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Cognitive and Aggressive Reactions of Male Dating Violence Perpetrators to Anger Arousal

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Abstract

In the current study, 20 dating violent and 27 non-violent college males provided verbal articulations and self-report data regarding cognitive biases, change in affect, and aggressive reactions following anger induction through the articulated thoughts in simulated situations (ATSS) paradigm. Violent, relative to non-violent, males articulated more cognitive biases and verbally aggressive statements during provocation. These same relationships did not hold for a retrospective self-report measure. Greater cognitive biases and aggressive articulations reliably distinguished between violent and non-violent males in the current study. Results suggest that assessing cognitive and affective content “in the heat of the moment” may be a more sensitive indicator of dating violence than retrospective self-reports.

Keywords

aggression; anger arousal; cognitive bias; intimate partner violence; dating violence

Intimate partner violence (IPV) is the act inflicting or threatening physical, sexual or emotional harm to intimidate or control an intimate partner (Saltzman, Fanslow, McMahon, & Shelley, 2002). Rates of IPV are alarmingly high among young adults, with 20-60% of current dating couples reporting some form of physical aggression, nearly 70% of females reporting sexual victimization by college graduation, and upwards of 80% of dating partners reporting at least minimal use of verbal aggression (e.g., Bookwala, Frieze, Smith & Ryan, 1992; Humphrey & White, 2000; Stacy, Schandel, Flannery, Conlon & Milardo, 1994). Straus (2004) presented data on the perpetration of dating IPV by students at 31 colleges in 16 different countries involved in the International Dating Violence Study, concluding that rates of male perpetration were high (11.6% - 42.4%) in each region. The further development of models reflecting the affective, cognitive, and behavioral patterns observed within violent relationships among dating couples is crucial to the development of successful intervention and prevention programs that target harmful behaviors in younger populations (Makepeace, 1981). The present study compares two methods of assessing the

associations between thoughts, feelings, and violent behavior in a sample of male college students following provocation.

Anger experience and expression

Provocation has been shown to elicit general anger and aggression, though it is neither a necessary nor sufficient condition to predict behavioral responding (Giancola, Saucier & Gussler-Burkhardt, 2003). A strong relationship between provocation and aggressive responding has been detected with male IPV perpetrators under laboratory conditions (e.g., Eckhardt, 2007; Eckhardt, Jamison, & Watts, 2002). Previous research suggests that factors associated with affect and cognition may mediate the relationship between provocation and violence, offering insight into the variability in responses to provocation within and between couples (Hilgard, 1980).

Violent males experience greater anger and express more maladaptive thought patterns while interpreting incoming social stimuli than their non-violent counterparts (Eckhardt & Dye, 2000; Norlander & Eckhardt, 2005). No clear consensus regarding the directionality of the relationship between affect and cognition has emerged during the past thirty years of research. Affect and cognition may indeed function concurrently as stimuli-related cognition gives rise to affect and affect effects the cognitive interpretation of social stimuli (Forgas, 2002). Several models have been advanced to explain how anger and maladaptive thinking may increase the likelihood of perpetrating IPV.

Etiological models

Berkowitz's (2011) cognitive neoassociationistic (CNA) model directly relates provocation, negative affect, cognition, and aggression. The CNA model states that provocation in the form of aversive stimuli, ranging from workplace stress to seeing that a partner has texted an ex-lover, results in a generalized state of negative affect that automatically activates cognitive elements (i.e., memories, thoughts, images, emotions) related to the negative affective state. Concurrently, the body prepares for either fight (when angered) or flight (when fearful or anxious) in response to the active affective state. The physiological priming theoretically precedes the activation of higher order cognitive processes that aid the individual in processing the situation and behaviorally expressing the appropriate feelings and behavior. The degree of negative affect experienced is regulated by one's higher-level cognitions. Maladaptive cognitions result in biased social information processing during this period and may exacerbate a more refined experience of angry affect, increasing the likelihood of violent responding toward a romantic partner (e.g., Holtzworth-Monroe, 1992; Norlander & Eckhardt, 2005).

In the present research, we examined cognitive and affective components of IPV-related social information processing (SIP) occurring after one's initial affective reaction to aversive stimuli as specified by the CNA model. Researchers in affective science (Forgas, 2008) and IPV (Holtzworth-Munroe, 1992) have outlined a three phase model of SIP. It is during the first, *decoding* phase that incoming social information is interpreted and encoded consistent with previous experiences. According to Bower's (1981) affect priming model, affective states influence the manner in which incoming information is perceived and results in

significantly more attention directed toward those stimuli that are consistent with mood (Forgas, Bower, & Krantz, 1984). It is also during this phase that cognitive biases (e.g., “She’s texting him to cheat on me” or “She must be sleeping with everyone”) may serve to bias the perception and interpretation of incoming stimuli. In the second *decision-making* stage, one determines the optimal response to the incoming stimuli (e.g., a verbally and physically aggressive altercation to teach the partner a lesson). During the *enactment* stage, one carries out and evaluates the response (e.g., beliefs and evaluations that the aggressive response was deserved and effective at preventing future transgressions).

