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Problematic Drinking Mediates the Association between Urgency and Intimate Partner Aggression During Acute Intoxication

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Abstract

Background—This study tested a moderated-mediation model whereby dimensions of impulsivity (i.e., negative urgency, positive urgency, sensation seeking, lack of premeditation, and lack of perseverance) differentially predict perpetration of physical intimate partner aggression through problematic drinking in intoxicated and non-intoxicated heavy drinkers.

Methods—Participants were 249 heavy drinkers (148 men and 101 women) with a recent history of psychological and/or physical intimate partner aggression perpetration toward their current partner recruited from two metropolitan U.S. cities. Participants completed questionnaires that assessed impulsivity and problematic drinking, consumed an alcohol or no-alcohol control beverage, and completed a shock-based aggression task in which they were ostensibly provoked by their intimate partner.

Results—Results indicated an indirect effect of urgency on intimate partner aggression through problematic drinking that was significantly more positive in intoxicated individuals.

Conclusions—These findings implicate a tendency to act rashly in response to emotions as the specific dimension of impulsivity associated with problematic drinking, which in turn exacerbates risk for intimate partner aggression perpetration. Results also suggest acute effects of alcohol are key in facilitating this mechanism.

Keywords

problematic drinking; intimate relationships; disinhibitory traits; domestic violence

Intimate partner aggression (IPA) is a serious public health concern. Despite the prevalence of IPA and its association with adverse mental health (Kaura & Lohman, 2007) and physical health outcomes (Black, 2011), support for the effectiveness of interventions that seek to reduce IPA perpetration is equivocal (Eckhardt et al., 2013). To develop effective

interventions, it is important to examine the mechanisms of action that increase risk for IPA perpetration. While problematic alcohol use has been established as a contributing cause of IPA (Leonard & Quigley, 2016), less literature has examined dispositional traits that may interact with long-term and acute effects of alcohol to increase IPA. The current study tested a mechanism of action whereby impulsivity leads to a pattern of problematic drinking which in turn increases risk for IPA perpetration. We also sought to examine the moderating effect of acute alcohol intoxication on this mechanism.

Impulsivity and IPA Perpetration

Impulsivity is one of the most robust contributors to aggression (Miller & Lynam, 2001), including psychological (Shorey et al., 2011), reactive (Latzman et al., 2011), and alcohol-related aggression (Giancola et al., 2010). Not surprisingly, research has also demonstrated that impulsivity-related constructs, such as low levels of dispositional self-control and momentary self-control depletion (Finkel et al., 2009) are associated with IPA perpetration. Impulsivity has also been found to predict IPA perpetration in both men and women (Cunradi et al., 2009; Shorey et al., 2011). Importantly, these and other studies have conceptualized impulsivity as a unidimensional construct. However, extant literature indicates that heterogeneity in the associations between impulsivity and risky behaviors, including various manifestations of aggression, necessitates the conceptualization of impulsivity as a multidimensional construct (Smith et al., 2007).

One well-validated model of impulsivity provides support for four distinct subcomponents (Whiteside & Lynam, 2001). *Lack of premeditation* is conceptualized as the inability to plan behavior before acting. *Negative urgency* is the tendency to act rashly while experiencing negative affect. *Sensation seeking* is the tendency to seek excitement or novel stimuli. *Lack of perseverance* is the inability to maintain attention to a task. Cyders and colleagues (2007) further identified the subcomponent of *positive urgency*, which is the tendency to act rashly while experiencing positive affect. This multidimensional conceptualization of impulsivity has garnered widespread support throughout the literature, as these dimensions have been shown to predict a wide range of risky behaviors (Cyders & Smith, 2007, 2008; Lynam & Miller, 2004). In particular, studies indicate that negative urgency, and to a lesser extent positive urgency, demonstrate the most robust associations with general aggression (Carlson et al., 2013; Miller et al., 2003; Miller et al., 2012). However, only two studies have examined the differential associations between these dimensions of impulsivity and IPA perpetration (Derefinko et al., 2011; Leone et al., 2016). Consistent with the general aggression literature, both studies support negative urgency as a unique correlate of IPA perpetration. It is not surprising that the inability to control behavioral urges when experiencing negative affect is most predictive of IPA perpetration. Indeed, many aggressive encounters between intimate partners are likely precipitated by conflict characterized by high levels of state negative affect (Crane & Eckhardt, 2013; Elkins et al., 2013). However, Leone and colleagues (2016) also found a significant positive association between lack of perseverance and IPA perpetration. These authors posited that one's inability to sustain focus on mundane tasks could manifest as difficulty sustaining implementation of adaptive coping strategies required to inhibit aggression during intimate partner conflict. This unexpected

finding suggests dimensions of impulsivity not typically associated with general aggression may be important predictors of IPA perpetration.

These findings clearly contribute to our understanding of the disinhibitory processes that may facilitate IPA perpetration. However, this literature has relied exclusively on cross-sectional designs to examine the link between subcomponents of impulsivity and aggression generally and IPA perpetration specifically. Thus, conclusions about the temporal relationship between these dimensions of impulsivity and IPA perpetration cannot be made. To address this limitation, Cyders and Smith (2007) called for experimental methods that allow one to determine whether dimensions of impulsivity predict proximal changes in behavior. To date, no studies within the IPA literature have heeded this call. The present investigation sought to address this weakness by assessing IPA perpetration within a controlled laboratory setting.

Alcohol: Distal and Proximal Effects on IPA Perpetration

Problematic alcohol use

The reviewed literature demonstrates that individual differences in dimensions of impulsivity, particularly negative urgency, are positively associated with IPA perpetration. This is likely because negative urgency is the strongest and most consistent predictor of problematic drinking (Shin et al., 2012; Whiteside & Lynam, 2009), and problematic drinking has been established as a robust contributing cause of IPA perpetration (Leonard & Quigley, 2016).

