Examining the Role of Facial Affect Recognition In The Relation Between Physiological Reactivity And Aggression During Marital Conflict

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Abstract

Understanding the affective mechanisms that underlie aggression and violence within interpersonal relationships is vital to the development of treatments that will reduce recidivism. Researchers examining physiological factors of emotion have identified differential patterns of physiological reactivity among different types of intimate partner violence (IPV) perpetrators during interpersonal conflict. Although it is unclear what mechanisms are influencing these distinct physiological patterns, research suggests that perpetrators' ability to decode emotions may be involved. The current study examined the effects of physiological reactivity on observed aggression of male IPV perpetrators during marital conflict across levels of facial affect recognition (FAR) accuracy. In particular, we examined the sympathetic nervous system, via Skin Conductance Level (SCL) Reactivity, and the parasympathetic nervous system, via Respiratory Sinus Arrhythmia (RSA) reactivity. Secondary data analyses were conducted on a previous study examining heterosexual couples with past male to female IPV perpetration. Couples completed self-report measures and participated in a conflict discussion regarding a topic of conflict with their partner while physiological and behavioral measures were recorded. Additionally, males were administered a facial affect recognition task. Results suggest that RSA and SCL reactivity had a significant effect on male observed aggression at high FAR accuracy. Specifically, co-deactivation of both parasympathetic and sympathetic nervous system activity was associated with increased observed aggressive behavior. Our result suggests a dual physiological model of affect reactive aggression: parasympathetic withdrawal indicative of emotional dysregulation, and sympathetic attenuation associated with behavioral disinhibition.

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Introduction

Intimate partner violence (IPV) refers to the threatened, attempted or completed physical or sexual assault, and emotional abuse within a romantic relationship (Saltzman, Fanslow, McMahon, & Shelley, 1999). Victims of IPV often suffer from both long- and short-term physical and mental health conditions, including depression, substance use, and chronic disease (Coker et al., 2002). Studies have reported physical assault IPV perpetration prevalence rates as high as 30% (Stets, Straus, & Straus, 2017). Additionally, high IPV perpetration prevalence rates have been identified across the United States demonstrating it to be a significant public health issue (Breiding, Black, & Ryan, 2008). Despite extensive research examining factors that influence the perpetration of IPV, current standard treatments for perpetrators have little efficacy in reducing recidivism (Babcock, Green, & Robie, 2004).

Historically, IPV treatments have focused primarily on targeting sexist attitudes and cognitions towards woman that result in men using aggression to control and dominate their female partners (Pence & Paymar, 1993). While cognitions related to dominance may influence IPV perpetration, researchers have since identified affective factors related to psychopathology, physiological reactivity and social cognition to play a significant role in IPV perpetration (Armenti & Babcock, 2018; Babcock, Green, Webb, & Yerington, 2005; Giancola, Saucier, & Gussler-Burkhardt, 2003; Jackson, Sippel, Mota, Whalen, & Schumacher, 2015; Johnson, Giordano, Manning, & Longmore, 2015; Ross & Babcock, 2009). Social cognition refers to the underlying mental processes that influence behavior during social interaction (Ralph Adolphs et al., 2002). Neurobiological models of social cognition often examine amygdala activity as it plays a significant role in the detection of threat and facial affect recognition (FAR) (Adolphs, Tranel, Damasio, & Damasio, 1994). Facial affect recognition refers to an individual's ability to identify and distinguish emotional states and has a significant influence on social behavior (Binder, Lancaster, Lengenfelder, Chiaravalloti, & Genova, 2019; Rigon, Turkstra, Mutlu, & Duff, 2018).

