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Reflective Processing and Intimate Partner Violence

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REFLECTIVE PROCESSING AND INTIMATE PARTNER VIOLENCE

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ABSTRACT

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Intimate Partner Violence (IPV) is a prevalent problem, especially among college students. The serious physical and psychological consequences of IPV highlight the need to better understand its correlates. Individuals tend to process information and make decisions in different ways; these styles of thinking and decision likely hold important implications for intimate partnerships. Using a sample of undergraduate students, the current study aims to better understand the thinking processes of those who engage in IPV. Furthering our understanding of the cognitive processes that predict IPV may hold important treatment implications, both from a preventive and therapeutic standpoint. Previous studies show that IPV occurs under conditions of diminished control resources. Reflective processing is a style of thinking and decision-making that depends on the use of control resources. We therefore hypothesized that reflective processing at baseline, measured by the Cognitive Reflection Test (CRT), would be negatively associated with IPV perpetration. Few studies examine the importance of reflective processing in predicting IPV, and no studies that we know of have used the CRT in examining this relation. Because IPV occurs in 'hot,' emotional contexts, we also examined the impact of negative emotion on reflective processing. Participants were randomly assigned to one of two conditions, either anger or neutral mood induction, and completed CRT items both pre- and post-induction. Based on previous research showing that anger triggers shallow processing, we hypothesized that participants in the anger mood condition would experience a greater decline in reflective processing from pre- to post-induction than

those in the neutral mood condition. Based on theories of emotional flooding and the General Aggression Model (GAM), we also predicted that the anger mood induction would have a stronger negative effect on reflective processing for those reporting more extensive IPV perpetration. Results did not support our hypotheses; the implications of the null findings are discussed.

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INTRODUCTION

Intimate partner violence (IPV) is a prevalent problem, especially among college students. According to a recent survey report, 62% of undergraduates across six universities reported being physically or psychologically abused by a partner (Cho et al., 2020). IPV refers to abuse or aggression that occurs in romantic relationships, including physical violence and psychological/verbal violence. Beyond physical health complaints, consequences of IPV include serious mental health problems, such as depression, anxiety, and somatization (Kaura & Lohman, 2007). The widespread prevalence of IPV and its consequences highlight the need to better understand its correlates.

Individuals tend to process information and make decisions in different ways. Some individuals process information quickly, relying more on 'gut-feelings' and intuition, while others are slower, and employ a more effortful, analytical approach. These two styles of thinking and decision-making likely have important implications for intimate partnerships. The tendency to process information slowly and carefully likely leads to fewer instances of retaliation and more constructive attempts at conflict resolution. Indeed, previous research associates a rational, analytical style of thinking to greater tendencies to apply calm, rational responses in resolving intimate partner conflicts (Epstein et al., 1996). IPV often follows from conflict escalation, so the ability to think and make decisions in a manner conducive to conflict resolution is critical in its prevention. The present study examines the relation between styles of thinking and decision-making, and IPV, along with the influence of negative emotion on this relation.

Self-Control and IPV

Previous research links self-control and IPV perpetration. Using a sample of undergraduates, Finkel and colleagues (2009) found dispositional self-control, a stable personality trait measured via self-report, to be significantly associated with IPV, such that participants high in self-control reported significantly fewer acts of IPV than participants low in self-control. State self-control, which fluctuates over time in response to momentary demands, is also associated with IPV perpetration. Using a sample of undergraduate students and an emotion suppression procedure, Finkel and Campbell (2001) examined the impact of self-regulatory strength, a form of state self-control, on the tendency to inhibit destructive responses towards partners' provocations. Results showed that participants whose self-regulatory strength had been depleted, as a result of the emotion suppression manipulation, were less likely to inhibit destructive responses toward partners' provocations than participants whose self-regulatory strength had not been depleted (Finkel & Campbell, 2001). Finkel and colleagues (2009) also manipulated self-regulatory strength using an attention control procedure in a sample of intimate partners. Similarly, in response to negative partner feedback, participants assigned to the depletion condition were significantly more violent that participants assigned to the no-depletion condition (Finkel et al., 2009). These studies highlight the importance of both dispositional and state self-control in predicting IPV, which hold important implications for the relation between cognitive processing styles and IPV.

Self-Control and Cognitive Processing

State self-control depends on control resources that enable people to override, inhibit, or modify their impulses, thoughts, emotions, and behavior (Baumeister et al.,

2007). According to the ego depletion model, acts of self-control deplete these resources and impair future attempts at self-control, similar to energy or strength (Baumeister, 2002). Returning to the aforementioned self-control studies, when participants were engaged in the emotion suppression and attention control procedures, it is hypothesized that their control resources became depleted (Finkel & Campbell, 2001; Finkel et al., 2009). Depletion of control resources led to more violent responses to partner provocations, highlighting the importance of control resources to IPV perpetration. IPV often occurs under conditions of strong emotion and availability of control resources may buffer depletion due to strong emotions (Bodenhausen et al., 1994). The results linking low dispositional self-control to IPV (Finkel et al., 2009) suggest that IPV perpetrators may have fewer available control resources overall, as a stable trait.