The putative mechanism driving the relation between negative urgency and problematic drinking is a preference for immediate alleviation of negative emotions with little to no consideration of detrimental long-term consequences that may arise from such behavior (Chester, et al., 2016; Coskunpinar & Cyders, 2013). The immediate alleviation of negative emotions via alcohol use is negatively reinforcing, leading to a pattern of alcohol use over time. Accordingly, motivations for drinking have been found to be an important mediator of the link between negative urgency and alcohol related problems (Adams et al., 2012). After accounting for amount of consumption, drinking to cope with negative mood predicts worse outcomes than other drinking motivations, such as drinking to enhance positive mood (Dvorak et al., 2014; Kuntsche et al., 2005). Further, drinking to cope with negative mood stemming from conflict has been shown to mediate the link between couple conflict and alcohol-related problems (Lambe et al., 2015). In summary, a substantive body of research has established that negative urgency is positively associated with problematic alcohol use and that problematic alcohol use is a robust contributor to IPA. However, to our knowledge, no study to date has examined problematic drinking as a mediator of the association between dimensions of impulsivity and IPA.

Acute alcohol intoxication

There exists strong evidence to support the proximal effects of alcohol as a contributing cause of IPA perpetration (Leonard & Quigley, 2016). Studies that utilize retrospective reports of alcohol use have found that IPA was more likely to occur on drinking days

(Leonard & Quigley, 1999; Schumacher et al., 2013; Rothman et al., 2012). Using daily diaries, Testa and Derrick (2014) found that alcohol consumption in the preceding four hours led to more aggressive encounters with one's partner. Laboratory-based studies indicate that acute alcohol intoxication increases IPA perpetration (Eckhardt, 2007; Leonard & Roberts, 1998; Watkins et al., 2015).

These studies offer insight into the well-established effect between problematic drinking and IPA perpetration (Leonard & Quigley, 2016). Specifically, problematic drinkers are at a higher risk of perpetrating IPA because they drink more often and at higher quantities, and thus have more opportunities to engage in disinhibited behavior. And, in particular, problematic drinkers are more susceptible to the aggression-promoting effects of acute alcohol intoxication (Parrott & Giancola, 2006). To explain this effect, Alcohol Myopia Theory (AMT; Steele & Josephs, 1990) posits that acute alcohol intoxication leads to a disruption in working memory that hinders the simultaneous processing of both instigative and inhibitory cues in the environment. Thus, attention is allocated to the most salient situational cues. The AMT-based explanation for alcohol-related aggression is supported by a wealth of experimental studies (Giancola et al., 2010). Research also shows that alcohol intoxication disproportionately increases aggression in individuals with aggression-promoting traits such as high trait anger (Parrott & Zeichner, 2002), irritability (Giancola, 2002), and dispositional aggressivity (Eckhardt & Crane, 2008). It is likely that individuals with aggression-promoting traits (e.g., high negative urgency) are predisposed to focus their attention on provoking cues in a hostile situation. Thus, alcohol intoxication likely exacerbates attentional focus on aggression-promoting cues, especially among individuals with aggressogenic traits, leading to an increase in aggressive responding.

Current Study and Hypotheses

The present study used an experimental paradigm to examine the temporal association between risk-promoting disinhibitory factors (i.e., dimensions of impulsivity, problematic drinking) and IPA perpetration among intoxicated and non-intoxicated heavy drinkers. We aimed to examine this model in an at-risk sample that would generalize to populations of clinical interest. Thus, we recruited a sample of heavy drinking men and women with a history of relationship conflict, as operationalized by psychological and/or physical IPA perpetration during the past year. Participants were randomly assigned to an Alcohol or No-Alcohol control condition and completed a laboratory aggression task in which they were physically provoked via the receipt of high intensity electric shocks ostensibly from their intimate partner. IPA perpetration was operationalized as the intensity of shock participants delivered to their intimate partner. Based on the reviewed literature, three hypotheses were advanced.

Consistent with the well-accepted relation between negative urgency and aggression, including IPA, a positive association between negative urgency and IPA was expected (Hypothesis 1). Although previous research has suggested that difficulty regulating behavior when experiencing negative affect is a sufficient predictor of IPA, considerable research has linked problematic drinking to both negative urgency and IPA perpetration. As such, it was predicted that problematic drinking would mediate the association between negative urgency

and IPA perpetration (Hypothesis 2). Pertinent literature indicates that alcohol-induced myopia narrows attention to aggression-promoting cues in individuals who are already prone to aggression (e.g., those high in negative urgency). Moreover, problematic drinkers are especially susceptible to the aggression-promoting effects of acute alcohol intoxication (Parrott & Giancola, 2006). Thus, it was expected that problematic drinking would mediate the association between negative urgency and IPA perpetration to a greater extent in intoxicated, relative to sober, individuals (Hypothesis 3).

Method

Participants

Participants were individuals nested within intimate heterosexual couples recruited from two U.S. cities through advertisements placed online, in community newspapers, and on public transportation. Upon contacting the laboratory, respondents were informed that they would be required to complete a questionnaire battery (Session 1) and an experimental session on a separate day (Session 2). Interested couples were then screened separately by telephone to assess eligibility, which was then verified in a more comprehensive in-person laboratory assessment at Session 1. To be eligible, couples had to be dating for at least one month, be at least 21 years of age, and identify English as their native language. Couples were excluded if either partner reported serious head injuries, a medical or psychiatric condition in which alcohol is medically contraindicated, or a desire to seek treatment for alcohol use. Females with a positive urine pregnancy test were also excluded. In addition, at least one partner – termed the index participant – was required to meet two additional eligibility criteria. First, this individual had to meet criteria for heavy drinking, which was operationalized as consumption of an average of at least five (for men) or four (for women) standard drinks per occasion at least twice per month during the past year. Second, this individual had to be identified as perpetrating at least one act of psychological or physical IPA in the past year against the partner via self- or partner- report on the Revised Conflict Tactics Scale (Straus et al., 1996).

Within one week of completing the telephone screening interview, ineligible couples were contacted by phone and informed that they would not be eligible to participate. Eligible couples were contacted by phone and scheduled for a Session 1 appointment. Consistent with prior alcohol administration studies, participants were told to refrain from drinking alcohol or using recreational drugs 24 hours prior to testing and to refrain from eating 4 hours prior to testing (e.g., Gallagher & Parrott, 2016). Any participant who arrived to the laboratory with a positive breath alcohol concentration (BrAC) was not tested and was given an opportunity to reschedule.