Facial Affect Recognition and Aggression

Within studies of general aggression, deficits in FAR have been be related to increased levels of aggression and violence (Hall, 2006; Hoaken, Allaby, & Earle, 2007). Within IPV literature, FAR abilities among perpetrators differ across groups. For example, Babcock and colleagues (Babcock, Green, & Webb, 2008) found that IPV perpetrators who fit generally violent antisocial profiles had poor FAR ability while those with borderline and dysphoric profiles had increased FAR ability. Two theoretical rationales have been proposed to explain this discrepancy in FAR across violence perpetrator profiles. One mechanism suggests violence manifests due to deficits in social emotion processing resulting in decreased behavioral inhibition. When individuals are unable to perceive affect that signals distress and discomfort, such as fear or sadness, neural behavioral inhibitory mechanisms are not activated that would prevent the escalation of aggression (Blair, 1995; Blair et al., 2004). A second theoretical rationale suggests that individuals with sensitivity to facial affect respond to conflict with increased behavioral reactivity resulting in aggression (Wilkowski & Robinson, 2012).

Physiological research has supported these theoretical rationales. Babcock and Michonski (2019) examined physiological reactivity of IPV perpetrators viewing slides of facial affect and found that perpetrators high in borderline personality traits exhibited hyper-reactivity, while those high in psychopathy features experienced physiological hypo-reactivity. Additionally, pharmacological suppression of the central nervous system has been shown to decrease FAR accuracy, supporting the theory that FAR is related to states of physiological arousal (Zangara, Blair, & Curran, 2002). Although differential abilities in FAR have been identified with possible physiological underpinnings, less is understood regarding how FAR abilities interact with physiological reactivity within the context of marital conflict.

IPV Perpetrator Physiological Reactivity During Marital Conflict

Observational research on couples has demonstrated that examining physiological reactivity during interpersonal conflict can have predictive qualities for important relationship outcomes (Levenson & Gottman, 1983). Using the same observational procedure, Gottman and colleagues found that different types of IPV perpetrators exhibited distinct cardiovascular response patterns during conflict with their partner (Gottman, Jacobson, Rushe, & Shortt, 1995). Gottman et al. (1995) dichotomized IPV perpetrators based on whether their heart rate increased or decreased during conflict with their partner. Men whose heart rate decreased during the conflict where classified as Type I IPV perpetrators; those whose heart rate increased during the conflict were classified as Type II IPV perpetrators. Type I perpetrators scored higher on measures of antisocial personality, had higher rates of severe violence, increased sadistic aggression, and were more violent toward individuals outside of their relationship. Type II perpetrators showed higher scores on dependency, jealousy and were more verbally aggressive toward their wives. In a popular book, Jacobsen and Gottman (1998) speculated that Type I perpetrators were like Cobras, calming their heart rates to better strike at their partners whereas Type II perpetrators were like pitbulls, whose violence arose from lack of self-control, neediness and inability to let go (Jacobson & Gottman, 1998). However, attempts to replicate the typology by dichotomizing IPV perpetrators based on whether their heart rate increased or decreased during interpersonal conflict have been unsuccessful (Babcock, Green, Webb, & Graham, 2004; Meehan, Holtzworth-Munroe, & Herron, 2001). Critics of the original study point to sampling error and methodology, as the men in the Type I condition had unusually high resting heart rates and the baseline physiological measurement was only two minutes (Babcock, Green, Webb, & Graham, 2004; Margolin, Gordis, Oliver, & Raine, 1995).

While dichotomizing perpetrators based on heart rate change did not prove reliable, examining physiological markers on a continuum during interpersonal conflict has shown promise. For example, Babcock and colleagues (Babcock et al., 2005) differentiated IPV perpetrators by severity when examining both cardiovascular activity and sympathetic nervous activity during a marital conflict activity. They found that antisocial behaviors and psychopathy were positively correlated with physiological reactivity for low level violent perpetrators, but negatively correlated for severely violent perpetrators. Furthermore, Armenti and Babcock (2017) found that the relation between skin conductance reactivity and psychopathy factor 1 traits, characterized by callousness and unemotional disregard for others, was moderated by affective empathy, suggesting that physiological reactivity is related to affective processing involving empathizing for their partner's emotions. Skin conductance is a measure of the sympathetic nervous system (SNS), the branch of the autonomic nervous system responsible for changing metabolic states to initiate or inhibit behavior (Beauchaine, 2001; Gray & McNaughton, 2003). Although research has demonstrated that cardiovascular and SNS reactivity within IPV perpetrators during marital conflict is moderated by the severity of IPV they perpetrate and affective variables related to empathy, a current gap in the literature is the understanding of how the parasympathetic nervous system functions during interpersonal conflict and aggression. While often