The use of control resources is also important in determining cognitive processing styles. Dual process theory distinguishes between intuitive thinking, which is described as fast, automatic, unconscious, and independent of working memory, from reflective thinking, which is described as slow, effortful, analytical, and limited by working memory capacity (Evans & Stanovich, 2013). To engage in reflective processing, one must use control resources to suppress their intuitive, automatic response tendency (Frederick, 2005). For example, suppose an individual is on the market for a new home. The impulsive system might lead the individual to make an offer on the first home she likes based on her positive emotional response or gut-feelings. However, through the use of control resources, her reflective system may override this initial impulsive response and lead her to take time and carefully consider all aspects of the decision, such as proximity to schools, personal finances, and investment value.

Further, reflective processing has been shown to depend on the same limited resource as self-control (Schmeichel et al., 2003). For example, a study of undergraduates found the tendency to engage in and enjoy effortful cognitive endeavors (known as 'need for cognition') to be related to dispositional self-control capacity (Bertrams & Dickhäuser, 2009). In a follow-up study, Bertrams & Dickhäuser (2012) found that people higher in this capacity to engage in effortful cognitive endeavors are less prone to self-control depletion. Because low or diminished self-control predicts IPV and reflective processing relies on the same limited resource as self-control, these findings suggest those more likely to engage in reflective processing are less likely to engage in IPV.

Reflective Processing and IPV

IPV often occurs when partners experience an inability to control their impulses following intense conflict. When partners engage in heated, emotional conflicts, what determines whether they escalate or deescalate may rest on the ability for one or both partners to engage in reflective processing. In conflict, reflective processing allows an individual to suppress the fast, emotional urge to respond to a partner's provocation in an angry, retaliatory manner and instead respond carefully and constructively. Such slow and careful responding may facilitate the use of repair responses, such as disclosure of feelings, taking responsibility or apologizing, and moving toward compromise (Gottman, 1999). This type of responding likely deescalates conflict and prevents escalation to IPV. Drawing from the aggression literature more broadly, the General Aggression Model (GAM; Anderson & Bushman, 2002) similarly theorizes that spontaneous aggression is predicted by impulsive information processing that is not overridden by reflective processing.

Much of the literature on reflective processing has focused on identifying its cognitive-based correlates related to judgments, beliefs, and decision-making. For example, those more likely to engage in reflective processing have been shown to be more skeptical of religious, paranormal, and conspiracy theories and hold less traditional moral values (Pennycook et al., 2015). Few studies examine the importance of reflective processing in the context of aggression or IPV and those that do are flawed in their measurement of reflective processing. For example, one study of undergraduates investigated the impacts of distinct emotions, including anger, on cognitive processing for aggressive vs. non-aggressive participants (Tiedens, 2001). Participants were instructed to read and memorize a series of sentences, eight of which were ambiguous and could be interpreted as hostile. As measures of reflective vs. spontaneous processing, participants were timed as they completed a cued recall task and asked to rate the ambiguity of the stimulus sentences. It was believed that those making reflective vs. spontaneous judgements should spend more time on the task and rate more sentences as ambiguous. Results showed that aggressive individuals engaged in less reflective processing than non-aggressive individuals. The study measured reflective processing based on response times and tendencies toward hostile attribution biases. While reflective processing is likely related to these factors, this is certainly an indirect and likely inaccurate form of measurement.

Similarly, Finkel and colleagues (2009) measured cognitive processing time to capture the concept of reflective processing, theorizing that taking more time increases the likelihood that individuals will react deliberately or reflectively rather than immediately and impulsively. Using a sample of undergraduates, they found evidence in

support of this theory. After participants listened to audio recordings in which they overheard their hypothetical partners engaging in flirtatious behavior and insulting them, they were significantly more likely to verbalize a tendency toward IPV when their responses were verbalized immediately vs. after a 10-second delay (Finkel et al., 2009). Again, although response time seems to be an important factor in reflective processing, it does not directly or sufficiently measure the construct. To more accurately measure reflective processing, one must consider additional response qualities that associate with effortful versus impulsive processing.

These two studies provide preliminary evidence for the importance of reflective processing in the context of aggression or IPV; however, both studies were limited in their measurement of reflective processing. To address this measurement flaw and gap in the literature, we will be using a highly validated measure, the Cognitive Reflection Test (CRT; Frederick, 2005). The CRT is the most widely used behavioral measure of reflective processing. The original version consisted of three logical reasoning items designed to elicit automatic and seemingly obvious, but incorrect responses. To be able to produce a correct response, participants need to display a considerable ability to monitor and override intuitive and automatic response tendencies (Frederick, 2005). The CRT was found to be predictive of rational thinking ability, measured by heuristics/biases tasks and logical reasoning problems, independent not only of intelligence measures, but also of executive functioning and thinking dispositions measures (Toplak et al., 2011).

Reflective Processing, Negative Emotions, and IPV

Up until this point, we have argued for the importance of considering reflective processing as a predictor of IPV based largely on its implications for self-control

capacity. However, it is important to also consider the contexts in which IPV frequently occurs in understanding its cognitive predictors. Reflective processing refers to 'cool' processing; it is emotionally neutral, slow, and strategic. However, IPV occurs in the context of 'hot' processing; it is often emotional, fast, and reflexive (Metcalfe & Mischel, 1999).