Of all respondents deemed eligible at telephone screening, 613 couples presented to Session 1. Eligibility criteria were reassessed upon participants' presentation to Session 1. In addition, participants who endorsed a non-heterosexual identity or were identified as perpetrating severe physical IPA were excluded at this time. This process resulted in 289 eligible couples who presented to Session 2. Upon arrival to the laboratory for Session 2, all eligibility criteria were re-verified. Following a manipulation check, 40 participants were excluded due to various reasons, including not reaching the required BrAC ($n = 7$), not being

deceived ($n = 12$), voluntarily withdrawing during Session 2 ($n = 11$), and unpredictable miscellaneous events ($n = 10$) such as an inability to comprehend TAP instructions or not being able to finish the alcoholic beverage.

This left a final sample of 249 participants (148 men, 101 women). Site 1 enrolled 146 of the index participants in the study, with the remaining 103 index participants enrolled at Site 2. See Table 1 for participant demographic information. This study was approved by each university's Institutional Review Board.

Measures

Demographic Form—This form obtains information such as age, self-identified sexual orientation, race, relationship status and length, years of education, and yearly family income.

Revised Conflict Tactics Scale (CTS-2; Straus et al., 1996)—This 78-item self-report instrument measures a range of events that occur during disagreements within intimate relationships. Participants rate on a 0 (never) to 6 (more than 20 times) scale how many times they have engaged in these behaviors over the past year. In the present study, the physical and psychological subscales were used to determine eligibility. Dichotomous scores were derived from each subscale, wherein a score of “1” was assigned to participants who were identified via self-report or partner-report as having perpetrated at least one of the acts on either subscale. Only participants who obtained a score of “1” were deemed eligible for the study.

Alcohol Use Disorder Identification Test (AUDIT; Babor et al., 2001)—The present study defined problematic drinking as a pattern of alcohol use that increases the risk of or results in negative consequences for the drinker or others. Consistent with this definition, the 10-item AUDIT measures hazardous and harmful patterns of alcohol consumption. Participants rate items on a 0 to 4 scale, with higher scores indicative of greater problematic drinking. Sample items include “how often during the past year have you failed to do what was normally expected of you because of drinking,” and “How often do you have a drink containing alcohol.” The AUDIT has high internal consistency across a range of samples (Babor et al., 2001), which is consistent with the current sample ($\alpha = .77$). While the current sample was comprised entirely of heavy drinkers, the AUDIT was used to measure participants' level of problematic drinking.

UPPS-P (Lynam et al., 2006; Whiteside & Lynam, 2001)—The UPPS-P is a 59-item self-report measure developed to measure five impulsivity-related traits: Positive Urgency, Negative Urgency, Lack of Premeditation, Lack of Perseverance, and Sensation Seeking. Participants rate items on a 1 (strongly disagree) to 5 (strongly agree) scale, with higher scores indicating greater impulsive tendencies. These subscales have good psychometric properties ($\alpha = .82-.95$), which is consistent with the current sample ($\alpha = .77-.87$). Initial analyses revealed considerable overlap between the dimensions of Positive and Negative Urgency ($r = .73$). Consistent with previous literature, these two subscales were combined

for all analyses (Cyders & Smith, 2007; Derefinko et al., 2011). We refer to the combined variable as “Urgency.”

Buss-Perry Aggression Questionnaire (BAQ; Buss & Perry, 1992)—This 29-item self-report measure assesses one’s disposition toward physical aggression, verbal aggression, anger, and hostility. In the present study, the Physical Aggression subscale was analyzed to identify group differences that could confound laboratory-based physical aggression. Participants rate how each item describes them on a 5-point scale ranging from 1 (*extremely uncharacteristic of me*) to 5 (*extremely characteristic of me*). The BAQ has been shown to have high validity and reliability ($\alpha = .80$). A Cronbach’s alpha coefficient of .78 was obtained for the Physical Aggression subscale in the present sample.

Beverage Administration

Upon arrival to the laboratory for Session 2, participants were randomly assigned to an alcohol ($n = 122$) or no-alcohol control ($n = 127$) beverage condition. Participants in the alcohol beverage condition were administered a dose of .99 g/kg body weight of 95% alcohol mixed at a 1:5 ratio with Tropicana orange juice. This dose reliably produces BrAC levels between .08% and .12%. Participants in the no-alcohol control beverage condition received an isovolemic beverage consisting of only orange juice. All participants were allotted 20 minutes to consume their beverage. Participants were explicitly informed whether or not their drink contained alcohol.

Taylor Aggression Paradigm

A modified version (Giancola & Zeichner, 1995) of the Taylor Aggression Paradigm (TAP; Taylor, 1967) was used to assess direct physical aggression. 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 TAP is presented as a reaction time competition in which electric shocks are administered to and received from a “fictitious” opponent. Participants are seated at a table in a small room facing a computer screen and keyboard. The numbers 1 through 10 on the computer keyboard are labeled from *low* to *high* to allow participants to determine varying levels of shock to administer. The keyboard and monitor are connected to a computer located in an adjacent room out of the participant’s view. *Physical intimate partner aggression (IPA)* was defined as the average intensity of shocks selected. The TAP and other similar laboratory paradigms have been repeatedly shown to be safe and valid measures of aggressive behavior (Giancola & Parrott, 2008; Parrott et al., 2015).

Procedure

Participants presented to the lab on two separate days. To minimize potential coercion, informed consent was obtained separately (i.e., in separate rooms) for the index participant and his/her partner upon arrival to each session. Session 1 involved reassessment of all eligibility criteria as well as administration of a questionnaire battery. For Session 2, participants were met in a room separate from the aggression laboratory. In order to disguise the task as a measure of aggression, participants were given a fictitious cover story. They were informed that the purpose of the study was to examine the relation between alcohol and

reaction time under competitive conditions. As such, they would consume an alcoholic or nonalcoholic beverage prior to engaging in a competitive reaction time task against their partner. At this time, participants were also weighed and their BrAC was assessed to confirm sobriety. Participants with a BrAC above 0% were rescheduled on a subsequent day.

