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Conflict Intensity, Family History, and Physiological Stress Reactions to Conflict Within Romantic Relationships

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This study drew upon the physiological model of stress and desensitization processes to deduce hypotheses linking the intensity of conflict communication and exposure to familial verbal aggression in childhood to experiences of conflict within romantic relationships. One hundred college-aged students (50 dating couples) participated in a dyadic interaction in which partners discussed a source of conflict in their romantic relationship. Participants reported childhood exposure to familial verbal aggression, third-party observers rated the intensity of conflict communication, and salivary cortisol indexed physiological stress responses to the conflict interactions. As predicted, results showed a positive association between conflict intensity and cortisol reactivity, and this association was attenuated for individuals who reported higher, rather than lower, levels of childhood exposure to familial verbal aggression.

Keywords: Interpersonal Conflict, Family History, Verbal Aggression, Stress Response, Cortisol Reactivity.

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A large body of research has examined experiences of conflict within an array of interpersonal associations, including roommate relationships and friendships (Bippus & Rollins, 2003; Marek, Wanzer, & Knapp, 2004), romantic and marital relationships (Caughlin, 2002; Koerner & Fitzpatrick, 2002), family relationships (Sillars, Koerner, & Fitzpatrick, 2005), and workplace and student–teacher relationships (Frymier & Houser, 2000; Tracy, Lutgen-Sandvik, & Alberts, 2006). These studies make clear that conflict can produce a myriad of negative outcomes. For example, exposure to and participation in conflict interactions has been linked to depression, distress, and anxiety (Koerner & Fitzpatrick, 1997; Sillars, Coletti, Parry, & Rogers, 1982); feelings of hurt and anger (Fitzpatrick & Winke, 1979; Sereno, Welch, & Braaten, 1987);

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relationship dissatisfaction (Guerrero, 1994); and subsequent violence (Infante, Sabourin, Rudd, & Shannon, 1990).

At the same time, conflict experiences can be beneficial, by alleviating tension and avoiding conflict escalation (Baron & Richardson, 2004; Infante, 1995), reducing communication apprehension and enhancing intersubjectivity (Benjamin, 1990), contributing to the development of closeness within relationships (Siegert & Stamp, 1994), and clarifying individual and relational goals (Burgess & Burgess, 1996). Given the diversity and the potential severity of outcomes associated with interpersonal conflicts, efforts to understand variation in the negativity of conflict interaction experiences are well-placed.

The parameter most frequently tied to experiences of interpersonal conflict is relational distress. Conflict is pervasive in satisfying and dissatisfying relationships, but conflict is more frequent, severe, and stressful in dissatisfying relationships (Lloyd, 1990). For example, Sabourin, Infante, and Rudd (1993) found that distressed couples are more likely than nondistressed couples to reciprocate verbally aggressive behavior during a conflict interaction. Within dissatisfied relationships, conflict interactions are often characterized by negative and competitive patterns of communication behavior, such as confront–confront, confront–defend, complain–defend, and defend–complain sequences (Caughlin & Vangelisti, 2006; Ting-Toomey, 1983).

In fact, research has shown that dissatisfied couples, compared to satisfied ones, are more likely to engage in negative reciprocity (Pike & Sillars, 1985), countercomplaining (Alberts, 1988), and demand/withdraw patterns of communication (Gottman & Levenson, 2000; Heavey, Christensen, & Malamuth, 1995). Not surprisingly, then, distressed couples’ communication behaviors are less effective in resolving disagreements, produce less satisfaction with conflict interactions, and result in less positive outcomes (Billings, 1979; Markman, 1981).

Although prior research provides convincing evidence linking relationship satisfaction to the conduct of interpersonal conflicts, questions remain concerning variation in the distress elicited by conflict episodes. Recent efforts point to the role of physiological processes in understanding experiences of interpersonal conflict. For example, Robles, Shaffer, Malarkey, and Kiecolt-Glaser (2006) found that the negativity of conflict communication between spouses (indexed by criticism, disagreement, denial of responsibility, and interrupting) promotes maladaptive physiological responses to interpersonal conflict. Similarly, Heffner et al. (2006) observed that wife demand/husband withdraw sequences during conflict are associated with increases in cortisol levels for wives.