Initial evidence suggests that violent and non-violent males may differ in multiple domains of SIP. Abusive males evidence a less robust behavioral repertoire for responding to conflict in the final stage of SIP, as evidenced by greater reliance upon aggressive reactions and the generation of fewer non-violent alternatives in laboratory paradigms when compared to non-violent males (Anglin & Holtzworth-Munroe, 1997; Barbour et al., 1998; Sugarman & Frankel, 1996). Cognitive biases broadly represent irrational thought patterns about the self (e.g., “I can never do anything right”) and others (“Everyone in this world is against me”) that arise with little conscious effort and reflect more deeply embedded patterns of maladaptive cognitive processing (Beck, 1976, 1999). Similarly, hostile attributions refer to the interpretation of ambiguous stimuli as intentionally threatening or motivated by hostile intent (e.g., “She meant for this to happen just to get back at me.”). Greater cognitive biases and hostile attributions have been detected among IPV relative to non-violent males, suggesting that maladaptive cognitive processing during SIP may exacerbate negative affect into intense anger (as described by the CNA model) and thus increase the likelihood of IPV perpetration (Eckhardt, Barbour & Davison, 1998; Holtzworth-Monroe & Hutchinson, 1993). Given the rapidity of cognitive processing inherent in both the CNA and SIP models, the association between cognitive distortions and aggression may be more easily detected using novel, observational methodologies that aim to assess these constructs in the context of concurrent anger arousal.

Assessment methodology

The majority of research conducted within the IPV population has relied upon retrospective, self-report measures rather than observational or objective ratings of automatic, on-line responses to environmental stimuli (Eckhardt & Dye, 2000). Concerns about the validity of self-report measures have been raised, including that respondents may be able to successfully deceive investigators by either intentionally or unintentionally censoring natural, automatic responses. Self-report measures of cognitive distortion may also be inadvertently biased as they are typically administered in a “cold” assessment situation devoid of conflict-related cues, and thus may reflect associations inconsistent with the emotions and cognitions experienced during IPV. Concerns about the validity of self-report measures prompted Eckhardt and Dye (2000) to call for a move toward an on-line assessment method capable of more accurately assessing IPV-related cognition in the “heat of the moment.”

The articulated thoughts in simulated situations (ATSS; Davison, Robins, & Johnson, 1983; Davison, Vogel & Coffman, 1997) paradigm has been used to investigate online content in

verbal responses to anger provocation among violent and non-violent husbands. Within a married sample, violent men verbalized greater maladaptive cognitive distortions and hostile attributions than non-violent men (Eckhardt, Barbour, & Davison, 1998). Satisfied, non-violent husbands further distinguished themselves from both violent and dissatisfied, non-violent husbands through the use of greater anger control strategies. Ample data have therefore indicated that online cognitive and affective content gathered through the ATSS paradigm reliably differentiates between violent and non-violent spouses during anger arousal (e.g., Eckhardt, 2007).

The ATSS has less frequently been applied to dating violence. Eckhardt and Jamison (2002) reported that dating violent (DV) males articulated significantly more cognitive biases when compared to non-violent (NV) men. They also concluded that cognitive variables were able to reliably distinguish between DV and NV participants. Eckhardt, Jamison, and Watts (2002) reported a discrepancy between self-report measures and ATSS responses when examining anger experience and expression in a sample of college students. DV participants self-reported greater anger than NV participants on the State-Trait Anger Expression Inventory (STAXI; Spielberger, 1988), a paper-and-pencil measure of anger. DV participants, however, only verbalized more aggressive thought content following provocation rather than during a control scenario. Findings suggested greater dispositional anger and more aggressive responding to provocation among DV, relative to NV, men.

The current study

The present investigation builds upon this body of literature by first deconstructing aggression and cognition into their constituent components and then examining cognitive and aggressive variables together. The following hypotheses were evaluated: 1) anger induction was expected to result in a general increase in state anger, with DV males showing a greater increase in anger relative to NV males; 2) provocation and IPV status were expected to interact such that, when provoked, DV rather than NV males would articulate more ATSS aggressive verbalizations and ATSS cognitive biases; 3) provocation and IPV status were predicted to interact such that DV, rather than NV, males would report greater written, self-reported aggressive content following provocation and written, self-reported cognitive biases following provocation; and 4) ATSS aggressive verbalizations and ATSS cognitive biases were expected to be superior to written, self-report measures in distinguishing between DV and NV participants.