Both members of the couple were then escorted to the index participant's testing room. Participants received instructions regarding the reaction time competition. For each trial, participants were informed that shortly after the words "Get Ready" appeared on the screen, the words "Press the Spacebar" would appear at which time they would press, and hold down, the spacebar. Following this, the words "Release the Spacebar" would appear, at which time they would lift their fingers off of the spacebar as quickly as possible. A "win" was signaled by the words "You Won. You Get to Give a Shock." A "loss" was signaled by the words "You Lost. You Get a Shock." A winning trial required participants to deliver a shock to their partner, and a losing trial resulted in receiving a shock from their partner. Participants were told that they had a choice of 10 different shock intensities to administer at the end of each winning trial for a duration of their choosing. Participants were informed that, while they could not elect to not shock their partner, the shock button "1" would deliver a low-intensity shock that is best characterized as "very mild" and "definitely" not painful. Evidence supports the TAP's validity, despite its lack of a non-aggressive response option (Giancola & Chermack, 1998; Parrott & Giancola, 2008).

Next, the partner was escorted to a separate testing room to ostensibly consume his or her beverage. In actuality, this participant received a full debriefing of the study, was compensated, and discharged. This was done as a safety precaution so that the partner could provide consent for the deception protocol to continue with the index participant. Upon obtaining this consent, index participants were administered an alcoholic or non-alcoholic beverage. After consuming their beverages, index participants' pain thresholds were then assessed to determine the intensity parameters for the shocks they would receive. This was accomplished via the administration of one-second duration shocks presented in an incremental stepwise intensity method from the lowest available shock setting, which is imperceptible, until the shocks reached a reportedly "painful" level. All shocks were administered through two electrodes that were attached to the index and middle fingers of the nondominant hand. Participants were asked to state when the shocks were "first detectable" and then when they reached a "painful" level. This procedure was conducted while participants were seated in the testing room and the experimenter was in an adjacent control room. They communicated through an intercom.

After the pain thresholds were determined and participants reached a BrAC of .075%, participants completed six "practice" TAP trials, ostensibly against their intimate partner, so that they could become familiar with the procedure. In actuality, the "practice" trials were rigged so that all participants received physical and verbal provocations from their partner in order to create an adversarial interpersonal interaction. Participants "lost" four out of six trials and received moderate intensity shocks (i.e., 4's and 5's) on each of these losing trials. Next, participants received standardized written negative feedback they believed to be from their partner. Most relevant to this feedback was the partner's statement that s/he intended to deliver the highest possible level shock in the subsequent reaction time trials.

Upon reaching a BrAC of .08, the full aggression task commenced and consisted of 20 trials (10 wins and 10 losses). On losing trials, participants received shocks from their “partner” that were one second in duration and ranged from 90% (an “8”) to 100% (a “10”) of their highest tolerated shock intensity. A specially designed “volt meter” and the illumination of one of the 10 “shock lights” (ranging from 1 [low] to 10 [high]) on the computer screen signaled to the participant the shock that s/he or the partner selected. A randomly generated win/loss sequence was predetermined and incorporated into the computer program that executed the task. All participants received the same sequence. A computer controlled initiation of trials, administration of shocks to participants, and recordings of their responses.

Immediately upon completion of the TAP, BrACs were measured. Participants were then asked a variety of questions to assess indirectly the credibility of the experimental manipulation (see below), debriefed, and compensated. All individuals who received alcohol remained in the laboratory until their BrAC fell to .03% and were escorted to prearranged transportation by laboratory staff.

Analytic Plan

To test study hypotheses, we used the PROCESS macro <http://www.processmacro.org> for SPSS (IBM Corporation, New York, USA; Hayes, 2013). This modeling technique tests all effects within simple and moderated mediation models. It also produces an index of moderated mediation, which is the slope of the line reflecting the association between the moderator and the indirect effect of the independent variable on the dependent variable through the mediator. This index has been established as the gold standard for estimating moderated mediation (Hayes, 2015).

A simple mediation model was computed to examine the indirect effect of each dimension of impulsivity (i.e., urgency, lack of premeditation, lack of perseverance, sensation seeking) on TAP physical aggression through problematic drinking (this model corresponds to Model 4 in Hayes, 2013). This model simultaneously estimated paths from each dimension of impulsivity to problematic drinking and TAP physical aggression, respectively, while accounting for relations between the predictors. A moderation model was also computed to examine whether the association between problematic drinking and TAP physical aggression was moderated by beverage condition (dummy coded as Alcohol = 0 and No-Alcohol Control = 1).

The moderated-mediation model tested whether the indirect effect of each dimension of impulsivity on TAP physical aggression through problematic drinking differed as a function of beverage condition (this model corresponds to Model 14, in Hayes, 2013). This model replicates the simple mediation analysis but also simultaneously models each conditional indirect effect. As the products of regression coefficients are non-normally distributed, each analysis utilized 5,000 bootstrap re-samples. To control for any variation in experimental procedure by the two sites, experimental site was entered as a control variable in all models.

Results

Manipulation Check

Aggression task checks—Prior to debriefing, participants were interviewed to confirm their belief that they were competing against their partner on a “reaction time” task and that this task was not a measure of aggression. First, participants were asked whether or not they thought the task was a good measure of reaction time. Second, they were asked how they thought their partner performed on the task. The main criteria for exclusion were participants’ beliefs that they were not actually competing against their partner or that the task was a measure of aggression. As noted above, of the 289 participants, 12 (4%) indicated that the task was not a measure of reaction time and/or that they were not actually competing against their partner.

BrAC levels—All participants tested in this study had BrACs of 0% upon entering the laboratory. A paired samples *t*-test indicated that participants’ BrACs in the alcohol group were significantly higher post-TAP ($M = .106\%$, $SD = .016$) than pre-TAP ($M = .093\%$, $SD = .014$), $t(120) = -9.55$, $p < .001$. This finding indicated that participants were on the ascending limb of the BrAC curve. Inspection of these data at the individual level confirmed that all intoxicated participants were on the ascending limb of the BrAC curve during the experimental procedures. Participants in the no-alcohol control condition had a mean BrAC of 0% before and after the experimental procedures.