Parasympathetic Nervous System - Respiratory Sinus Arrhythmia

Respiratory sinus arrhythmia (RSA) has been established as a measure of the parasympathetic nervous system (PNS), the branch of the autonomic nervous system responsible for reducing physiological arousal. RSA is measure of heart rate variability that coincides with respiratory drive. Increased variability in heart rate between inhalation and exhalation indicates increased RSA and PNS activity (Grossman, 1983). RSA has been associated with general emotion regulation abilities, such that low resting RSA is indicative of emotional dysregulation (Porges, Doussard-Roosevelt, & Maita, 1994). Studies have found that similar to low resting RSA, RSA withdrawal (decreases in RSA from baseline to task) has been associated with emotional dysregulation (Beauchaine et al., 2013). Additionally, RSA withdrawal is associated with externalizing problems in tasks that elicit a negative emotion (Beauchaine et al., 2019). While there is a small amount of evidence suggesting there are deficits in parasympathetic functioning within perpetrators of IPV (Thomson & Beauchaine, 2018; Umhau et al., 2002), it is unclear how PNS activity influences aggression during interpersonal conflict.

The aim of this current study was to examine reactivity of both the parasympathetic and sympathetic branches of the autonomic nervous system in IPV perpetrators during interpersonal conflict. While past studies have identified how physiological reactivity during marital conflict relates to pathology, it is unclear how physiological reactivity influences behavioral aggression during the conflict. Thus, the current study examined how physiological reactivity is related to aggression during the conflict. In line with previous research, we expect differential patterns of physiological reactivity based on social-emotional abilities. Specifically, FAR accuracy will moderate the effects of physiological activity on aggressive behavior observed during marital conflict. We hypothesized that increases in observed aggression would be associated with increased arousal states indicated by positive SCL reactivity and negative RSA reactivity for those with high facial affect recognition accuracy. In contrast, we hypothesized that for those with low facial affect recognition accuracy, increased observed aggression would be associated with decreases in arousal states indicated by negative SCL reactivity and positive RSA reactivity.

Materials and Method

Participants

Data for this analysis was derived from a larger study examining the effects of couples therapy based interventions on male perpetrators of IPV in a proximal change experiment (Babcock, Graham, Canady, & Ross, 2011; Babcock & Michonski, 2019). Participants were recruited from ads and flyers posted with the Houston area explaining some of the basic study inclusion criteria including, couples to be in a relationship for more than 6 months, must be 18 years of age and must be proficient in English. Research assistants contacted interested female applicants and administered the violence subscale of the Conflicts Tactics Scale-2 (CTS2; Straus, Hamby, Boney-McCoy, & Sugarman, 1996) to measure IPV history. Those who had reported at least two incidents of male perpetrated IPV were invited to the research lab. Those who reported relationship distress but no violence in the past five years and no serious violence ever in their relationship were also invite to participate as a non-violent comparison group.