Because IPV tends to occur in hot, emotional contexts, we must examine the impact of negative emotion on reflective processing to fully understand the relation between reflective processing and IPV. Anger specifically has been shown to be a strong predictor of IPV. (Birkley & Eckhardt, 2015). Previous research shows that anger activates heuristic, shallow processing relative to sadness and neutral emotion, which is likely due to depletion of effortful control resources (Bodenhausen et al., 1994). Considering this, anger should negatively impact the ability to engage in reflective processing. Consistent with this notion, The GAM suggests that negative mood influences aggressive behavior by compromising effortful control resources in the appraisal process (Anderson & Bushman, 2002). When effortful control resources are scarce, the individual is more likely to engage in hot information processing. Tiedens (2001) used a mood induction to measure the impact of anger on participants' cognitive processing. Results showed that both aggressive and non-aggressive individuals engaged in less reflective processing (as measured by ambiguity ratings) following an anger mood induction as compared to individuals in a neutral mood induction. This preliminary evidence further suggests anger may negatively impact reflective processing; use of a more valid and sensitive measure of reflective processing will build upon this finding.

The aforementioned studies by Finkel and colleagues (2001; 2009) used procedures in an effort to mirror this hot, emotional context for participants, but did not explicitly measure participants' emotional states (Finkel et al., 2009; Finkel et al., 2001). For example, the impact of cognitive processing time on IPV was measured following an imagined intimate partner provocation. Although the provocation was designed to promote an emotional response, the study did not specifically examine the impact of participants' emotions on cognitive processing or IPV.

If anger negatively impacts reflective processing via depletion of control resources, stronger experiences of anger should lead to increased impairment in reflective processing ability. Individuals vary in the intensity with which they experience and express emotions and this affects both processing of social information and decision making in challenging situations (Lemerise & Arsenio, 2000). Previous studies consistently link emotional flooding and IPV, which suggests that perpetrators of IPV may experience emotions more strongly in intimate partner contexts than others, leading to more depleted effortful control resources (Foran et al., 2018; Malik et al., 2019; O'Leary et al., 2007; Sotskova et al., 2015). Flooding occurs when an individual finds their partner's negative affect as intensely disorganizing and overwhelming leading to feelings of impaired information processing (Gottman, 1993). The relation between flooding and IPV follows in that individuals who are overwhelmed by their emotions are more likely to choose hostile goals in an attempt to reduce distressing arousal. If perpetrators of IPV experience more depleted effortful control resources following experiences of anger, their reflective processing ability should also be more severely impaired in these contexts.

Current Study

Considering the high rates of IPV perpetration and its grave physical and psychological consequences, it is important to better understand predictors of IPV. Studies involving self-control depletion tasks show that IPV occurs under conditions of diminished control resources (Finkel & Campbell, 2001; Finkel et al., 2009). Reflective processing is a style of thinking and decision-making that depends on the use of control resources. However, few studies examine the importance of reflective processing in predicting IPV and those that do use flawed forms of measurement.

Furthering our understanding of the cognitive processes that predict IPV may hold important treatment implications, both from a preventive and therapeutic standpoint. From a preventive standpoint, individuals may be assessed for their tendencies toward automatic thinking styles and if appropriate, provided psychoeducation on the link between this style of thinking and maladaptive relationship outcomes. If it proves to be malleable, promoting reflective processing may be a component of treatment, as a mechanism through which partners can improve their conflict management skills.

Using a sample of undergraduate students, the current study aims to better understand the thinking processes of those who engage in IPV. Do perpetrators of IPV have trouble inhibiting automatic response tendencies at baseline and/or is this tendency elicited by experiences of angry emotions? Reflective processing was measured using the CRT, an extremely sensitive and valid behavioral measure of this type of processing. We hypothesized that reflective processing at baseline would be negatively associated with self-reported IPV, in that more reflective responses would predict less extensive IPV perpetration.

Because IPV occurs in 'hot,' emotional contexts, we also examined the impact of negative emotion on reflective processing. Participants were randomly assigned to one of two conditions, either anger or neutral mood induction. All participants completed three CRT items before the mood induction and three additional items after the induction. Based on previous research showing that anger triggers shallow processing, we hypothesized that participants in the anger mood condition would experience a greater decline in reflective processing from pre- to post-induction than those in the neutral mood condition.

Further, we predicted that the anger mood induction would have a stronger negative effect on reflective processing for those reporting more extensive IPV perpetration; specifically, we hypothesized that IPV perpetration would moderate the negative association between reflective processing at pre- and post-induction. This prediction is based on theories of emotional flooding and the GAM, which suggests negative mood influences aggression by compromising effortful control resources (Anderson & Bushman, 2002; Gottman, 1993). If IPV perpetrators are more likely to feel emotionally flooded with impaired information processing, and negative mood compromises effortful control resources, then experiences of anger should more strongly impact reflective processing for those with extensive histories of IPV. This study will further our understanding of the cognitive processes that predict IPV, both at baseline and in response to strong negative emotion.

PILOT STUDY

We first conducted a pilot study to compare the effects of an autobiographical mood induction procedure between in-person and online administrations and determine the primary study's procedures.

METHODS

Participants

Participants were 34 undergraduate students who volunteered to take part as part of requirements put forth by their psychology courses. The first 14 participants were assigned to the in-person administration and the last 20 participants were assigned to the online administration.