Preliminary Analyses

Random group assignment was expected to produce, on average, an equal distribution of pertinent demographic and dispositional variables across experimental groups. To confirm this assumption, we conducted a series of independent *t*-tests with beverage condition as the between subjects variable and with pertinent demographic characteristics (e.g., age, years of education, yearly income), dimensions of impulsivity, problematic drinking, and dispositional physical aggression as the dependent variable. No significant group differences emerged for any of these variables. Gender differences on key variables are presented in Table 2.

Simple Mediation and Moderation Analyses

The first analysis tested a simple mediation model to examine the indirect effect of each dimension of impulsivity (i.e., urgency, lack of premeditation, lack of perseverance, sensation seeking) on TAP physical aggression through problematic drinking. Results indicated no significant indirect effects. However, consistent with hypotheses, a significant direct effect emerged in which urgency was positively associated with IPA, $b = .394$, $p < .05$. The second analysis examined the moderating effect of beverage condition on the association between problematic drinking and IPA. The overall model was significant, $F(4, 244) = 3.83$, $p < .01$, $R^2 = .059$. The main effect of problematic drinking on IPA was marginally significant, $b = .414$, $SE = .22$, 95% CI $[-.019, .847]$, $p = .06$. The main effect of beverage condition was significant ($b = -.698$, $SE = .30$, 95% CI $[-1.297, -.099]$, $p < .05$) and indicated that participants who consumed alcohol displayed higher levels of IPA than participants who did not consume alcohol. The Beverage x Problematic Drinking interaction

term was also significant ($b = -.727$, $SE = .31$, $p < .05$, $R^2 = .02$). As depicted in Figure 1, explication of this interaction revealed that the association between problematic drinking and IPA was significantly more positive in intoxicated ($b = .414$, $SE = .22$, $p = .06$) relative to sober participants ($b = -.247$, $SE = .21$, $p = .24$)

Moderated-Mediation Analyses

The index of moderated mediation indicated that there was a conditional indirect effect of urgency on IPA through problematic drinking, $b = -.268$, $SE = .144$, 95% CI $[-.582, -.002]$. Further probing of this relationship revealed that this indirect effect was significantly more positive in intoxicated ($b = .131$, $SE = .088$, 95% CI $[-.018, .336]$) relative to sober individuals ($b = -.137$, $SE = .125$, 95% CI $[-.385, .108]$)¹. Indices of moderated mediation for lack of premeditation, lack of perseverance, and sensation seeking were not significant (See Table 3).

Discussion

The present study is the first to examine the role of specific dimensions of impulsivity on *in vivo* IPA. Consistent with Hypothesis 3, results indicate that the indirect effect of urgency on IPA through problematic drinking was significantly more positive among intoxicated, relative to sober, individuals. This pattern of results was not found for lack of perseverance, lack of premeditation, or sensation seeking. The specificity of urgency in the current results supports a growing body of literature that conceptualizes impulsivity as a multidimensional construct, with urgency as the dimension most predictive of IPA perpetration (Derefinko et al., 2011). Our finding that negative urgency predicts IPA perpetration through problematic drinking among intoxicated participants is consistent with previous research that has demonstrated state negative affect stemming from conflict is an important antecedent of IPA (Crane & Eckhardt, 2013; Elkins et al., 2013).

Previous research has shown that drinking to cope with emotions, including those stemming from couple conflict, leads to more problematic drinking outcomes than other drinking motivations (Lambe et al., 2015). A key contribution of the present study is that it allows for an examination of the mechanism by which those who experience these problematic drinking outcomes perpetrate IPA. Specifically, the moderating effect of beverage condition in the current study suggests that acute alcohol intoxication is a key facilitator of the association between such problematic drinking patterns and IPA. That is, individuals who tend to act rashly in response to their emotions are more likely to drink problematically; however, it is only under acute alcohol intoxication that they are more likely than non-problematic drinkers to perpetrate IPA. Alcohol myopia theory provides a parsimonious explanation of this effect. Extant literature suggests that negative urgency is associated with attentional biases to substance-related cues (Chester et al., 2016; Coskunpinar & Cyders, 2013). Consistent with this literature, we posit that during conflict, individuals high in urgency may tend to focus on salient emotional cues that promote aggression at the expense

¹Given that urgency and problematic drinking were assessed cross-sectionally, the temporal association between these variables could not be established. Thus, it was necessary to examine a reverse mediational path, wherein analyses were repeated to determine whether urgency mediated the relation between problematic drinking and IPA perpetration. Results did not support this alternative path.

of attending to and processing less salient cues that inhibit aggression. This trait-level bias in attention allocation is likely exacerbated by alcohol's acute myopic effects, which have been shown to facilitate people's attention to aggression-promoting cues in physically provoking contexts (Gallagher & Parrott, 2011). This explanation is consistent with previous research which has shown that alcohol facilitates aggression to a greater extent in individuals who have traits that predispose them to behave aggressively (Parrott & Zeichner, 2002).

In the current study, problematic drinkers were only more likely to perpetrate IPA when intoxicated. This finding suggests that while such individuals may be especially susceptible to the acute disinhibitory effects of alcohol, a history of problematic drinking does not invariably lead to IPA perpetration. It is here that the present data point to urgency as a key determinant of IPA. By repeated episodes of using alcohol to cope with negative affect, high levels of urgency give rise to problematic drinking patterns (e.g., Shin et al., 2012; Whiteside & Lynam, 2009). As a result, problematic drinkers may be especially likely to be intoxicated around their partners during situations characterized by heightened negative affect and interpersonal conflict. During such conflicts, intoxicated, problematic drinkers are at especially high risk of IPA perpetration.