Procedure

The study involved two separate visits. The first visits asked only male participants to visit the lab and take part in an anger induction task while being physiologically monitored. During the second visit men were administered the FAR task to determine their ability to decode facial affect. Additionally, both male and female participants filled out questionnaires and took part in the proximal change paradigm in which physiological, self-report and observational data was collected. Participants were first lead through a play-by-play interview (Hooven, Rushe, & Gottman, 1996), during which couples confirmed with a research assistant a conflict within their relationship to discuss. Two topics were chosen from responses on the Knox problem inventory that they indicated were areas of conflict within their relationship (Knox, 1971). Following the play- by-play interview, a physiological baseline measurement was collected for four minutes during which they were again instructed to sit still and to not interact. Dyads then took part in the conflict discussion in which they discussed the two problems that they had both agreed upon for 7.5 minutes. During the conflict discussion, dyads were filmed for later SPAFF coding. Physiological measurements were recorded throughout the entire procedure.

Measures

Specific affect (SPAFF). Behavioral coding was conducted by trained undergraduate research assistants using the Specific Affect coding system (SPAFF: Gottman, McCoy, Coan, & Collier, 1995). SPAFF coding system has shown strong reliability and predictive qualities for couples during marital interaction tasks for both violent and non-violent couples (Sommer, Lyican & Babcock, 2016). Research assistants were trained on the SPAFF coding systems to recognize 16 global codes from facial affect, body position and contents of speech. Research assistants reviewed the marital conflicts and identified each instant of aggression during the conflict. Aggressive behavior was defined by affects that are characterized by oppositional or inciting behaviors and included domineering, contempt, disgust, defensiveness and belligerent behavior captured by SPAFF for both male and female participants. The final observed aggression variables for male and female participants was a summation for each instance of the designated aggression behavioral affects. The *Kappa* value for observed aggression in this study was .91 demonstrating acceptable interrater reliability.

*Facial affect recognition***.** Male participants were administered a facial affect recognition task developed by Ekman & Friesen (1976). Participants were presented with 60 different slides containing images of the six basic emotions (happiness, sadness, fear, disgust, surprise and anger) plus neutral. These facial affects are used as research has demonstrated them to be found across ethnic groups and cultural backgrounds (Ekman & Friesen, 1971). Slides are presented to the participants for 10 seconds with a 1 a second pause between slides. Male participants used a dial to designate which emotion the facial affect was displayed. Facial affect recognition accuracy is reported in hit rate (hit rate = correct responses divided by the number of times the affect was presented, multiplied by correct responses divided by the number of times the affect was given as an answer). This value represents the percentage of correct responses of an affect while correcting for the probability of choosing the correct answer (Wagner, 1993).

Psychophysiological measures of autonomic nervous system activity. Physiological measures were collected using the James-Long five-channel bio-amp (James Long Company, 1999). For RSA collection, electrodes were placed on the sternum and bilaterally on the opposites sides of the chest to collect electrocardiography. A respiration belt was fit around participant's chest over the xyphoid process to record inhalation and exhalation rates by identifying the peak of midpoints of exhalation and inhalation. RSA values were calculated using the James long software Inter-Beat Interval analysis software. First, Interbeat-intervals (IBI) are calculated from the average time between each heart beat for every 10 MS from the R peaks of the electrocardiograph. RSA was calculated by subtracting the highest value during expiration from the lowest IBI value for each respiration cycle. This method creates a value of the difference between IBI at the peak of inhalation and exhalation, a highly utilized and acceptable method for RSA calculation (Grossman, 1983; Grossman, Karemaker, & Wieling, 1991). R peaks were examined and edited to decrease artifact from movement or poor electrode connectivity. Data that has a significant amount of artifact to the extent that R peaks are not discernable was considered missing data and removed from analysis. RSA Reactivity was calculated by subtracting the post play-by-play interview baseline RSA minute averages from the RSA minute averages across the conflict interaction. This provides the change in RSA from the post play-by-play interview baseline to the conflict interaction, or the change in physiological reason related to conflict. Additionally, two electrodes Ag/AgCl (1 cm diameter) were placed on the first and third finger of the participant's non-dominant hand to monitor skin conductance via electrodermal activity. SCL values were recorded in microsiemens and were collected from the palm electrodes monitoring electrodermal activity. Data in which there was a high degree of artifact and poor electrode connectivity (extreme changes of 15+ microsiemens within a minute or consistent levels of 0 or 25 microsiemens throughout the entire task) was considered missing data. SCR reactivity was calculated by subtracting the average SCL during the conflict discussion from SCL during the post play-by-play interview baseline.