Procedure

We used an autobiographical recall mood induction procedure based on previous research showing its effectiveness in inducing negative mood (Krauth-Gruber & Ric, 2000). Both the online and in-person procedures were identical except for their form of administration. Participants were randomly assigned to either anger or neutral mood induction conditions. Before and after the mood induction, participants in the in-person and online administrations completed either paper or online questionnaires, respectively, assessing their current mood state. During the mood induction, in the anger condition, participants were asked to think about a time when they were angry with their current romantic partners. They were asked to relive this memory as vividly as possible and to concentrate on the time they felt their anger most strongly and reexperience these emotions. They were asked to write or type what happened and how they felt, reporting as many details as possible and as vividly as possible. In the neutral condition,

participants were asked to think about and relive an ordinary day and write or type what happened. These instructions were read aloud to participants during the in-person administration, while those participating online were asked to read the instructions to themselves.

Measures

Current Mood State. Participants were asked to report on their current emotional state before and after the mood induction using a 5-item questionnaire, which was adapted from the Spielberger Trait Anger Scale (STAXI; Spielberger, 1996). Participants were asked to rate their current experience of dimensions of anger (i.e., "I am furious," "I feel irritated," "I feel annoyed," "I feel angry," and "I feel mad") on a 4-point Likert scale from 1= not at all to 4= very much so. Scores were averaged across the 5 items on the 4-point scale to yield a pre-mood score, post-mood score, and then subtracted pre-mood from post-mood to yield a mood-change score.

RESULTS

In-person effects. The mood induction was effective in-person. Those in the anger group reported significantly more negative affect at post-mood than the neutral group (r= .553), U = 3.0, p = .004, and experienced significantly more mood-change from pre- to post-induction than the neutral group (r = .694), U = 4.50, p = .01.

Online effects. The mood induction was effective online. Those in the anger group reported significantly more negative affect at post-mood than the neutral group (r = .646), U = 8.5, p = .002, and experienced significantly more mood-change from pre- to post-induction than the neutral group (r = .719), U = 5.50, p < .001.

Comparing in-person to online. In evaluating differences in post-mood and mood-change effects between in-person and online administrations, we performed a Fisher's *r* to *z* transformation. In terms of post-mood effects, there was no statistical differences between in-person and online, $z = -.372$, $p > .05$, and similarly no differences in mood-change effects between in-person and online, $z = -0.129$, $p > .05$.

DISCUSSION

The autobiographical recall mood induction was effective when administered both online and in-person and there were no significant differences between the two formats. Further, the effect sizes obtained are comparable to the meta-analytical effect size ($r = .522$) reported by Westermann and colleagues (1996) evaluating the effectiveness of imagination procedures in inducing negative mood. Considering this, we proceeded with the primary study fully online.

PRIMARY STUDY

METHODS

Participants

Participants were 232 undergraduate students (168 females) who volunteered to take part as part of requirements for their psychology courses. Participants has a median age of 19 (range= 18 - 30) and were primarily Caucasian by a slight margin (52% Caucasian, 21% African American, 14% Asian, 6% mixed, 3% American Indian or Alaska Native, 1% Native Hawaiian or Pacific Islander, and 3% unknown). To be included in the present study, participants needed to be at least 18 years old and in a romantic relationship at the time of the study.

Procedure

Participants were randomly assigned to either anger (N=114) or neutral mood (N=118) induction conditions. They completed online questionnaires that included assessments of their current mood state (pre- and post-induction), six CRT items (3 pre-induction and 3 post-induction) and the revised Conflict Tactics Scale (CTS-2), a measure of IPV. We used the same online autobiographical recall mood induction procedure that was used during the pilot study.

Measures

Intimate Partner Violence. IPV was assessed using the revised Conflict Tactics Scale (CTS-2; Straus et al., 1996). The full version consists of 40-items in which partners are asked to use an 8-point Likert scale to rate how often they and their partner engaged in conflictual behaviors in a given timeframe; because our study was focused on perpetrators of IPV, we shortened the scale to 20-items. Participants rated how often they

engaged in conflictual behaviors over the past 6-months from 0= never to 6= more than 20 times. The scale includes 8 psychological aggression items (i.e., "insulted or swore," "called partner fat or ugly," "destroyed something of partner's," "shouted or yelled," "stomped out during a disagreement," "accused partner of being a lousy lover," "did something to spite partner," and "threatened to hit or throw something") and 12 physical aggression items (i.e., "threw an object that could hurt," "twisted arm or hair," "pushed or shoved," "grabbed," "slapped," "beat up," "burned or scaled on purpose," "kicked," "slammed against a wall," "choked," "punched or hit with something that could hurt," and "used a knife or gun"). We averaged scores across all 20 items using 7-point scales to yield an extent of any aggression score. This scoring strategy was used over frequency scoring because of its emphasis on both variety and frequency of aggressive acts, which more closely resembles the construct of extent, and the frequency approach tends to result in more skewed distributions (O'Leary et al., 2007).