Limitations

Several limitations of the present study merit attention. First, the present sample was unique in that all participants were considered high-risk for perpetration of IPA given their history of heavy drinking and previous perpetration of IPA. However, it is not clear whether the present findings generalize to lower-risk individuals. Further, individuals with a history of severe IPA perpetration and those with current diagnosed psychiatric disorders were excluded from participation, impeding generalization of these findings to those at even higher risk for perpetration. Second, our conclusions are based in part on the assumption that attention was biased toward provocative cues, resulting in greater IPA. However, this study did not employ techniques that directly assess *in vivo* attention throughout the aggression task, such as eye tracking (Eckhardt et al., 2015). Third, a nonaggressive response option was not provided to participants. Thus, it is unclear how participants would choose to respond to provocation if alternatives to physical aggression were available. By using validated modifications of the TAP that include a nonaggressive response option (e.g., Zeichner, Parrott, & Frey, 2003), research will be better equipped to understand the complex determinants of aggression. Fourth, although including both men and women is a strength, the present sample did not provide sufficient statistical power to directly test whether participant gender moderated the observed effects. Indeed, research is needed to determine whether this difference generalizes to men's and women's IPA perpetration. Because the effect size of alcohol intoxication on laboratory-based aggression in men and women is moderate and small, respectively (Giancola et al., 2009), such work will necessitate relatively large samples or use of meta-analytic techniques. Finally, only cisgender heterosexual couples were included in the current sample, hindering generalizability of findings. Although some risk factors predict IPA perpetration in both heterosexual and non-heterosexual couples, future research should examine the role of risk factors specific to non-heterosexual couples, such as sexual minority stress (Edwards, Sylaska, & Neal, 2015).

Research Implications

Despite these limitations, the current study makes important contributions to the field by providing insight into specific disinhibitory processes and the conditions under which these processes are most likely to result in IPA perpetration. We utilized a high-risk sample characterized by heavy drinking and prior perpetration of IPA. This study contributes to a small but growing literature that has examined IPA in high risk samples (Schumacher et al., 2013; Shorey et al., 2011), and it is the first of these to test experimentally the alcohol-IPA link. Given the robust association between heavy drinking and IPA, our results provide important insight into the mechanisms of action that contribute to IPA in those at highest risk of perpetration.

The results of the current study implicate alcohol use as an important target for treatment. Indeed, interventions that target problematic alcohol use have been found to be effective in reducing IPA (Murphy & Ting, 2010). However, despite such promising support, the long-term effects of these interventions are unknown (Wilson et al., 2014). Moreover, even if treatment for an alcohol use disorder was deemed a first-line intervention for IPA, the reality is that many individuals do not achieve sustained abstinence. Thus, research that seeks to inform the development of interventions for alcohol-related perpetration of IPA should examine mechanisms of action among individuals who have already consumed alcohol. The present study makes an important contribution to this developing line of research. In addition to extant literature that links negative urgency to biased attention toward substance-related cues (Chester et al., 2016; Coskunpinar & Cyders, 2013), and negative urgency to IPA perpetration (Derefinko et al., 2011; Leone et al., 2016), the present findings provide indirect support for biased attention to emotional cues as a critical determinant of alcohol-related IPA. Pertinent theory (Giancola et al., 2010) and empirical evidence (Gallagher & Parrott, 2011) support the exacerbation of such biased attention allocation to emotional cues during acute alcohol intoxication. Moreover, distraction away from aggression-promoting cues (Giancola & Corman, 2007) and redirection of attention onto aggression-inhibiting cues, such as peaceful images (Giancola et al., 2011) and the self (Gallagher & Parrott, 2016), have been found to be effective in reducing aggression under acute intoxication. Thus, such methods of attentional redirection may be effective in disrupting the mechanism of IPA perpetration observed in the present study.

Conclusion

The present study is the first to examine whether dimensions of impulsivity predict *in vivo* IPA perpetration among intoxicated high-risk individuals. Results provide insight into a possible mechanism of action whereby disinhibitory traits, specifically the tendency to engage in impulsive behavior in response to emotions, leads to a problematic pattern of drinking that exacerbates risk for IPA perpetration. Further, the current study suggests that the acute effects of alcohol are a key facilitator of the association between problematic drinking and IPA perpetration.

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References

- Adams ZW, Kaiser AJ, Lynam DR, Charnigo RJ, Milich R. Drinking motives as mediators of the impulsivity-substance use relation: Pathways for negative urgency, lack of premeditation, and sensation seeking. *Addict Behav.* 2012; 37:848–855. [PubMed: 22472524]
- Babor, TF., Biddle-Higgins, JC., Saunders, JB., Monteiro, MG. Guidelines for Use in Primary Health Care. World Health Organization; Geneva, Switzerland: 2001. AUDIT: The Alcohol Use Disorders Identification Test.
- Black MC. Intimate partner violence and adverse health consequences: Implications for clinicians. *American Journal of Lifestyle Medicine.* 2011; 5:428–439.
- Bushman BJ. Human aggression while under the influence of alcohol and other drugs: An integrative research review. *Curr Dir in Psychol Sci.* 1993; 2:148–152.
- Buss AH, Perry M. The Aggression Questionnaire. *J Pers Soc Psychol.* 1992; 63:452–459. [PubMed: 1403624]
- Carlson SR, Pritchard AA, Dominelli RM. Externalizing behavior, the UPPS-P impulsive behavior scale and reward and punishment sensitivity. *Pers Indiv Differ.* 2013; 54:202–207.
- Chester DS, Lynam DR, Milich R, DeWall CN. Craving versus control: Negative urgency and neural correlates of alcohol reactivity. *Drug Alcohol Depen.* 2016; 163:S25–S28.
- Coskunpinar A, Cyders MA. Impulsivity and substance-related attentional bias: A meta-analytic review. *Drug Alcohol Depen.* 2013; 133:1–14.
- Crane C, Eckhardt CI. Negative affect, alcohol consumption, and female-to-male intimate partner violence: A daily diary investigation. *Partner Abuse.* 2013; 4:332–355. [PubMed: 26413212]
- Cunradi CB, Todd M, Dukes M, Ames GM. Problem drinking, unemployment, and intimate partner violence among a sample of construction industry workers and their partners. *J Fam Violence.* 2009; 24:63–74. [PubMed: 22096270]
- Cyders MA, Smith GT. Mood-based rash action and its components: Positive and negative urgency. *Pers Indiv Differ.* 2007; 43:839–850.
- Cyders MA, Smith GT, Spillane NS, Fischer S, Annus AM, Peterson C. Integration of impulsivity and positive mood to predict risky behavior: Development and validation of a measure of positive urgency. *Psychol Assessment.* 2007; 19:107–118.
- Derefinko K, DeWall CN, Metze AV, Walsh EC, Lynam DR. Do different facets of impulsivity predict different types of aggression? *Aggressive Behav.* 2011; 37:223–233.
- Dvorak RD, Pearson MR, Day AM. Ecological momentary assessment of acute alcohol use disorder symptoms: Associations with mood, motives, and use on planned drinking days. *Exp Clinical Psychopharm.* 2014; 22:285–297.
- Eckhardt CI. Effects of alcohol intoxication on anger experience and expression among partner assaultive men. *J Consult Clin Psych.* 2007; 75:61–71.
- Eckhardt CI, Crane C. Effects of alcohol intoxication and aggressivity on aggressive verbalizations during anger arousal. *Aggressive Behav.* 2008; 34:428–436.
- Eckhardt CI, Murphy CM, Whitaker DJ, Sprunger J, Dykstra R, Woodard K. The effectiveness of intervention programs for perpetrators and victims of intimate partner violence. *Partner Abuse.* 2013; 4:196–231.
- Eckhardt CI, Parrott DJ, Sprunger J. Mechanisms of alcohol-facilitated intimate partner violence. *Violence Against Wom.* 2015; 21:939–957.
- Edwards KM, Sylaska KM, Neal AM. Intimate partner violence among sexual minority populations: A critical review of the literature and agenda for future research. *Psych Viol.* 2015; 5:112–121.
- Elkins SR, Moore TM, McNulty JK, Kivisto AJ, Handsel VA. Electronic diary assessment of the temporal association between proximal anger and intimate partner violence perpetration. *Psych Viol.* 2013; 3:100–113.
- Finkel EJ, DeWall CN, Slotter EB, Oaten M, Foshee VA. Self-regulatory failure and intimate partner violence perpetration. *J Pers Soc Psychol.* 2009; 97:483–499. [PubMed: 19686003]
- Gallagher KE, Parrott DJ. Does distraction reduce the alcohol-aggression relation? A cognitive and behavioral test of the attention-allocation model. *J Consult Clin Psych.* 2011; 79:319–329.