Balanced inventory of desired responding- impression management. The BIDR is a 40 question measure in which respondents rate questions regarding self-deception and impression management on a 7 point Likert scale ranging from "strongly agree" to "strongly disagree" (Hart, Ritchie, Hepper, & Gebauer, 2015). The impression management or "lie" scale, is a subscale of the BIDR designated to measure the degree in which individuals attempt to improve their perceived social behavior with questions such as "I have never dropped litter on the street". The *Cronbach Alpha* for this value was .70 suggesting the measure had acceptable reliability (Tavakol & Dennick, 2011).

Analytic Strategy

Controlling variables. To improve the precision for identifying an effect on male aggression from the interaction of physiological reactivity and FAR hit rate, covariates were added to the model. The impression management subscale derived from the Balanced Inventory of Desired Response (BIDR) scale was used as a covariate to control for efforts to suppress aggressive behavior within the lab. Additionally, female partners' observed aggression was entered in as a covariate to control for differential levels of female aggression that could influence both physiological reactivity and male aggression in response.

Moderation analysis. Variables were initially examined for normality by calculating skewness or kurtosis. All study variables demonstrated skewness and kurtosis within acceptable ranges; skewness > |2|, kurtosis > |7| (Curran, West, & Finch, 1996). For the moderation analysis, predicting variables (RSA Reactivity, SCR reactivity and FAR hit rate) were first mean centered prior to being input into the model (Hofmann & Gavin, 1998). the main effects and interaction effects of RSA/SCL reactivity and facial affect recognition on male observed aggression were analyzed within SPSS version 25 utilizing the PROCESS Macro version 3.3 (Hayes & Preacher, 2013). A two step hierarchical regression was run to examine the effects of the covariates and main effects of the predictors in the first step, and the interaction of RSA/SCL reactivity and FAR hit rate in the second. A post-hoc analysis was conducted to probe significant interactions that included examining the dependent variable at +/- 1 standard deviations levels of the moderator (Holmbeck, 2002). Second, an analysis of significant regions utilizing a Johnson-Neyman analysis determined the level of the moderator at which the slope of the dependent variable and independent became significantly greater than zero (Bauer & Curran, 2005; Preacher, Curran, & Bauer, 2006).

Results

Descriptive and Bivariate Correlations

From the original sample of 79 dyads (Babcock & Michonski, 2019), 17 Dyads were removed due to missing data in male participant RSA and/or SCL values resulting in a final sample of 62 dyads. To determine whether the physiological artifact that resulted in the removal of data was due to random error and not related to the study variables, a Multivariate Analysis of Variance (MANOVA) was conducted to test for differences between the removed dyads and the remaining sample (Aiken & West, 1991). The results from the MANOVA omnibus test demonstrated that there were no differences in FAR hit rate, female aggression or male aggression between the removed dyads and the remaining sample (F (3,75) = 0.48, p = .69). Descriptive statistics from the remaining sample for all variables of analysis are presented in Table 1. Within the sample, 79% of the men have a past history of male to female physical IPV and 21% had no male to female physical IPV history. Additionally, 40% of the sample identified as African American, 25% Hispanic, 28% Caucasian, and 7% reported as other. The education level of men within our sample included 10.8% with some high school education, 20% completed their GED, 26.2% completed high school, 7.7% completed some college, 23.1% completed their associate or technical college degree, 12.3% completed college graduate education. Male income averaged 25,790 dollars per year (SD =37,771) and the average household income for couples was 35,075 dollars a year (SD = 49,971). The average age of men in the sample was approximately 30 years old (SD = 9.1). Correlations of study variables displayed in Table 1 demonstrate that prior to examining the interaction effects, male observed aggression during the conflict was not significantly related to RSA reactivity (r = -.05, p = .31), SCL reactivity (r = -.04, p = .38), or FAR accuracy (r = -.12, p = .07).