Reflective processing. The Cognitive Reflection Test (CRT; Frederick, 2005) was originally developed as a 3-item measure and is one of the most widely used measures in heuristics-and-biases research. The CRT was found to be predictive of reflective styles of thinking independent not only of measures of intelligence, but also executive functioning and thinking dispositions (Toplak et al., 2011). The items are open-ended and there is no time limit to solve them. Since publication of the original three-item measure, additional versions have been developed including the CRT-2 (Thomson & Oppenheimer, 2016) and the CRT-Long (Primi et al., 2016). The CRT-2 was developed to increase the pool of available questions and address concerns that many subjects have been exposed to the original items. It was shown to be highly correlated with the original measure and to

predict performance on the same cognitive measures as the original CRT (Thomson & Oppenheimer, 2016). The CRT-Long was developed to address concerns that the original items are too difficult, which could lead to floor effects in less educated populations (Primi et al., 2016). As compared to the original CRT, the new scale was found to be both similarly correlated with various measures (including measures of numeracy, reasoning and decision-making skills, and intelligence and thinking dispositions) and easier than the original items (Primi et al., 2016). We used six CRT items in total, which were presented using a counterbalanced Latin Square design. One item was used from the original 3-item measure: "If it takes 5 minutes for five machines to make five widgets, how long would it take for 100 machines to 100 widgets?" (CRT; Frederick, 2005). Two items were used from CRT-long: "Jerry received both the 15th highest and 15th lowest mark in the class. How many students are there in the class?" and "If three elves can wrap three toys in an hour, how many elves are needed wrap six toys in 2 hours?" (Primi et al., 2016). Three items were used from CRT-2: "How many cubic feet of dirt are there in a hole that is 3' deep x 3' wide x 3' long?", "If you're running a race and you pass the person in second place, what place are you in?", and "Emily's father has three daughters. The first two are named April and May. What is the third daughter's name?" (Thomson & Oppenheimer, 2016). Correct responses were summed pre- and post-induction to yield two reflective processing scores, pre-mood and post-mood. Each score ranged between 0 (no items correct) and 3 (all items correct).

Current Mood State. Participants were asked to report on their current emotional state before and after the mood induction using a 5-item questionnaire adapted from the

Spielberger Trait Anger Scale (STAXI; Spielberger, 1996). Details are included under the pilot study.

Analytic Strategy

Spearman's Rank Correlation Coefficient was used to evaluate the association between baseline reflective processing and IPV. We used nonparametric Spearman correlations to address the positive skew in our data; Spearman correlations are more robust to deviations in normality than Pearson correlations. We conducted a manipulation check to ensure the mood induction was successful using Mann-Whitney U tests comparing means between anger and neutral conditions on current mood at post-induction and mood change (from pre- to post-induction). As we were not concerned about skew with regard to the CRT data, repeated measures ANOVA was used to examine the impact of the mood induction on reflective processing. Using the MEMORE (Mediation and Moderation for Repeated Measures; Montoya, 2019) macro for SPSS, a moderated repeated-measures analysis was conducted to examine the moderating impact of IPV perpetration on change in reflective processing from pre- to post-induction. This analysis is based on the method outlined by Judd, Kenny, & McClelland (2001), in which moderation effects in within-subjects designs are tested by using difference scores in regression models. Moderation was estimated by regressing change in reflective processing on IPV (Judd et al., 2001).

There was no missing data in the sample. We conducted Spearman correlations between demographic variables and outcome variables and found no significant associations, so no demographic variables were controlled in the statistical tests. However, in analyses involving the mood induction, we removed participants (n=9) who

did not successfully complete the autobiographical recall mood inductions. This was determined by looking at the autobiographical recall entries and removing participants who entered responses such as "We never got into a fight yet" and "I have never been angry with my partner." During post-hoc analyses, correlations were also examined separately by sex using Spearman's Rank Correlation Coefficient.

RESULTS

Preliminary Analyses

Manipulation check. The mood induction was effective. Those in the anger group reported significantly more negative affect at post-mood than the neutral group, $U = 4751$, $p = .001$, and experienced significantly more mood-change from pre- to post-induction than the neutral group, $U = 4751$, $p = .001$.

Primary Analyses

IPV and baseline reflective processing. The correlation between pre-mood reflective processing and IPV was nonsignificant, $r_s = .056$, *ns*.

Impact of anger on reflective processing. Repeated measures ANOVA was conducted with CRT Reflection as the dependent variable, time as the within-subjects effect (pre- and post-induction), and condition as the between-subjects effect (anger vs. neutral). There were no significant effects of time, $F(1,221) = .141$, $p > .05$, or condition, $F(1,221) = .001$, $p > .05$, on CRT Reflection and the interaction was not significant, $F(1, 221) = .235$, $p > .05$.

IPV and change in reflection. IPV did not moderate change in reflective processing from pre- to post-induction for the anger condition group, $R^2 = .0016$, $F(1,103) = 0.161$, $p > .05$.

Post-hoc Analyses: Split by Sex

IPV and baseline reflective processing. For females (N=168), there was a significant association between pre-mood reflection and severe IPV. Those that responded less reflectively at baseline reported the perpetration of more severe IPV, r_s = -.157, $p < .05$. For males (N=64), there were significant associations between pre-mood reflection, psychological IPV, r_s = .286, $p < .05$, physical IPV, r_s = .289, $p < .05$, and minor IPV, r_s = .282, $p < .05$, but these associations were in the opposite direction. Those that responded more reflectively at baseline reported the perpetration of more psychological, physical, and minor IPV in the past 6-months.

IPV and mood change. For females in the anger condition (N=80), there were significant associations between mood change and minor IPV, r_s = .253, $p < .05$, psychological IPV, r_s = .242, $p < .05$, and physical IPV, r_s = .242, $p < .05$. A greater mood-change from pre to post induction was associated with reports of more minor, psychological, and physical IPV.