Method

Participants

Participants were 47 males (27 NV, 20 DV) between the ages of 18 and 22 ($M = 19.09$ years, $SD = 1.04$ years). Participants were recruited from mass screenings of introductory psychology students at a large Midwestern university. Eligible males had been involved in a non-marital heterosexual relationship during the previous six months. Participants' intimate relationships lasted on average 8.86 ($SD = 14.39$) months. Thirty-six (76.60%) participants were Caucasian, five (10.64%) identified as Asian, and six (12.77%) reported another ethnicity. Participants were identified as DV if they were involved in a relationship with a

recent history of at least one male-to-female physically (e.g., pushing or punching a partner; $M = 1.75$, $SD = 2.36$) or psychologically (e.g., swearing at or insulting a partner; $M = 7.60$, $SD = 5.87$) aggressive act (Saltzman et al., 2002). Ethical concerns precluded the involvement of males who had engaged in more than one act of severe violence (e.g., beating with a fist, threatening with a weapon, etc). Participants in the NV condition denied any male-to-female perpetration.

Procedure

Screening—Student participants attended and received credit for a 30 minute screening session during which they responded to (1) informed consent, (2) a general background and demographics form, (3) the revised Conflict Tactics Scale (CTS2, Straus et. al., 1996), (4) the dating version of the Dyadic Adjustment Scale (DAS; Spanier, 1976), and (5) the Positive Affect Negative Affect Scale (PANAS-X; Watson & Clark, 1994). At the end of each screening session, participants were provided with a sheet that informed them of the opportunity to participate in a study dealing with relationships and dating behavior. Those males who agreed to participate in the study by providing names and contact information were categorized as DV or NV based upon the eligibility criteria previously described. Fifty eligible participants were contacted and asked to return to the lab within two weeks of their initial participation. Forty-nine agreed to participate and 47 reported to the lab at their designated time.

Study—Participants returned to the lab for the one-hour study. Participants were assigned a subject number that was used to pair study materials to screening data. They again completed informed consent and were asked to complete an initial mood rating form. Participants were then provided standardized audio taped instructions detailing the ATSS procedure. Participants were instructed to listen carefully to and mentally place themselves in each of three simulated situations (Barbour et al., 1998; Eckhardt et al., 1998). They verbally reported their thoughts and reactions to eight separate 30-second segments in each of three scenarios via a microphone attached to a digital voice recorder for safe storage and later transcription. Participants were signaled to begin and end their verbal responses by a short, uniform tone. The first scenario was always a neutral “control” interaction between the participant, his simulated girlfriend and two of their mutual friends. The control scenario described an evening in which the two couples participated in a friendly game. A second scenario involved an overheard conversation between the same simulated girlfriend and her female friend. This scenario involved ideation related to blame, relationship dissatisfaction, and relationship termination. A third scenario was intended to evoke jealousy and involved a series of ambiguous interactions between the simulated girlfriend and one of her male friends. The second and third scenarios were counterbalanced as both were intended to provoke anger (Eckhardt et al., 1998).

Each articulation was transcribed by research assistants and coded by two graduate student raters following 30 hours of training with an experienced ATSS coder (the first author). Detailed coding protocols were composed by the authors to determine the degree of aggression/cognitive biases present in the set of each participant’s verbal responses. Raters independently coded each articulation and recalibrated by reviewing items on which they

had disagreed after every 15 participants. Articulated aggression scores were averaged for (a) physical aggression ($r_{IC} = .96$), (b) verbal aggression ($r_{IC} = .85$), and (c) belligerent statements ($r_{IC} = .92$). Five of Beck's cognitive biases were also coded, including (a) causal thinking ($r_{IC} = .71$), (b) overgeneralization ($r_{IC} = .75$), (c) personalization ($r_{IC} = .74$), (d) absolute or dichotomous thinking ($r_{IC} = .76$), and (e) demandingness ($r_{IC} = .76$). A composite score summing all five cognitive biases was calculated for each participant ($r_{IC} = .77$).

After each scenario, participants were prompted to complete a mood rating scale with a tone and to then write for 1 minute about any thoughts or feelings experienced during the previous scenario. The beginning and end of the articulation period were signaled by another tone. These retrospective thought listing narratives were also transcribed and coded for aggressive content and cognitive biases by the same raters that coded the ATSS segments. Inter-rater reliability was high for aggressive articulations including physical aggression (e.g., $r_{IC} = .92$), belligerence ($r_{IC} = .94$), and the composite measure of aggression ($r_{IC} = .92$). Verbal aggression was written too infrequently during the thought listing exercise to calculate inter-rater reliability across scenarios. Reliability for cognitive variables was also high in causal thinking ($r_{IC} = .83$), demandingness ($r_{IC} = .86$), dichotomous thinking ($r_{IC} = .87$), personalization ($r_{IC} = .86$), overgeneralization ($r_{IC} = .88$), and the composite cognitive bias ratings ($r_{IC} = .89$).

