of aggression and who were participating in an aggression-based task against someone with whom they did not have an aggressive history. On the other hand, for IPA perpetrators, the provocation they ostensibly experienced from their partner could have captured attention more effectively than environmental cues of self-awareness. This possible explanation is supported by research that has found attentional biases toward anger and aggressogenic cues, compared to neutral cues, among IPA perpetrators (Chan, Raine, & Lee, 2010; Eckhardt, Barbour, & Davison, 1998; Massa et al., 2019). Simply exposing individuals with a history of aggressive behavior to neutrally-valenced self-awareness cues while they are in the midst of a provocative situation with their partner may not be sufficient to redirect attention away from aggressogenic cues.

The third major assumption was that the self-awareness cues would serve as an aggression inhibitor in the current study. However, previous studies have found that self-awareness does not always produce aggression-inhibiting effects, particularly in the presence of provocation. In fact,

self-awareness has served to increase aggression among provoked participants to a level even greater than that of non-self-aware participants (Scheier, 1976). The authors of this study argued that self-awareness cues amplified the participants' experience of anger and thus acted as a facilitator of aggressive behavior, outweighing any effects of an inhibiting standard of correctness. In the current study, all participants were provoked and there was no difference in self-reported anger between the intervention and control conditions. Thus, it is possible that the provocation and associated anger experience outweighed any potential inhibiting effects of the self-awareness cues. However, evidence from two previous tests of a self-awareness intervention for alcohol-facilitated provoked aggression do not align with this interpretation, and thus this explanation alone is not sufficient to explain why the intervention was not efficacious in the current study (Gallagher & Parrott, 2016; Purvis et al., 2016).

The assumption that focusing on self-awareness cues would serve as an aggression inhibitor is based on the premise in OSA theory that self-awareness should call to one's attention a comparison between their behavior and a standard for correct behavior (Silvia & Duval, 2001). One of the major weaknesses of OSA theory is that it does not clearly specify how a standard of comparison is determined or which standard takes precedence when several competing standards exist (Duval, Silvia, & Lalwani, 2001). Several attempts have been made to work around this issue by either experimentally imposing a standard of correct behavior on participants or by measuring participants' own standards of behavior and comparing them to laboratory aggression. When standards were experimentally imposed, participants who were made to be self-aware were more likely to behave in line with those standards compared to participants who were not made self-aware (Carver, 1974). When participants' own standards were measured and made salient, participants tended to behave in line with their own standards when they were exposed to self-awareness cues, even when those standards were aggression-promoting (Carver, 1975).

A limitation of the current study is the absence of a measure or manipulation of participants' standards of correct behavior, and thus the inability to assess whether participants were comparing their own behavior to an aggression-inhibiting or aggression-promoting standard. It is possible that some participants in the self-awareness condition were made aware of their personal standards for nonaggressive behavior and thus changed their behavior to align with these standards. Given that all participants in the current study had a history of engaging in IPA, it is likely that some held personal beliefs that are accepting of aggression and behaved in line with those standards. In

addition, given that we had included cues of both private (e.g., mirrors) and public (e.g., surveillance cameras) self-awareness, some participants' internal beliefs may have conflicted with their perceptions of societal standards of correct behavior. Given that perceptions of societal standards were not measured either, this adds another layer of uncertainty.

The final major assumption was that the aggression-inhibiting nature of the self-awareness cues would be strong enough to outweigh any aggression-promoting factors that were present during the aggression task. Participants in the current study were not operating in a vacuum in which they were exposed to only two sets of stimuli: self-awareness cues and provocative cues. Rather, each participant brought with them a constellation of dispositional trait factors, relationship factors, and normative beliefs that could have impacted their behavior during the TAP. Using I3 model as a framework for understanding how these factors might interact, it is expected that for aggression to be inhibited, the inhibiting nature of the self-awareness cues would need to outweigh the instigating cues (i.e., provocation ostensibly from one's partner), the disinhibiting effect of alcohol intoxication, and any other impelling factors that were present (Finkel & Hall, 2018). In the current study, anger rumination, hostile attribution bias, and a history of bidirectional IPA were conceptualized as potential impelling factors that would increase the likelihood that one would behave aggressively during the TAP. Results revealed that these impellors did not have an impact on TAP aggression for individuals in the self-awareness or control conditions. However, there are a multitude of other potentially unmeasured impelling and instigating factors that could have interacted with alcohol intoxication and provocation to reduce the efficacy of the intervention.

Clinical and Research Implications

Given the finding that the self-awareness intervention did not effectively reduce laboratory-based IPA, it is critical that more work is conducted to better understand the potential positive or negative impacts of this intervention before attempting to implement it in a clinical setting. While there is a great need for IPA interventions that can be implemented while individuals are acutely intoxicated, these interventions must be developed with caution and a full understanding of their potential effects must be gained prior to translation and dissemination.

Future research should strive to address the lessons learned in the current study in order to test if and under what conditions a self-awareness intervention may effectively reduce alcohol-facilitated IPA. In order to address the first assumption discussed above (i.e., that alcohol narrows

attention onto the most salient cues in the environment), more direct and stringent tests of the attention allocation model of AMT are needed. Prior tests of the attention allocation model in the context of alcohol-facilitated aggression have relied heavily on indirect measures of attention, such as distraction techniques or the dot probe task, a reaction-time based measure of attention that has exhibited poor reliability (Gallagher & Parrott, 2011; 2016; Massa et al., 2019; Waechter, Nelson, Wright, Hyatt, & Oakman, 2014). In order to address these limitations, future research should incorporate eye-tracking methods, which have exhibited excellent reliability when used to assess attentional bias toward threatening stimuli (Waechter et al., 2014), and event-related potentials (ERPs), which provide information regarding temporal neural processing (e.g., attention) that cannot be assessed using other methods (Luck, 2014).