In a study of children’s reactions to interparental conflict, Davies, Struge-Apple, Cicchetti, and Cummings (2007) showed that exposure to interparental hostility attenuated children’s cortisol reactions to witnessing a simulated phone disagreement between parents. In addition, Afifi, Granger, Joseph, Denes, and Aldeis (2014) reported that children were able to down regulate physiological arousal associated with a difficult parent–child interaction more quickly when their parents were communicatively skilled, rather than unskilled. Taken as a set, these findings suggest
that conceptualizing experiences of interpersonal conflict as a stress response can shed light on factors that affect variation in individuals’ experiences of conflict.

Following Cohen, Kessler, and Underwood Gordon’s (1995) physiological model of stress, we conceptualize stress as an interactive relationship between the external environment and an individual’s internal state. During a stressful experience, the demands of the situation prompt an appraisal of the threat imposed by external conditions, as well as an assessment of the individual’s internal capacity to adapt to or cope with the situation (Cohen et al., 1995). If an individual evaluates the environment as threatening, potentially dangerous, or taxing (McNamara, 2000), a physiological stress response to the external threat is initiated (Dohrenwend & Shrout, 1985).

Drawing on the physiological model of stress (Cohen et al., 1995) and viewing interpersonal conflict interactions as potential stressors highlights how experiences of conflict, as reflected in physiological markers of stress, are shaped by both the demands that an interaction places on individuals and people’s internal adaptive capacity. Thus, we focused this investigation on the interaction between communication qualities and personal sensitivities to shed light on people’s experience of conflict interactions as stressful.

In this study, we examine conflict interaction intensity and childhood exposure to familial verbal aggression as factors that influence physiological stress reactions to conflict interactions between college-aged romantic partners. We position conflict intensity as an environmental factor that influences the external demands imposed by conflict. We also develop a framework emphasizing desensitization to conflict, due to family history, as a factor contributing to a person’s internal capacity to cope with those demands. After deriving the hypotheses that focus our investigation, we report a laboratory-based dyadic interaction study that tested our thinking.

Conflict conceptualized as a physiological stressor

The body’s two primary physiological stress response systems are the sympathetic-adrenal-medullary (SAM) axis and the hypothalamic–pituitary–adrenal (HPA) axis. The HPA axis, in particular, promotes defense against stressors through the production of adrenal steroids and stress hormones; the hormone cortisol is the main product of the HPA axis. Under normal, nonstressful conditions, the HPA axis’s cortisol production follows a diurnal pattern of activation, releasing the greatest concentration of cortisol during the morning, dramatically reducing the production during the afternoon, and slowly decreasing the production of cortisol during the evening. Under stressful conditions, defined by threatening external conditions and insufficient internal capacity to adapt to those demands, additional cortisol is released to mobilize energy against the stressor. To the extent that this additional energy enhances an individual’s ability to cope with a threat (see Bateup, Booth, Shirtcliff, & Granger, 2002), activation of the HPA axis is a normative and functional response to stressful conditions.
In the following sections, we examine the aspects of the physiological model of stress (Cohen et al., 1995). Specifically, we consider features of the external environment, or conflict communication interactions, that amplify the demands placed on communicators’ internal environments. In addition, we suggest that the process of desensitization, due to exposure to family verbal aggression in childhood, influences individual differences in sensitivity to conflict that is reflected in the activation of the HPA axis.

**Conflict behaviors that amplify external demands**

The physiological model of stress (Cohen et al., 1995) implies that the demands that conflict interactions make on individuals are influenced by the behaviors that occur during a communication episode. In a systematic analysis of conflict interactions, Resick et al. (1981) concluded that four features influence evaluations of conflict as mild versus intense: volume of speech, presence of critical statements, expressions of disagreement, and use of sarcasm. In particular, conflicts characterized by loud voices, frequent criticism, disagreement, and sarcasm are rated as more negative, intense, and severe (see also, Gottman & Levenson, 2000; Nomura & Barnlund, 1983). Cupach (1982) demonstrated that competitive conflict tactics such as shouting and blaming are viewed more negatively than cooperative approaches to conflict such as seeking information. Conversely, indirect conflict communication versus direct communication patterns are evaluated as more agreeable (van de Vliert & Euwema, 1994) and polite (Goldsmith, 1992).

The incidence of caustic communication can also fuel conflict escalation. According to the argumentative skills deficiency model (Infante, Chandler, & Rudd, 1989), the receipt of hostile language serves as a trigger for the receiver and often results in an impulsive, aggressive response. In addition, Durbin (2008) found a variety of utterances that can intensify conflict, including profanity, commands, negative comparisons, and behavior criticism. A verbal attack that is perceived by the recipient as intentional and illegitimate is especially likely to worsen the conflict interaction (Infante et al., 1989).