After the last thought listing narrative, participants were asked to listen to a 90-second audio recording of a comedy skit to reduce any temporary negative emotions experienced during the study. Participants were then debriefed and given the numbers for two local counseling centers that specialize in relationship issues. Participants received lab credits for participating in the lab study.

Measures

Physical aggression—IPV status was established through the widely-used Revised Conflict Tactics Scale (CTS2, Straus et. al., 1996). The CTS2 subscales have demonstrated high internal consistency, with alphas ranging from .79 to .95, as well as empirical evidence for high convergent, content and construct validity (Straus, Hamby, Boney-McCoy, & Sugarman, 1996). Item responses on the CTS2 range from 1 to 7 with higher scores indicative of more frequent IPV. The current revised measure consisted of 24 physical acts of violence, 8 verbally aggressive actions, and 8 prosocial behaviors divided evenly between perpetration and victimization. The items represented various levels of physical aggression and injury severity, with perpetration items like, "I tried to control my girlfriend by twisting her arm" or "My girlfriend had a physical injury because of a fight with me." ($\alpha = .76$).

Relationship satisfaction—The 32-item Dyadic Adjustment Scale (DAS; Spanier, 1976) was administered at the screening session and was used to generate a total relationship satisfaction score for each participant. Items include, "how often do you argue about everyday tasks?" and "how often do you laugh together?" Scores below 98 on the DAS indicate a high likelihood of significant relationship dissatisfaction. The DAS has proven to be both reliable and valid (e.g. Carey, Spector, Lantinga, & Krauss, 1993).

Mood state—The Positive and Negative Affect Schedule - Expanded Form (PANAS-X; Watson & Clark, 1994) consists of 60-items and instructs participants to rate the degree to which they had experienced a series of moods, over a given period of time, on a scale ranging from 1 (very slightly or not at all) to 7 (extremely). The full PANAS-X was administered during screening and a shortened mood rating scale (MRS) was completed at four separate times during the actual study. The MRS consisted of 15 affective terms with 5 assessing positive emotions, 6 designed to gauge anger, and 4 measuring other negative moods like “sad” or “anxious” ($\alpha = .86$).

Observational coding—The Articulated Thoughts in Simulated Situations paradigm (ATSS; Davison et al., 1983), was used to collect and code verbal responses for cognitive and aggressive content. Two trained raters coded each articulation on a 5-point scale reflecting the relative usage of individual biases and aggressive statements in each response segment from no content (1) to most or all of the content (5). The cognitive information processing biases that were evaluated include: 1) *causal thinking*, reaching a specific conclusion in the absence of supporting evidence (e.g., “She invited him over because she doesn’t love me anymore.”), 2) *overgeneralization*, the general application of a rule constructed from one or a few isolated incidents (e.g., “She always says nasty things about me.”), 3) *personalization*, the suspicion that others have malicious motives and the assumption that one is personally involved in events or comments of an impersonal nature (e.g., “She only took that job because she thinks I cannot earn enough money.”), 4) *demandingness*, the rigid belief that something must or must not be done (e.g., “She needs to respect our relationship.”), and 5) *dichotomous thinking*, categorizing an event or an individual in one of two extremes (e.g., “Her behavior is completely out of line.”) (Beck, 1976, 1999).

Definitions for aggression in the current study drew heavily upon Anderson and Bushman’s (2002) operationalization of aggression as behaviors that are intended to cause immediate harm. Aggressive ATSS statements were evaluated and further divided into three components that were assessed via the proxy of verbal articulations and defined in a manner that was consistent with Eckhardt (2007). *Physical aggression* refers to any stated intention to cause physical harm to a simulated partner (e.g., “I’m going to kick your butt for that one.”). *Verbal aggression* was defined as an insulting or emotionally harmful statement about the simulated partner (e.g., “You are such a slut.”). Finally, all statements intended to instigate a confrontation with a simulated partner were determined to be *belligerent* (e.g., “Why don’t you try saying that to my face?”).

Data analysis

Primary analyses in the current study consisted of a series of repeated measures analysis of covariance (ANCOVAs). A series of 2×2 mixed ANCOVAs were conducted using IPV status as a within-person variable and ATSS (control and anger) scenarios as a repeated measures variable. Relationship satisfaction, as reflected by the DAS, was used as a between-persons covariate. Separate binary logistic regression analyses were then conducted to differentiate between IPV group status using cognitive biases and aggressive articulations. Parallel analyses were conducted for observed ATSS content and retrospective self-reports.