Interaction Effects of RSA Reactivity and Facial Affect Recognition

The first step of the regression analysis examining the effects of the covariates and main effects on male observed aggression accounted for a significant amount of variance (R^2 = .77, F (4, 57) = 48.83, p < .000) as female observed aggression was a significant predictor of male aggression (B = .77, SE = .56, p < .000), but not RSA reactivity (*B* = -4.31, *SE* = 15.41, *p* = .78), FAR accuracy (*B* = -6.35, *SE* = 6.61 *p* = .34) or BIDR-IM (*B* = -.15, *SE* = .25, *p* =.56). The second step of the hierarchical analysis examining the interaction between RSA Reactivity and FAR accuracy accounted for additional 3% of the variance as the interaction had a significant effect on male observed aggression (*B* = -411.51, *SE* = 142.19, *p* = .006), Simple slope analysis indicated that at high levels (+1 SD) of FAR, RSA reactivity has a significant negative effect on aggression (*B* = -84.20, *SE* =.31.55, *p* = .009), but at low levels (-1 SD) of FAR accurate there was not a significant relationship between RSA reactivity and male observed aggression (*B* = .31.52, *SE* = .19, *p* = .11). Additionally, a Johnson-Neyman analysis of significant regions demonstrated that the slope between RSA reactivity and male observed aggression was only significantly greater than zero for individuals with FAR scores greater than or equal to approximately .03 standard deviations above the mean which represents 44% of the sample. Thus, for individuals with FAR hit rate below .03 SD amongst the sample, which represented 56% of the males in our study, there was no effect of RSA reactivity on male observed aggression.

Interaction Effects of SCL Reactivity and Facial Affect Recognition

Examining the effects of the covariates and main effects on male observed aggression in the second model, overall they accounted for a significant amount of variance (R^2 = .77, *F* (4, 57) = 47.6, *p* < .000) as female observed aggression was a significant predictor of male aggression (*B* = .79, *SE* = .57, *p* < .000). However, SCL reactivity (*B* = -1.11, *SE* = .81, *p* = .18), FAR accuracy (*B* = -11.02, *SE* = 6.57 *p* = .09) and BIDR-IM were not (*B* = -.15, *SE* = .25, *p* =.55) were unrelated to observed aggression. The second step examining the interaction between SCL Reactivity and FAR accuracy accounted for additional 2% of the variance as the interaction had a significant effect on male observed aggression (*B* = -14.95, *SE* = 6.91, *p* = .03), Simple slope analysis indicated that at high levels (+1 SD) of FAR, SCL reactivity has a significant negative effect on aggression (*B* = -3.44, *SE* =1.35, *p* = .01), but at low levels (-1 SD) of FAR accurate. There was not a significant relationship between RSA reactivity and male observed aggression (*B* = .77, *SE* = 1.16, *p* = .51). Additionally, a Johnson-Neyman analysis of significant regions demonstrated that the slope between FAR accuracy and male observed aggression was only significantly greater than zero for individuals with FAR scores greater than or equal to approximately .02 standard deviations above the mean which represents 42% of the sample. Thus, individuals with FAR hit rate below .02 SD amongst the sample, which represented 58% of the males in our study, there was no effect of RSA reactivity on male observed aggression.

Discussion

The current study sought to examine the relation between both parasympathetic and sympathetic activity with aggression as moderated by FAR accuracy. For individuals with poor FAR abilities, there was a trending positive effect of RSA reactivity on male observed aggression, but it did not reach significance. This could be due to a physiological hyposensitivity to emotions due to impaired decoding of facial affect. Physiological response for these individuals may be influenced by other social cognition processes unrelated to affect recognition.