Not surprisingly, then, the reciprocation of negative affect, complaints, and other competitive acts has been linked to conflict negativity (Alberts, 1988; Billings, 1979; Margolin & Wampold, 1981; Pike & Sillars, 1985). The surreptitious delivery of a sarcastic message also increases the intensity of a conflict and often escalates conflict interactions (Gordon, 1985; Resick et al., 1981). Moreover, extended chains of negative and competitive messages can create patterns of destructive conflict, exacerbating the negative consequences of conflict communication (Gottman, 1994).

These studies suggest that qualities of communication behavior amplify the threat imposed by conflict interactions. When one person’s communication expresses criticism, conveys dominance or disagreement, or demands a response, the immediate threat to the message recipient is increased. When partners reciprocate aggressive tactics and a conflict escalates, the interaction as a whole becomes more demanding and dangerous to both participants. For these reasons, qualities of communication are an
inherent driver of variations in the experience of conflict indexed by the physiological stress response.

Following this logic, we position the intensity of a conflict interaction as a proximal factor influencing increases in salivary cortisol as a marker of HPA axis activity. As detailed in the following hypothesis, we focus on the effects of the intensity of conflict interactions after controlling for the well-documented effects of relational distress that we reviewed previously:

H1: Controlling for relational distress, conflict intensity is positively associated with the amplitude of stress reactivity to conflict interactions between college-aged dating partners, as measured by salivary cortisol.

Childhood experiences that attenuate perceived threat
The physiological model of stress (Cohen et al., 1995) further suggests that the perceived threat of the external environment depends on the internal adaptive capacity of the individual. Individual differences in reactions to conflict have been linked to a variety of causes, ranging from genetic predispositions (Beatty & McCroskey, 1997) to social learning processes that promote the development of relevant communication skills (Infante, 1987). Evidence also suggests that particular traits, such as personal hostility (Suarez & Williams, 1989) and an insecure attachment style (Powers, Pietromonaco, Gunlicks, & Sayer, 2006) render people more physiologically reactive to interpersonal conflicts. One individual difference that has been linked to experiences of conflict in adulthood is childhood exposure to conflict within the family environment (Dumlao & Botta, 2000; Koerner & Fitzpatrick, 2002). In this section, we consider desensitization processes as a framework for explaining how family communication experiences in childhood may calibrate individuals’ reactions to conflict interactions in adulthood.

Desensitization is defined as “the attenuation or elimination of cognitive, emotional, and ultimately, behavioral responses to a stimulus” (Rule & Ferguson, 1986, p. 29). Desensitization can be manipulated directly and purposefully. For example, desensitization is a technique used in behavioral therapy to decrease or eliminate certain emotional responses through exposure to anxiety-inducing stimuli (Wolpe, 1973). This process has documented effectiveness in changing children psychologically and behaviorally (Weersing & Weisz, 2002).

In addition, desensitization has been recognized as a key mechanism in determining the psychological effects of exposure to chronic violence. In particular, children who have experienced severe and chronic physical aggression describe violence as a way of life, and they report that they no longer feel overwhelmed or upset by violence (Guterman & Cameron, 1997). Using a similar logic, we suggest that desensitization explains the association between childhood exposure to familial verbal aggression and physiological stress responses to conflict in adult romantic relationships.

Research has consistently found that intense, negative marital conflict threatens a child’s sense of security and safety in the home and in the outside world (Gordis, Margolin, & John, 2001). For example, Cummings, Goeke-Morey, Papp, and Dukewich
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(2002) found that young children respond to adult anger with various negative emotions, such as distress, fear, sadness, and anger. In turn, children in high-conflict homes show higher levels of anger and aggression as rated by their peers, teachers, and mothers (Jenkins, 2000). Children who witness competitive conflict during development, compared to those who do not, also have more adjustment problems, including internalizing emotions, acting out, behaving in socially incompetent ways, and performing poorly in school (Cummings et al.; Davies, Cicchetti, & Martin, 2012; Kelly, 2000).

Although familial conflicts are stressful to children, ongoing exposure to intense conflict in childhood may attenuate the perceived threat of conflict in adulthood. Huesmann (1998) argued that children who are exposed to violence, either as victims or witnesses, habituate to it and, consequently, come to experience violence as less adverse. For children who have experienced high levels of familial conflict, the stress response system may be recalibrated, such that the normal physiological responses to conflict cues are attenuated. In turn, children experience verbal aggression as less adverse and even normative, increasing their own verbal aggression and tolerance for other’s verbal aggression (Eisenberg, 2000). This desensitization to signals of conflict spares children from immediate distress by attenuating physiological reactions, even though it may increase people’s propensity to engage in violence (Garbarino, 1999; Garbarino & Kostelny, 1997; Ng-Mak, Salzinger, Feldman, & Stueve, 2002).