Results

ATSS anger induction

The validity of the ATSS paradigm to induce a state of heightened anger in participants was examined using a repeated measures ANOVA design. We found significant main effects for IPV group, $F(1,40) = 8.07, p < .01$, and scenario, $F(1,40) = 45.68, p < .01$. The interaction term was not significant, $F(1,40) = 1.95, p = .13$. We then examined mood changes across sequential rating periods using a series of three ANOVAs with IPV group status as a within-group factor and scenario as the repeated measures variable. Results detected a significant main effect for group in each analysis [$F(1,40) = 4.98, p = .03$, $F(1,40) = 6.48, p = .02$, and $F(1,40) = 8.82, p < .01$]. DV participants evidenced greater anger than NV participants following exposure to each ATSS scenario. Participants reported increased anger from pre-to-post control, $F(1,40) = 14.77, p < .01$, and from post-control to post anger scenario 1, $F(1,40) = 42.86, p < .01$. We detected no significant change in anger from post-anger scenario 1 to post-anger scenario 2, and we found no IPV X scenario interactions. Thus, hypothesis 1 was partially supported as all participants demonstrated an increase in anger following anger induction.

ATSS variables

Post hoc analyses were conducted upon cognitive variable scores and aggressive verbalizations during the two anger scenarios. The results yielded no significant within-group differences between the two anger-arousing scenarios. The two scores were averaged to produce a single anger scenario set of responses for each participant. Furthermore, a series of independent sample *t*-tests were conducted to examine general group differences, concluding that DV and NV groups significantly differed only in relationship satisfaction, $t(45) = -2.98, p < .01$.

ATSS aggressive verbalizations—ATSS repeated measures ANCOVA revealed a main effect of group on intended *physical aggression* that approached significance, $F(1,41) = 2.93, p = .09$. The scenario main effect and the interaction term were not significant. When examining *verbal aggression*, IPV group status approached significance, $F(1,42) = 2.61, p = .06$. The interaction term was significant with NV males maintaining their level of verbal aggression across scenarios while DV males increased in verbal aggression from the control to the anger scenario, $F(1,42) = 4.81, p = .03$. The scenario main effect was not significant. A greater number of *belligerent* statements were made during the anger scenario relative to the control scenario, $F(1,42) = 8.27, p < .01$. Neither the main effect of IPV group status nor the interaction were significant.

We examined the composite aggression variable by summing articulated physical aggression, verbal aggression, and belligerence within each of the two scenarios. We found a marginal main effect for group, $F(1,40) = 3.78, p = .06$, and a significant effect of scenario, $F(1,40) = 19.91, p < .01$, and the interaction term, $F(1,40) = 6.06, p = .02$ (Table). DV men did not significantly differ from NV men in the control scenario, $t(42) = .46, p = .65$, but did articulate greater aggressive content in the anger scenarios, $t(42) = -2.40, p = .02$.

02. Results supported hypothesis 2a; DV males demonstrated greater aggression than NV males following provocation.

ATSS cognitive biases—Regarding *causal thinking*, the ANCOVA detected a significant main effect for ATSS scenario repeated measures with greater thinking errors occurring during the anger scenario, $F(1, 43)=4.06, p=.05$. A main effect for IPV group status was also detected such that DV males articulated a greater amount of thinking errors regardless of scenario, $F(1,43)= 6.32, p=.02$. The interaction of group and scenario was not significant. The group main effect was significant for both *demandingness* and *dichotomous thinking* with DV males articulating greater cognitive biases than NV males, $F(1,43)=5.36, p=.03$ and $F(1,43)=6.39, p = .02$, respectively. Neither the scenario main effects nor the interaction terms demonstrated significance. No main effects or interactions were detected for *overgeneralization* or *personalization*, although the main effect of scenario for overgeneralization approached significance, $F(1,43)=3.27, p = .08$.

The ANCOVA detected a significant main effect for IPV group, $F(1,43)=5.60, p=.02$, and scenario, $F(1,43)=259.20, p<.01$, on the composite cognitive bias value but not the interaction of group and scenario, $F(1,43) = 1.76, p=.19$ (Table). Both groups increased in cognitive biases from the control to the anger scenario and the DV group consistently articulated greater biases. The groups differed more significantly in the anger scenario, $t(43) = 2.21, p = .03$, than during the control scenario, $t(43) = 1.97, p = .06$. Results partially supported hypothesis 2b in that DV males demonstrated greater cognitive biases than NV males following provocation.

ATSS regression analyses

We next examined the relative utility of using individual ATSS aggressive articulations and cognitive biases to predict IPV group status in separate binary logistic regression analyses. All regression analyses used relationship satisfaction as a covariate introduced in the first step of the analysis, which was significant, $\beta = -.06, p = .03$, and increased the model's ability to predict group membership, $R^2 = .13, \chi^2(1) = 5.96, p = .02$.

The model including all individual cognitive variables was significant, $\chi^2(6) = 16.92, p = .01$, in that it reliably classified 75.6% (22 NV, 12 DV) of participants. No individual cognitive variable significantly contributed to the cognition model's discriminative capability. Causal thinking approached significance, $\beta = .197, p = .07$. The individual cognitive biases were highly interrelated, so we aggregated the data and conducted a second analysis with only the composite cognitive bias value, $\beta = 0.05, p = .04$. The model was again significant, $\chi^2(2) = 12.28, p<.01$, and reliably classified 80.0% (21 NV, 15 DV) of the sample.