As hypothesized, individuals with good emotion recognition experienced decreases in RSA reactivity in relation to increased aggression. These findings support our hypothesis and coincide with current the literature that suggests withdrawal of the parasympathetic nervous system in response to negative stimuli is associated with increased externalizing behaviors (Beauchaine et al., 2019). Decreased RSA reactivity indicates parasympathetic withdrawal; those who were perceptive of affect in their environment become aggressive due to emotional dysregulation. Individuals who maintained, or even increased in parasympathetic activity during the conflict, demonstrated significantly less aggression than those whose parasympathetic activity decreased. Increased aggression associated RSA withdrawal may indicative of emotional dysregulation in response to the interpersonal conflict. However, due to the aggression and physiological measures occur simultaneously, inferences of causality cannot be inferred.

For the SCL reactivity, we found that for individuals with poor facial affect recognition ability, there was no significant relation between physiological reactivity, suggesting the relation between SCL reactivity and male observed aggression is not dependent on facial affect recognition. Like with RSA, for individuals with good FAR, SCL reactivity was negatively related to men's aggression. These findings were unexpected as we hypothesized that SCL reactivity would have a positive effect on aggression such that increased sympathetic activity would be associated with increased aggressive behavior. Our findings suggest that increased sympathetic reactivity was associated with a possible behavioral inhibiting effect as it was associated with decreases in aggression. Research has demonstrated that depending on the neural pathways being activated, sympathetic reactivity can initiate activation of either Behavioral Approach Systems (BAS) or a Behavioral Inhibition Systems (BIS) (Beauchaine, 2001; Brenner, Beauchaine, & Sylvers, 2005). According to Gray's Motivational Theory (Gray &

McNaughton, 2003), these systems are both influenced by sympathetic activity, but have remarkable differences in their behavioral responses. Individuals with decreased BIS are prone to more impulsivity and aggression as a result of their disinhibition (Beauchaine, 2001). Additionally, electro-dermal activity in particular has been identified to have a stronger association with the BIS than the BAS (Fowles, 1988). Thus, we suggest our findings are indicative of a possible interpersonal aggression inhibition mechanism. In order for individuals to suppress their behavioral aggression, they first need the ability to perceive the negative affect of those within their environment. When the perception of negative affect is met with a sympathetic response that activates behavioral inhibition, behavior is inhibited and individuals are less likely to react in an aggressive manner during a conflict with a person who they care about. This physiological component would add to the current theories of the Violence Inhibition Mechanisms (Blair, 1995).

It is important to note that the physiological measures and the behavioral measures occurred simultaneously during this experiment. Thus, no casual inferences can be made about the relation between physiological reactivity and behavioral inhibition. It may be that suppression of behavioral aggression initiated the physiological response. Research on emotional suppression has found that when individuals are instructed to not respond to certain negative stimuli they experience an increased physiological reactivity (Quartana & Burns, 2010). Thus, increases in SCL reactivity from individuals with increased affect recognition may have been a result of deliberate effort from the male participant to suppress aggressive affect.

Overall, our results indicated that FAR ability moderates the effects of both sympathetic and parasympathetic activity on male observed aggression, such that the only those skilled at labeling emotions were impacted by their physiological responses. Furthermore, for individuals with good emotional recognition, activation of both the parasympathetic nervous system and the sympathetic nervous system was associated with decreased observed male aggression.

Limitations

It important to note the limitations of the current study. For our measure of affect recognition, the current study only measured an individual's ability to recognize facial affect. While facial affect is a major component of affect expression, individuals can also perceive affect from changes in vocal pitch, body posture, and content of speech. Additionally, the current study utilized the original Ekman and Freisen (1976) slides that did not vary in intensity of emotional affect. Researchers who implement FAR study tasks that have varied levels of affect intensity have identified differences in affect recognition whether the task measured FAR via slides or the multi-morph paradigm (Kosson et al, 2019). The slides were also all of Caucasian men and women and subtle difficulties in decoding affect across ethnicity have been identified (Babcock & Banks, 2019). Thus, given the significant differences across studies, it is unclear how these results could be generalized across different methods and domains of affect recognition.