Drawing from this desensitization framework, we predict that childhood exposure to familial verbal aggression moderates the relationship between conflict intensity and cortisol reactivity specified in H1. Children who have experienced intense and frequent exposure to family conflict may adapt to it and evaluate conflict as normal, typical, or expected. Because these experiences increase a person’s internal ability to adapt to conflict, desensitization is reflected in a diminished physiological reaction to conflict interactions. Accordingly, we predict that the association between conflict intensity and stress reactivity to conflict interactions in romantic relationships is attenuated for individuals who have experienced a history of familial conflict. Specifically:

H2: Controlling for relational distress, a history of exposure to familial verbal aggression during childhood moderates the association between conflict intensity and the amplitude of stress reactivity to conflict interactions between college-aged dating partners, as measured by salivary cortisol, such that the magnitude of the positive association between conflict intensity and stress reactivity is reduced when a history of exposure to familial verbal aggression during childhood is high, rather than low.

Method

We used a dyadic interaction design to examine the influence of the intensity of conflict interaction and childhood exposure to familial verbal aggression on physiological stress responses to conflicts between dating partners. Although staging conflict interactions within a laboratory sacrifices external validity, it allowed us to observe
and record the conflict interactions and physiological reactions to them as they occurred.

Participants
Individuals were recruited from a general education communication course at a large Eastern university; participants completed the study (or a nonresearch alternative) to fulfill a research participation requirement in the course. The sample included individuals who reported being involved with a current romantic partner for longer than 3 months. In addition, all participants stated that their partners were geographically close to the university and willing to participate. Students who reported any instances of physical aggression in their romantic relationship were excluded, per Institutional Review Board requirements. Participants who were recruited from the general education course received 2% credit for completion of the study; their partners were compensated $10.00 for their participation.

The sample for the study was composed of 100 participants (50 females, 50 males). Participants’ ages ranged from 18- to 31-years old ($M = 20.93, SD = 0.99$), and the majority of the sample identified as White (81.73%; Asian, 6.73%; Black, 4.81%; Hispanic, 4.81%; other, 1.92%). Individuals reported being romantically involved with their partner for a range of 3 months to 8 years ($M = 1.28$ years, $SD = 1.42$ years).

Procedures
Prior to participation, individuals received an e-mail describing the purpose and procedures of the study. Individuals were told that they would be providing three saliva samples during their participation and, accordingly, they were asked to reschedule their participation if they had dental work performed 48 hours prior to coming to the lab; to avoid consuming alcohol, dairy, sugar, caffeine, nicotine, or any medication 1 hour prior to participation; and to refrain from exercising or brushing their teeth 45 minutes before participating. Each couple reported to the lab between 2:00 p.m. and 6:00 p.m. to minimize the impact of the diurnal variation in cortisol.

Upon arrival, partners were separated within the lab and administered informed consent forms. The consent forms clarified that participation would include interacting with the partner, that those conversations would be videotaped, and that the videos would be used to further analyze their participation after their session. Participants then provided their first saliva sample using oral swabs; all samples were frozen immediately after collection. Next, participants were asked to identify and describe the three most stressful areas of conflict in their relationship. Finally, participants completed an online questionnaire which collected demographic information, activity, and food consumption prior to arriving at the lab, and measures to capture the variables of interest.

Partners were then asked to sit together within the laboratory for the interaction. At this point in their participation, the participants had spent approximately 30 minutes in the lab. Given the length of the procedures and the period of time that the
participants already had to adjust to the lab setting, we did not perceive a need to further acclimate participants prior to the conflict discussion. We instructed the dyad to discuss a particular area of conflict; the most distressing conflict reported by either partner served as the stimuli for the interaction. The couple was left alone in the lab to discuss that topic of conflict. The interaction was videotaped using unobtrusive ceiling mounted cameras with internal microphones. After 10 minutes, we re-entered the lab and relocated the participants to separate areas within the lab.