The aggression model reliably distinguished between participants, $\chi^2(4) = 16.89, p < .01$, and correctly classified 75.0% (19 NV, 14 DV) of the sample. Verbal aggression, rather than physical aggression or belligerence, significantly contributed to the model's ability to distinguish between groups, $\beta = 4.23, p = .05$. The composite variable was significant, $\beta = 1.28, p = .02$, in a model by itself, $\chi^2(2) = 13.60, p < .01$, in predicting 77.3% (19 NV, 15 DV) of the sample.

Finally, we examined the predictive capability of a model combining the composite aggression score, $\beta = 1.08$, $p = .04$, with the composite cognitive bias score, $\beta = .05$, $p = .08$. Violence group status was associated with greater articulated aggression and a trend toward greater cognitive biases. Again, this model was reliable, $\chi^2(3) = 13.60$, $p < .01$, in correctly classifying 79.1% (19 NV and 15 DV) of the sample.

Written, self-report variables

Forty-three participants completed the thought listing self-report exercise after each scenario. Four participants chose to write nothing during this period of time. A parallel procedure using 2×2 mixed ANCOVAs with IPV status as the within group variable, scenario as the repeated measure, and satisfaction as a covariate was followed to analyze retrospective aggressive intent and cognitive biases as evidenced by written content following each scenario. Again, ratings collected during the two anger-arousing scenarios were averaged together.

The repeated measures ANCOVAs revealed no significant main effects or interactions for self-reported physical aggression, verbal aggression, or belligerence. No participants reacted aggressively to the control scenario and physical aggression ($M = 0.04$, $SD = 0.13$), verbal aggression ($M = 0.25$, $SD = 0.01$), and belligerence ($M = 0.04$, $SD = 0.15$) all evidenced low rates of occurrence in the anger scenario. Only 7 of the 43 valid participants recorded aggressive thoughts. Thus, our ability to detect effects in this set of analyses was compromised. There was a significant main effect of scenario when examining the composite aggression variable, $F(1,41) = 5.31$, $p = .03$, with greater aggression following the anger scenarios. The main effect of IPV group and the interaction were not significant (Table). Hypothesis 3a was not supported.

The self-report cognitive biases ANCOVA detected a significant main effect for IPV group status, $F(1,40) = 9.51$, $p < .01$, and a significant IPV group X scenario interaction, $F(1,40) = 4.91$, $p < .03$, for *overgeneralization* such that DV males significantly increased in overgeneralizations from the control to the anger scenarios, $t(15) = 4.33$, $p < .01$, while NV participants did not, $t(26) = 0.52$, $p = .61$. No other IPV group or scenario effects were detected among the cognitive variables of *causal thinking*, *personalization*, *demandingness*, or *dichotomous thinking*. The scenario main effect was significant for the composite cognitive bias variable, $F(1,41) = 79.29$, $p < .01$. Participants wrote more cognitive biases following the anger scenario than they did following the control scenario (Table). Results did not support hypothesis 3b, as neither the IPV group main effect nor the interaction was significant.

Self-report regression analyses

Parallel binary regression analyses were conducted upon the individual self-report cognitive and aggression variables. Relationship satisfaction was significant in step one of the model, $\beta = -.07$, $p = .02$; $R^2 = .15$, $\chi^2(1) = 7.16$, $p < .01$. The cognition model was again reliable, $\chi^2(6) = 20.51$, $p < .01$, in that it classified 78.6% (24 NV, 9 DV) of participants. Again, no cognitive variable significantly contributed to the model's discriminative capability. Demandingness approached significance, $\beta = .198$, $p = .06$. The composite cognitive bias

model was reliable, $\chi^2(2) = 8.99, p = .01$, and correctly classified 73.8% (23 NV, 8 DV) of the sample. The cognitive bias variable did not contribute to the model's predictive ability, $\beta = -0.05, p = .78$.

Again, the aggression model reliably distinguished between NV and DV participants, $\chi^2(4) = 18.43, p < .01$, and correctly classified 78.6% (24 NV, 9 DV) of the sample. This time, however, none of the aggression terms significantly contributed to the predictive capability of the model. The composite aggression variable approached significance, $\beta = 5.31, p = .07$, and the model was reliable, $\chi^2(2) = 13.97, p < .01$, correctly placing 73.8% (23 NV, 8 DV) of the sample.

Finally, neither the composite aggression score, $\beta = 5.36, p = .07$, nor the composite cognitive bias score, $\beta = -.05, p = .77$ significantly improved the model predicting IPV status, $\chi^2(3) = 14.05, p < .01$, in correctly classifying 73.8% (23 NV and 8 DV) of the sample. Thus, results supported hypothesis 4 as the inclusion of articulated, rather than self-reported, content generally produced superior models.