As mentioned previously, direction of causality cannot be determined. Physiological reactivity and behavioral aggression occurred simultaneously. Thus, inferences about causality of these factors cannot be made without further examination with true experimental design. Additionally, although the sample did consist of individuals from diverse race, age, and socio-economic backgrounds, the sample was relatively small. Further studies on the interaction effects of affect recognition and physiological reactivity on aggression should include increased sample sizes and apply experimental designs that would increase the ability to make casual inferences.

Clinical Implications and Future Directions

To date, current treatment standards suggest that IPV results from men's attitudes and beliefs about dominance and control over women (Pence & Paymar, 1993). Our results suggest that mechanisms of physiological reactivity and affect recognition also play a significant role in what influences an individual to be aggressive with their partner. Research has shown that affect recognition can be improved among clinical populations clinical interventions (Bozikas et al., 2019; Tsotsi, Kosmidis, & Bozikas, 2017). Although it is unclear whether increasing emotional decoding will improve recidivism independently, treatment effects could benefit from being paired with emotional regulation or behavioral inhibition training. To date, studies that target emotional dysregulation, such as Acceptance and Commitment Therapy based interventions, have shown promising effects on reducing recidivism among IPV perpetrators (Zarling, Bannon, & Berta, 2017; Zarling, Lawrence, & Marchman, 2015; Zarling & Berta, 2017). Adding curricula to battering interventions that target affect recognition and physiological reactivity may be effective in reducing recidivism rates among intimate partner perpetrators.

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Table 1. Descriptive statistics and correlations of linear variables

	1	2	3	4	5	6
1. RSA Reactivity [b]	1	.01	.06	.20	-.50	.07
2. SCL Reactivity [b]		1	.04	-.04	-.11	-.19
3. FAR Accuracy [d]			1	.06	-.12	-.09
4. BIDR-IM [a]				1	-.12	-.06
5.Female Observed Aggression [a]					1	.87***
6. Male Observed Aggression [c]						1
Mean	0.006	1.12	.55	7.05	25.40	23.00
Standard Deviation	0.056	1.13	.14	3.61	16.09	14.49

Note. N=62; * p <.05, ** p<.01 *** p< .001. [a] Covariate. [b] Predictor. [c] Outcome. [d] Moderator. N = 62. RSA Reactivity, changes in seconds from RSA baseline to RSA Conflict; SCL Reactivity, changes in microsiemens from SCL baseline to SCL conflict; Facial affect recognition hit rate, (Ekman & Friesen, 1976); BIDR-IM (Hart, Ritchie, Hepper, & Gebauer, 2015) , Male and female observed aggression, SPAFF (M. Gottman, McCoy, Coan, & Collier, 1995)

Table 2. Main and interaction effects of RSA/SCL reactivity and FAR Accuracy on observed male aggression

Male Observed Aggression	***B***	**SE**	***t***	***p***	**R^2 Change**
RSA Reactivity	-4.31	15.41	-0.28	0.78	
FAR Accuracy	-6.35	6.62	-0.96	0.34	
BIDR-IM	-0.15	0.25	-0.59	0.56	
Observed partner aggression	0.77	0.56	14.91	>0.000	0.77
RSA reactivity X FAR Accuracy	-411.51	142.19	-2.89	0.006	0.03
Male Observed Aggression	***B***	**SE**	***t***	***p***	**R^2 Change**
SCL Reactivity	-1.11	0.81	-1.36	0.18	
FAR Accuracy	-11.02	6.57	-1.68	0.09	
BIDR-IM	-0.15	0.25	-0.59	0.55	
Observed partner aggression	0.79	0.57	13.36	>0.000	0.77
SCL reactivity X FAR Accuracy	-14.195	6.691	-2.63	0.03	0.02