DISCUSSION

The current study sought to better understand how individual styles of thinking and decision-making, particularly tendencies to engage in reflective processing, relate to IPV perpetration. IPV has been shown to occur under conditions of reduced self-control and reflective processing is a style of thinking that depends on the use of control resources; we therefore hypothesized that reflective processing would be negatively associated with IPV perpetration. The results did not confirm this hypothesis; the association between baseline reflective processing and IPV was nonsignificant across the entire sample.

Although reflective processing is considered cool and emotionally neutral, IPV often occurs in hot, emotional contexts. Therefore, in understanding the relation between reflective processing and IPV, it was important to examine the impact of negative emotion, particularly anger, on reflective processing and the relation of this impact to IPV perpetration. Use of a mood induction allowed us to examine whether an individual's cognitive processing at baseline predicts IPV or whether their cognitive processing predicts IPV under conditions of strong emotion. We hypothesized that inducing angry mood would negatively impact participants' ability to cognitively reflect and that this manipulation would be stronger for those with extensive histories of IPV perpetration. The manipulation check suggested that the mood induction was successful in inducing negative mood for those in the anger condition. However, the effect of anger on reflective processing was nonsignificant and IPV perpetration did not moderate the change in reflective processing from pre- to post-induction. A closer look at responses to the mood state assessments revealed that participants most often endorsed increases in feelings of annoyance following the anger induction.

One possible reason for the null findings may be due to individual differences in reflective processing across multiple contexts. Although the CRT is valid in predicting reflective processing in the context of logical reasoning and heuristics and biases tasks, it is possible one's tendencies toward reflective processing differ across contexts. This may be due to varying levels of self-efficacy in different situations, also known as situation-specific self-efficacy. Individuals experience different levels of self-efficacy at different points in time, depending on task demands and personal characteristics (Ein-Gar & Steinhart, 2017). For example, perhaps one's tendency to engage in reflective processing

is more strongly activated in interpersonal contexts as compared to logical reasoning contexts based on a stronger sense of self efficacy in social situations. Those with self-doubts about their capabilities tend to abort their attempts prematurely, while those with stronger beliefs in their capabilities exert greater effort toward a goal (Bandura, 1989). One may feel ill-equipped to solve logical reasoning problems as compared to intimate partner conflicts and therefore exert less effort or cognitive resources in those contexts.

The null findings may also highlight the need to further examine the impact of emotional flooding on cognitive processing for IPV perpetrators. We hypothesized that angry mood would result in depleted effortful control resources and that this effect would be stronger for IPV perpetrators based on theories of emotional flooding. However, it may be that the mood-induction did not mirror the experience of flooding. Flooding is a dyadic experience in that it is a response to a partner's negative affect. Although, the autobiographical recall mood induction asked participants to relive past experiences of anger in intimate partner contexts, it may not have been close enough to mimic the intensity of the dyadic interaction. Further, in closely examining participants' reports of their post-induction mood states, it was clear that negative emotion was induced, but participants endorsed feelings of annoyance most often. This is a relatively low degree of anger and it's possible that these feelings were not intense enough to produce the hypothesized effect. This finding informs our conceptualization of emotional processes for IPV perpetrators; rather than simply experiencing emotions more strongly in intimate partner contexts, it may be the specific dyadic experience of a partner's angry emotion that results in emotional flooding and impaired information processing.

Another explanation for the lack of findings across the entire sample may be that males and females engage in different forms of IPV, which involve different styles of cognitive processing. For females (n=168), post-hoc analyses showed significant associations between baseline reflective processing and severe IPV, such that those less likely to cognitively reflect reported more severe IPV. For males (n=64), results showed significant associations between baseline reflective processing and psychological, physical, and minor IPV. However, these associations were in the opposite direction; more reflective processing at baseline was associated with more psychological, physical, and minor IPV. It may be that males and females engage in different forms of aggressive behavior, instrumental aggression and hostile aggression, respectively. Hostile aggression is largely reactive and driven by anger, while instrumental aggression is premeditated and proactive. The GAM distinguishes a more reflective, rational mode of information processing leading to instrumental aggressive behavior and a more automatic, impulsive mode of processing leading to hostile aggressive behavior (Anderson & Bushman, 2002). Accordingly, males may be more likely to engage in instrumental aggression which involves higher levels of reflective processing, while females may be more likely to engage in hostile aggression, which would associate with lower levels of reflective processing.

For females in the anger condition (n= 80), there were significant associations between mood change and minor, psychological, and physical IPV, such that more increases in negative mood post-induction was associated with more minor, psychological, and physical IPV. This finding lends support to the notion that females are more likely to engage in hostile aggression because it is reactive and fueled by increases

in negative emotion. These findings are consistent with previous research showing that females are more likely than males to experience acts of aggression as expressive or a loss of self-control than as instrumental, involving control over others (Driscoll et al., 2006). Future research could further examine this sex difference in IPV perpetration and its implications on patterns of cognitive processing.

Strengths and Limitations of Current Study

It is important to consider the current study's limitations. For one, the study relied on self-reports in measuring IPV. It may be that participants did not truthfully disclose the extent of their IPV perpetration due to social desirability concerns. Further, participants were asked to disclose their perpetrating behaviors rather than experiences of victimization. This may have increased the likelihood of limited self-disclosure and limited the representation of IPV as a dyadic construct (Straus, 2006).