Relationships between on-line ATSS and written, self-report measures

Causal thinking, overgeneralization, demandingness, and dichotomous thinking were all significantly interrelated within both ATSS ($r = .36-.72$) and written, self-report ($r = .27-.68$) methodologies. ATSS and self-report variables, however, failed to share any significant associations. Physical aggression, verbal aggression, and belligerence were related neither within nor between assessment methods. The lack of convergence held across assessment methods for the composite measures of cognitive biases, $r = .05, p = .76$, and aggression, $r = .21, p = .21$.

Discussion

The current study examined the cognitive and aggressive articulations of 27 NV and 20 DV male participants before and after provocation, using both written, retrospective, and verbal online assessment methods. The current investigation replicated previous research in detecting cognitive and aggressive differences between violent on non-violent participants. We also aimed to assess the relative strengths of the ATSS method over participant self-report. We found that the provocation was successful in eliciting anger as well as increased cognitive biases and aggression across methodologies. Greater differences between NV and DV participants were detected in verbal rather than written content. Similarly, verbal content more reliably differentiated between DV and NV participants than written content in regression analyses.

NV and DV participants differed on several individual measures of cognitive bias, including causal thinking, demandingness, and dichotomous thinking, but only when assessed via verbal rather than written responding. This held true for the composite cognitive bias variable as well. DV participants wrote significantly more overgeneralizations than the NV participants. These results support previous research that has investigated rates of cognitive biases across assessment methods (Eckhardt & Jamison, 2002; Eckhardt & Kassonove, 1998). Indeed, individual cognitive biases were highly associated within but not between

assessment methods, suggesting reliable and cohesive patterns across distorted cognition that may be detecting distinct content based upon affective salience or internal self-regulatory processes. Similarly, DV males articulated more composite aggressive statements than NV males following provocation but did not differ in written content. Thus, following provocation, IPV perpetrators in the current sample evidenced more maladaptive thinking and were more aggressive than non-violent controls but this difference was only detected by assessing their verbal, online thought content through the ATSS methodology.

Further, we found that the most reliable model predicting IPV group membership only included the ATSS composite cognitive bias variable and that the inclusion of ATSS composite aggression detracted from the model's overall predictive capability. The individual biases failed to increase the model's accuracy across assessment methods. The verbal and written aggression variables also added little to the accuracy of their respective models. Written retrospective aggression and cognitive variables were poor predictors of IPV group status. Thus, NV participants in the current sample were best differentiated from DV participants by their composite articulated cognitive biases following anger provocation, with DV participants using significantly more cognitive biases than NV participants. Together, these results suggest that anger expression "in the heat of the moment" may be a more sensitive indicator of violent behavior outside of the laboratory than retrospective reports. Results support Eckhardt and Dye's (2000) call for researchers to move away from self-report measures and toward paradigms that more closely represent real-world situations by assessing participants at affective heights consistent with periods of aggressive responding.

Given robust findings depicting differences between violent and non-violent samples across multiple correlates of IPV, however, it was unexpected to observe so few IPV group differences in written reports (e.g., Eckhardt & Dye, 2000). While others have found similar results using standardized paper-and-pencil measures, (Eckhardt & Jamison, 2002, Eckhardt & Kassino, 1998), this study utilized an open-ended question format and assessed free responses to identical social stimuli in both the ATSS and the thought listing exercises. While the ATSS responses occurred concurrently with the scenarios and were more automatic, the thought listing component occurred immediately after the scenarios ended and represent a retrospective and explicit form of responding that may be more susceptible to the influences of negative affect and social desirability (Dovidio, Brigham, Johnson, & Gaertner, 1996). Alternatively, significant effects may have been obscured by low power resulting from small sample sizes in both NV and DV groups. Also, the low frequency of aggressive responding in retrospective reports brings the validity of all self-report aggression analyses into question.

The SIP model previously discussed can aid in the interpretation of the current results. Aggression and cognitive biases, either verbalized or written, can be conceptualized not only as components but also the end result of a more elaborate cognitive process, occurring throughout the ATSS procedure, which included emotional provocation, priming for negative stimuli, information decoding, decision-making, and finally behavioral enactment (Berkowitz, 2011; Bower, 1981; Holtzworth-Munroe, 1992). As expected, DV males in the current study evidenced more maladaptive and aggressive content during the enactment

stage of SIP. Such responses indicate a similarly maladaptive decision making process that may evidence more intense emotional reactions to provocation, greater negative interpretation or reference memories during decoding, the presence of hostile attributions, more positive expectations or evaluations of maladaptive responding, limited availability of prosocial behavioral alternatives, or some combination of these. Indeed, there is evidence that violent males possess deficits in each stage of SIP (Anglin & Holtzworth-Munroe, 1997; Barbour et al., 1998; Sugarman & Frankel, 1996).