The second assumption, that self-awareness cues would be more salient than aggressogenic cues for intoxicated individuals with a history of IPA perpetration, must also be examined. Given that it is likely that passive cues of self-awareness, such as mirrors, may not be sufficient to capture the attention of this population, the self-awareness intervention itself may need to be adjusted. It is possible that a more active attention modification intervention is needed. For example, a simple yet more dynamic intervention could be delivered through the use of a smartphone application and wearable technology. Devices such as the BACtrack Skyn Wearable Alcohol Monitor have been designed to detect the wearer's transdermal alcohol content (TAC) and to send those data to a smartphone application. One example of a more active attention modification intervention could be a just-in-time adaptive intervention, which could be delivered as a push notification with an aggression-inhibiting message (e.g., a reminder of negative consequences of aggression or a reminder of one's nonaggressive values) that is sent to the individual's phone when the wearable device detects a rise in TAC (Nahum-Shani et al., 2018). This notification might be more noticeable and salient to the individual and might be better able to disrupt an ongoing conflict interaction compared to the presence of a static stimulus such as a mirror.

In order to address the third assumption, that self-awareness cues would inhibit aggression, a better understanding of individuals' standards of comparison would be necessary. As mentioned previously, standards of comparison have been found to be strong determining factors of behavior when individuals are in a state of heightened self-awareness, and thus the self-awareness intervention might only be effective at reducing aggression if the individual's standard of comparison is aggression-inhibiting. Future studies should attempt to explicitly measure

participants' standards of comparison so that the effect of the intervention can be more accurately assessed. Without knowing the standards of comparison, it is not possible to ascertain whether the intervention failed to work because the self-awareness cues failed to capture participants' attention or whether the cues did in fact capture attention, but the standards of comparison did not effectively inhibit aggression.

While future studies could more directly assess participants' standards of correct behavior in order to partially address this assumption, it is unclear how helpful this would be for implementing a self-awareness intervention outside of the laboratory. If the effectiveness of a self-awareness intervention truly does rely on an individual comparing his or her own behavior to an aggression-inhibiting standard of comparison, and that standard is often unknown and is unable to be experimentally imposed outside of a laboratory, then this intervention might only be helpful for individuals who have personal standards that inhibit IPA and perceptions of societal standards that are also IPA-inhibiting. In addition, these aggression-inhibiting standards would need to be accessible to the individual while he or she is intoxicated and is involved in a conflict scenario with his or her partner. For individuals who have personal beliefs that IPA is acceptable and normative, then the self-awareness intervention might yield iatrogenic effects. If the role of standards of comparison in inhibiting or promoting IPA were to be clarified, this could offer important insights into who may or may not benefit from this type of intervention. Additionally, the more active attention modification intervention described previously could potentially circumvent this issue by having the BACtrack wearer preprogram an aggression-inhibiting message to be delivered during episodes of acute intoxication.

Finally, it will be critical to address the fourth assumption, that the aggression-inhibiting nature of the self-awareness cues would outweigh any other aggression-promoting factors that are relevant to any given person or situation. In order to better understand these factors, researchers should continue to take a multidimensional approach by investigating the effects of both proximal (e.g., alcohol intoxication, provocation, self-awareness cues) and distal (e.g., dispositional traits, relationship factors, social and cultural norms) factors on alcohol-facilitated IPA. The body of literature on IPA perpetration points to the notion that IPA is a complex phenomenon that is best understood by examining risk factors at many levels, such as those described in Dutton's (1995) nested ecological model and the I3 model (Finkel & Hall, 2018). Focusing on proximal factors alone may not be sufficient for developing effective interventions.

Limitations

In addition to the limitations addressed above, several other aspects of the current study merit discussion. First, given the unique characteristics of our sample (e.g., relatively low SES, urban dwellers) and the specific inclusion criteria for the current study (e.g., heavy alcohol users, heterosexual couples), the present findings may not generalize to other populations (e.g., same-sex couples, upper SES, rural populations). Second, while I strove to enhance the reliability of the reports of past-year IPA by combining partner reports and by using a variety scoring method, the reports were retrospective in nature and thus were subject to recall biases. Third, the analyses in the current study, particularly those involving interactions, were underpowered given the modest sample size. Power was even further limited by the uneven sample sizes between the two testing sites. Verbalizations during the TAP were infrequent, and thus the measure of hostile attribution bias was weak and likely does not reflect the true association between this construct and alcohol-facilitated aggression. Finally, the methods employed in the current study did not allow for the measurement of the standards to which participants were comparing their behavior during the TAP. Therefore, it is unclear what that standard was for each participant and whether alcohol intoxication and the intervention narrowed participants' attention onto the standard. As mentioned previously, future research is needed to more carefully isolate this variable in order to test this key theoretical component of the self-awareness intervention.

Conclusion

In the current study, I applied a self-awareness intervention for alcohol-facilitated aggression to a sample of community couples with a history of heavy drinking and IPA. In addition, I investigated potential moderating factors to identify for whom this intervention would be most effective. Contrary to hypotheses and to previous research, the intervention did not have the intended effect of reducing alcohol-facilitated IPA during a laboratory-based aggression task. In addition, the three moderators that were investigated did not alter the effect of the intervention. Several theoretical and methodological limitations, as well as two key differences between the current sample and populations studied in previous tests of this intervention, may have contributed to the lack of efficacy of this intervention. Future research should strive to address the limitations

of the current study in order to examine whether there are circumstances under which this intervention may be useful for preventing or reducing IPA.

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