- Gallagher KE, Parrott DJ. A self-awareness intervention manipulation for heavy-drinking men's alcohol-related aggression toward women. *J Consult Clin Psych.* 2016; 84:813–823.
- Giancola PR. Alcohol-related aggression during the college years: Theories, risk factors, and policy implications. *J Stud Alcohol.* 2002; 14:129–139.
- Giancola PR, Corman MD. Alcohol and aggression: A test of the attention-allocation model. *Psychol Sci.* 2007; 18:649–655. [PubMed: 17614875]
- Giancola PR, Duke AA, Ritz KZ. Alcohol, violence, and the alcohol myopia model: Preliminary findings and implications for prevention. *Addict Behav.* 2011; 36:1019–1022. [PubMed: 21665371]
- Giancola PR, Josephs RA, Parrott DJ, Duke AA. Alcohol myopia revisited clarifying aggression and other acts of disinhibition through a distorted lens. *Perspect Psychol Sci.* 2010; 5:265–278. [PubMed: 26162159]
- Giancola PR, Parrott DJ. Further evidence of the validity of the Taylor Aggression Paradigm. *Aggressive Behav.* 2008; 34:214–229.
- Giancola PR, Zeichner A. An investigation of gender differences in alcohol-related aggression. *J Stud Alcohol.* 1995; 56:573–579. [PubMed: 7475039]
- Hayes, AF. An introduction to mediation, moderation, and conditional process analysis: A regression-based approach. Guilford Press; New York: 2013.
- Hayes AF. An index and test of linear moderated mediation. *Multivar Behav Res.* 2015; 50:1–22.
- Kaura SA, Lohman BJ. Dating violence victimization, relationship satisfaction, mental health problems, and acceptability of violence: A comparison of men and women. *J Fam Violence.* 2007; 22:367–381.
- Kuntsche E, Knibbe R, Gmel G, Engels R. Why do young people drink? A review of drinking motives. *Clin Psychol Rev.* 2005; 25:841–861. [PubMed: 16095785]
- Lambe L, Mackinnon SP, Stewart SH. Dyadic conflict, drinking to cope, and alcohol-related problems: A psychometric study and longitudinal actor-partner interdependence model. *J Fam Psychol.* 2015; 29:697–707. [PubMed: 26075735]
- Latzman RD, Vaidya JG, Watson D, Clark LA. Components of disinhibition (vs. constraint) differentially predict aggression and alcohol use. *Eur J Personality.* 2011; 25:477–486.
- Leonard KE, Quigley BM. Drinking and marital aggression in newlyweds: An event-based analysis of drinking and the occurrence of husband marital aggression. *J Stud Alcohol.* 1999; 60:537–545. [PubMed: 10463811]
- Leonard KE, Quigley BM. Thirty years of research shows alcohol to be a cause of intimate partner violence: Future research needs to identify who to treat and how to treat them. *Drug Alcohol Rev.* 2016
- Leonard KE, Roberts LJ. The effects of alcohol on the marital interactions of aggressive and nonaggressive husbands and their wives. *J Abnorm Psychol.* 1998; 107:602–615. [PubMed: 9830248]
- Leone RM, Crane CA, Parrott DJ, Eckhardt CI. Problematic drinking, impulsivity, and physical IPV perpetration: A dyadic analysis. *Psychol Addict Behav.* 2016; 30:356–366. [PubMed: 26828640]
- Lynam DR, Miller JD. Personality pathways to impulsive behavior and their relations to deviance: Results from three samples. *J Quant Criminol.* 2004; 20:319–341.
- Lynam, DR., Smith, GT., Whiteside, SP., Cyders, MA. The UPPS-P: Assessing five personality pathways to impulsive behavior (Tech. Rep.). Purdue University; West Lafayette, IN: 2006.
- Miller JD, Flory K, Lynam DR, Leukefeld C. A test of the four-factor model of impulsivity-related traits. *Pers Individ Differ.* 2003; 34:1403–1418.
- Miller JD, Lynam D. Structural models of personality and their relation to antisocial behavior: A meta-analytic review. *Criminology.* 2001; 39:765–798.
- Miller JD, Zeichner A, Wilson LF. Personality correlates of aggression evidence from measures of the Five-Factor Model, UPPS model of impulsivity, and BIS/BAS. *J Interpers Violence.* 2012; 27:2903–2919. [PubMed: 22610830]
- Murphy CM, Ting LA. The effects of treatment for substance use problems on intimate partner violence: A review of empirical data. *Aggress Violent Beh.* 2010; 15:325–333.