The ATSS paradigm provides a unique method for understanding the occurrence of IPV in a greater context. In the current sample, baseline CTS2 data indicated a strong relationship between male-to-female and female-to-male IPV, an association reported in prior reviews of this literature (Archer, 2000). Given the effect of provocation on IPV, female aggression may serve as an important provocation for male aggression in those with a history of aggressive behavior. The ATSS paradigm further reflects the limited cognitive resources available for conflict resolution among violent participants as the biases and aggression following provocation far surpassed the baseline established in the control scenario, which were equivalent across IPV groups (Anglin & Holtzworth-Munroe, 1997).

Treatment implications

As the experimental elicitation of anger toward even a simulated partner may be complicated by both legal and ethical concerns, the use of nonclinical proxy samples recruited from the community may represent an opportune method to better understand the general cognitive and affective processes associated with IPV, which in turn may suggest viable treatment targets for service providers. Results of the current study contribute to the understanding of these general processes by showing that IPV perpetrators differ from non-violent males on specific types of cognitive biases. Given that most IPV intervention programs aim to prevent new instances of violence via cognitive change (e.g., Babcock, Green, & Robie, 2004), we recommend that future developments in treatment programming focus on methods of adjusting causal thinking, demandingness, and dichotomous thinking among (at least) male perpetrators of IPV. Such methods have been outlined in several treatment guides and manuals (e.g., Murphy & Eckhardt, 2005; Sonkin, Martin, & Walker, 1985; Wexler, 2006), and are presumed to reduce the propensity for IPV by reducing negative affect, improving dyadic communication, and stabilizing close relationships. However, it should be noted that there are no published data clearly demonstrating that specifically modifying these (or any) cognitive distortions reliably causes nonviolent change (Eckhardt & Schram, 2009). Given this, the present results also suggest the need for improved assessment methods when assessing cognitive distortions in clinical IPV samples. While self-report, paper-and-pencil measures of cognitive distortions are convenient to administer, there are a wealth of reasons why the resulting data may be biased or inaccurate. Cognitive content may be more accessible and less prone to editing by offenders if these cognitions can also be assessed in an online, mood-congruent format. Such data may aid in risk assessment and personalized treatment planning, and serve as a particularly informative source of information for the evaluation of individual and programmatic treatment effectiveness.

Limitations

Limitations exist in the current study. First, our sample was small and relied upon self-reported IPV status for recruitment. We found a number of marginally significant effects that may have demonstrated significance with a larger sample. Ethical concerns and available resources did not allow for collecting partner reports to corroborate non-violence so it is possible that a small percentage of the NV group may have had a violence history, though rates of violence in our screening sample were consistent with the larger college population (e.g. Makepeace, 1981). Secondly, the college student DV males expectedly reported few acts of physical relationship violence within the previous 6 months. Third, there is no recommended method of accounting for the quantity of articulated or written responses in the ATSS and thought listing procedures. We attempted to account for this by having the coders indicate the relative percentage of content that evidenced biases and aggression. Finally, it should be noted that the majority of our sample was comprised of Caucasian students and the observed effects may not generalize to community and clinical samples or other racial/ethnic groups.

Conclusions

In the present study, DV males differed from NV males by articulating more cognitive distortions and aggressive verbalizations during the ATSS procedure. Notably, these differences were only apparent during concurrent anger arousal, suggesting that our understanding of IPV risk should take into account this interdependence among cognitive, affective, and behavioral phenomena. As intervention programs for IPV perpetrators move toward intervention models based on the notion that nonviolent change is best accomplished through modification of biased attitudes and cognitive distortions, the present results suggest potential treatment targets as well as novel methods of assessing cognitive change that can be integrated into program evaluation efforts.

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Table

Aggressive Articulations and Cognitive Errors Across IPV Group and ATSS Scenario.

Group	ATSS Measure						Self-Report Measure					
	ATSS Scenario			F-value			ATSS Scenario			F-value		
	Control	Anger		Control	Anger		Control	Anger		Main Effects	Main Effects	Scenario X IPV
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Composite Aggression												
Scenario					19.91**	6.06*				5.31*		0.30
IPV Group					3.78					0.30		
DV	0.03	0.11	0.80	0.70			0.00	0.00	0.06	0.19		
NV	0.06	0.30	0.28	0.73			0.00	0.00	0.10	0.24		
Composite Cognitive Biases												
Scenario					259.20**	1.76				79.29**		2.47
IPV Group					5.60*					1.33		
DV	10.05	10.91	39.04	14.05			0.75	0.97	3.59	2.37		
NV	5.50	3.94	29.88	13.73			0.74	0.81	2.73	1.55		

* Note: = p-value .05,

** = p-value .01. IPV = Intimate Partner Violence, DV = Dating Violent, NV = Non-Violent