Second, our hypothesis around the impact of anger on cognitive processing for IPV perpetrators rested, in part, on theories of emotional flooding, but our measure of participants' mood states was limited in its capacity to measure flooding. The current mood scale is a self-report which asked participants to rate the extent to which they felt various dimensions of anger. As a result, the scale is limited both in its reliance on self-report and its capacity to measure emotion complexity. Future studies may benefit from the inclusion of present-focused physiological correlates of flooding such as heart rate and skin conductance level (Lorber et al., 2016).

Third, although the sample was relatively ethnically diverse, it was an undergraduate student sample, which limits generalizability. As is expected with a non-clinical, undergraduate sample, we found low levels of IPV overall. 18 of 232 (8%)

participants endorsed a physical violence perpetration item. Perhaps further understanding would emerge from investigation of a more age-diverse, at-risk population with higher rates of perpetration.

Despite the limitations, the study also has a number of strengths. To our knowledge, the study is the first to examine the relation between reflective processing and IPV. While one previous study examined reflective processing between aggressive and non-aggressive individuals, its measure of reflective processing was flawed and embedded with tendencies toward hostile attributional biases (Tiedens, 2001). Another study of undergraduates used cognitive processing time as a measure of effortful versus spontaneous processing (Finkel et al., 2009). No studies that we know of have used the CRT in examining this relation, a widely used and highly validated measure of reflective processing. In bridging largely separated areas of research, of cognitive science and IPV, this study takes an important step in furthering our understanding of factors that predict IPV perpetration.

Table 1

Spearman Correlations between IPV and Baseline Reflective Processing: Full Sample (n= 232)

Variables	1	2	3	4	5	6
1. Baseline Reflection	—	.056	.054	-.098	-.027	.057
2. Extent of IPV	.056	—	.996**	.639**	.500**	.994**
3. Minor IPV	.054	.996**	—	.594**	.479**	.994**
4. Severe IPV	-.098	.639**	594**	—	.574**	.625**
5. Physical IPV	-.027	.500**	.479**	.574**	—	.434**
6. Psychological IPV	.057	.994**	.994**	.625**	.434**	—

*$p < .05$; ** $p < .01$

Table 2

Spearman Correlations between IPV and Baseline Reflective Processing: Females (n=168)

Variables	1	2	3	4	5	6
1. Baseline Reflection	—	-.016	-.017	-.157*	-.069	-.017
2. Extent of IPV	-.016	—	.995**	.648**	.511**	.993**
3. Minor IPV	-.017	.995**	—	.595**	.487**	.992**
4. Severe IPV	-.157*	.648**	.595**	—	.592**	.630**
5. Physical IPV	-.069	.511**	.487**	.592**	—	.436**
6. Psychological IPV	-.017	.993**	.992**	.630**	.436**	—

*$p < .05$; ** $p < .01$

Table 3

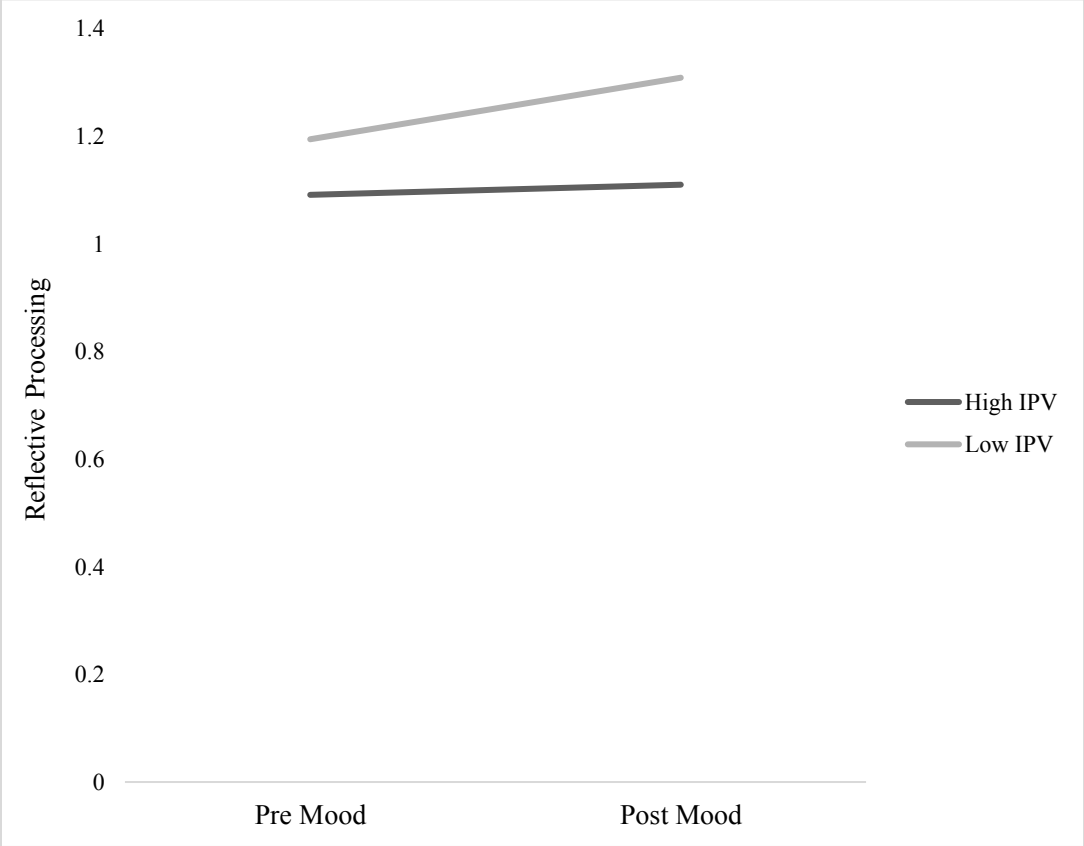
Spearman Correlations between IPV and Baseline Reflective Processing: Males (n=64)