- Parrott DJ, Giancola PR. The effect of past-year heavy drinking on alcohol-related aggression. *J Stud Alcohol*. 2006; 67:122–130. [PubMed: 16536136]
- Parrott DJ, Miller CA, Hudepohl AD. Immediate and short-term reactions to participation in laboratory aggression research. *Psych Viol*. 2015; 5:209–216.
- Parrott DJ, Zeichner A. Effects of alcohol and trait anger on physical aggression in men. *J Stud Alcohol*. 2002; 63:196–204. [PubMed: 12033696]
- Rothman EF, Stuart GL, Winter M, Wang N, Bowen DJ, Bernstein J, Vinci R. Youth alcohol use and dating abuse victimization and perpetration: A test of the relationships at the daily level in a sample of pediatric emergency department patients who use alcohol. *J Interpers Violence*. 2012; 27:2959–2979. [PubMed: 22550149]
- Schumacher JA, Coffey SF, Leonard KE, O’Jile JR, Landy NC. Self-regulation, daily drinking, and partner violence in alcohol treatment-seeking men. *Exp Clin Psychopharmacol*. 2013; 21:17–28. [PubMed: 23379612]
- Shin SH, Hong HG, Jeon SM. Personality and alcohol use: The role of impulsivity. *Addict Behav*. 2012; 37:102–107. [PubMed: 21955874]
- Shorey RC, Brasfield H, Febres J, Stuart GL. The association between impulsivity, trait anger, and the perpetration of intimate partner violence and general violence among women arrested for domestic violence. *J Interpers Violence*. 2011; 26:2681–2697. [PubMed: 21118862]
- Smith GT, Fischer S, Cyders MA, Annus AM, Spillane NS, McCarthy DM. On the validity and utility of discriminating among impulsivity-like traits. *Assessment*. 2007; 14:155–170. [PubMed: 17504888]
- Steele CM, Josephs RA. Alcohol myopia. Its prized and dangerous effects. *Am Psychol*. 1990; 45:921–933. [PubMed: 2221564]
- Straus MA, Hamby SL, Boney-McCoy S, Sugarman DB. The revised conflict tactics scales (CTS2): Development and preliminary psychometric data. *J Fam Issues*. 1996; 17:283–316.
- Testa M, Derrick JL. A daily process examination of the temporal association between alcohol use and verbal and physical aggression in community couples. *Psychol Addict Behav*. 2014; 28:127–138. [PubMed: 24341618]
- Watkins LE, Maldonado RC, DiLillo D. Hazardous alcohol use and intimate partner aggression among dating couples: The role of impulse control difficulties. *Aggressive Behav*. 2014; 40:369–381.
- Wilson IM, Graham K, Taft A. Alcohol interventions, alcohol policy and intimate partner violence: A systematic review. *BMC Public Health*. 2014; 14:881. [PubMed: 25160510]
- Whiteside SP, Lynam DR. The Five Factor Model and impulsivity: Using a structural model of personality to understand impulsivity. *Pers Indiv Differ*. 2001; 30:669–689.
- Whiteside SP, Lynam DR. Understanding the role of impulsivity and externalizing psychopathology in alcohol abuse: Application of the UPPS Impulsive Behavior Scale. *Personal Disord*. 2009; 1:69–79.
- Zeichner A, Parrott DJ, Frey FC. Gender differences in laboratory aggression under response choice conditions. *Aggressive Behav*. 2003; 29:95–106.

Figure 1. Moderating effect of acute alcohol intoxication on the relation between problematic drinking and intimate partner aggression.

Table 1

Participant demographics and descriptive statistics

	Males (<i>n</i> = 148)		Females (<i>n</i> = 101)		<i>t</i>	<i>p</i>
	Mean	<i>SD</i>	Mean	<i>SD</i>		
Age	32.97	10.62	31.72	10.28	-0.92	.36
Years of education	13.44	2.76	14.18	2.79	2.08 *	.04
Length of relationship, in months	57.61	60.86	47.16	48.61	-1.30	.20
Drinking days per week	3.04	1.89	2.66	1.79	-1.62	.11
Drinks per drinking day	7.03	3.74	5.39	2.80	-3.75 **	<.001

Note:

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

Descriptive and bivariate relationships for problematic drinking and impulsivity among male and female index participants

Table 2

	Full Sample (N = 249)					Males (n = 148)			Females (n = 101)		
	2	3	4	5		Mean	SD		Mean	SD	t
1. AUDIT	.47**	.19*	.22**	-.05		10.74	5.56	4.38	8.31	4.38	-3.68**
2. Urgency		.35**	.44**	.10		1.95	0.56	0.53	1.82	0.53	-1.78
3. Lack of Premeditation			.52**	.11		1.71	0.41	0.49	1.77	0.49	0.98
4. Lack of Perseverance				-.08		1.57	0.38	0.44	1.60	0.44	0.58
5. Sensation Seeking						2.72	0.59	0.60	2.48	0.60	-3.15*

Note:

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

Unstandardized regression coefficients for direct, indirect, and conditional indirect effects of dimensions of impulsivity on IPA perpetration through problematic drinking

Table 3

	Full Sample		Alcohol	No-Alcohol Control	Index of Moderated Mediation
	Direct	Indirect	Conditional Indirect	Conditional Indirect	
Urgency	.394 *	-.027	.131	-.137	-.268 *
Lack of Premeditation	-.047	-.003	.013	-.013	-.026
Lack of Perseverance	-.393 *	.001	-.004	.005	.009
Sensation Seeking	-.136	.006	-.028	.029	.056

Note:

** $p < .001$,

* $p < .05$