Variables	1	2	3	4	5	6
1. Baseline Reflection	—	.289*	.282*	.096	.145	.286*
2. Extent of IPV	.289*	—	.998**	.606**	.439**	1.00**
3. Minor IPV	.282*	.998**	—	.579**	.434**	.998**
4. Severe IPV	.096	.606**	.579**	—	.498**	.606**
5. Physical IPV	.145	.439**	.434**	.498**	—	.424**
6. Psychological IPV	.286*	1.00**	.998**	.606**	.424**	—

*$p < .05$; ** $p < .01$

Figure 1

IPV and change in reflection. IPV did not moderate change in reflective processing from pre- to post-induction.



Appendix A

Revised Conflict Tactics Scale (CTS-2)

Instructions: No matter how well a couple gets along, there are times when they disagree, get annoyed with the other person, want different things from each other, or just have spats or fights because they are in a bad mood, are tired, or for some other reason. Couples also have many different ways of trying to settle their differences. This is a list of things that might happen when you have differences. Please indicate how many times you did each of these things in the past year. If you did not do one of these things in the past year, but it happened before that, circle "7."

How often did this happen?

1 = Once in the past year	5 = 11-20 times in the past year
2 = Twice in the past year	6 = More than 20 times in the past year
3 = 3-5 times in the past year	7 = Not in the past year, but it did happen before
4 = 6-10 times in the past year	0 = This has never happened

1. I insulted or swore at my partner.	1	2	3	4	5	6	7	0
2. I threw something at my partner that could hurt.	1	2	3	4	5	6	7	0
3. I twisted my partner's arm or hair.	1	2	3	4	5	6	7	0
4. I pushed or shoved my partner.	1	2	3	4	5	6	7	0
5. I used a knife or gun on my partner.	1	2	3	4	5	6	7	0
6. I called my partner fat or ugly.	1	2	3	4	5	6	7	0
7. I punched or hit my partner with something that could hurt.	1	2	3	4	5	6	7	0
8. I destroyed something belonging to my partner.	1	2	3	4	5	6	7	0
9. I choked my partner.	1	2	3	4	5	6	7	0
10. I shouted or yelled at my partner.	1	2	3	4	5	6	7	0
11. I slammed my partner against a wall.	1	2	3	4	5	6	7	0
12. I beat up my partner.	1	2	3	4	5	6	7	0
13. I grabbed my partner.	1	2	3	4	5	6	7	0
14. I stomped out of the room or house or yard during a disagreement.	1	2	3	4	5	6	7	0
15. I slapped my partner.	1	2	3	4	5	6	7	0
16. I burned or scalded my partner on purpose.	1	2	3	4	5	6	7	0
17. I accused my partner of being a lousy lover.	1	2	3	4	5	6	7	0
18. I did something to spite my partner.	1	2	3	4	5	6	7	0
19. I threatened to hit or throw something at my partner.	1	2	3	4	5	6	7	0
20. I kicked my partner.	1	2	3	4	5	6	7	0

Appendix B

Cognitive Reflection Test (CRT) Questions

Instructions: Below are several problems that vary in difficulty. Try to answer as many as you can.

CRT (Frederick, 2005)

1. If it takes 5 minutes for five machines to make five widgets, how long would it take for 100 machines to make 100 widgets?
   Intuitive answer= 100 minutes
   Correct answer= 5 minutes

CRT-Long (Primi et al., 2016)

2. Jerry received both the 15th highest and the 15th lowest mark in the class. How many students are there in the class?
   Intuitive answer= 30 students
   Correct answer= 29 students

3. If three elves can wrap three toys in hour, how many elves are needed to wrap six toys in 2 hours?
   Intuitive answer= 6 elves
   Correct answer= 3 elves

CRT-2 (Thomson & Oppenheimer, 2016)

4. How many cubic feet of dirt are there in a hole that is 3' deep x 3' wide x 3' long?
   Intuitive answer= 27
   Correct answer= None/ 0

5. If you're running a race and you pass the person in second place, what place are you in?
   Intuitive answer= first
   Correct answer= second

6. Emily's father has three daughters. The first two are named April and May. What is the third daughter's name?
   Intuitive answer= June
   Correct answer= Emily

Appendix C

Current Mood State

Instructions: Circle the answer that *best* describes how you *currently* feel.

How I Currently Feel…

	Not at All	Somewhat	Moderately So	Very Much So
1. I am furious	1	2	3	4
2. I feel irritated	1	2	3	4
3. I feel angry	1	2	3	4
4. I am mad	1	2	3	4
5. I feel annoyed	1	2	3	4

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