Following the interactions, participants sat quietly for 15 minutes and then provided a second saliva sample. Participants relaxed for 5 additional minutes before we collected a third saliva sample. According to Powers et al. (2006), it takes between 15–20 minutes for cortisol to enter the saliva after being secreted in response to a stressor. Accordingly, we collected saliva samples 15 minutes and 20 minutes after the stressor to ensure a more valid and reliable measure of the body’s physiological reaction to the stress of a conflict interaction with a romantic partner. Because cortisol collection occurred 15 and 20 minutes after the end of the conflict interaction, these methods index stress reactions in response to the conflict interaction as it occurred.

To conclude the study, participants completed a postinteraction questionnaire. Finally, the couple was reunited and debriefed on their participation in the research study. During the debriefing session, we reviewed the purpose and procedures of the study with the couple, allowed the participants to ask any questions that they had, and made certain that the couple was not upset as a result of their participation.

Measures

History of familial verbal aggression

A history of familial verbal aggression was measured using 20 items drawn from the three most widely used measures of verbal aggression: the Verbal Aggressiveness Scale (Infante & Wigley, 1986), the Conflict Tactics Scale (Straus, Hamby, Boney-McCoy, & Sugarman, 1996), and the Aggression Questionnaire (Buss & Perry, 1992). We worded the items to focus on family members’ use of verbally aggressive communication behaviors toward the participant (e.g., “attacked my intelligence,” “insulted me”); benevolent items and items that discussed physical assault, sexual coercion, or injury were excluded. Participants responded using an 8-point scale to indicate the frequency of specific experiences during their childhood (0 = This has never happened, 1 = Not within a year, but it did happen before, 2 = Once a year, 3 = Twice a year, 4 = 3–5 times a year, 5 = 6–10 times a year, 6 = 11–20 times a year, 7 = More than 20 times a year; Straus et al., 1996).

We asked participants to focus on their experiences during middle childhood (i.e., third, fourth, fifth, and sixth grade). This period of life was chosen because the development of cognitive abilities, such as concentration and memory, render experiences during middle childhood easier to recall than experiences in early childhood (Burnett Heyes, Zokaei, van der Staaij, Bays, & Husain, 2012). The confirmatory factor analysis (CFA) results indicated that a composite scale, computed as the average of responses to the 20 items, was unidimensional ($M = 3.25$, $SD = 1.16$, $\alpha = .94$).
Conflict intensity

To operationalize conflict intensity, trained judges rated the communication of each participant during the 10-minute conflict interactions. All conflict interaction videos were first transcribed, and judges used both the transcripts and videos to rate the intensity of the conflict interactions. Next, judges participated in training sessions together; we discussed the content of each code, practiced the rating task on a variety of interactions, and discussed interactions with low agreement on the rating scale. Judges then rated a small portion of the sample independently. Training continued until reliability was achieved on all of the judgments ($\alpha > .85$). When adequate reliability was achieved, judges completed 20 videos per week. Each week, reliability was reassessed until all five of the judges completed rating the entire sample on each of the codes.

Conflict intensity was defined as the extent to which the individual displayed incompatible activity. Although conflict can be manifested in a variety of ways, the judges were asked to focus on verbalized conflict, which is also referred to as expressed disagreement or arguing. Verbalized conflict can include—but is not limited to—yelling, insulting the partner, criticizing the partner, accusing the partner, offending the partner, screaming, swearing, threatening the partner, and being cruel toward the partner (Buss & Perry, 1992; Infante & Wigley, 1986; Resick et al., 1981; Straus et al., 1996).

Judges used a 5-point Likert scale, in which three points were labeled, to evaluate the intensity of the conflict (1 = No conflict at all, 3 = Moderately intense conflict, 5 = Extremely intense conflict) in all of the videotaped interactions (Beutell & Greenhaus, 1983; Waln, 1982; Yau & Smetana, 1996). Although raters evaluated the intensity of each partner’s conflict communication separately, ratings within dyads were highly correlated, $r = .83, p < .001$. Therefore, we created a composite variable to index the intensity of conflict communication within the dyad. The intraclass correlation coefficient measuring consistency indicated that the five judges’ ratings were reliable ($\rho = .92, M = 3.01, SD = .64$).

After all of the videos were rated for conflict intensity, judges then rated each video for the four discriminators of conflict intensity identified by Resick et al. (1981). We used these measures to provide more precise indices of conflict communication behaviors to assess the validity of the global evaluation of conflict intensity. Specifically, judges indicated how loud, critical, disagreeable, and sarcastic each participant’s communication was during the conflict interaction (1 = Soft, 5 = Loud; 1 = Supportive, 5 = Critical; 1 = Cooperative, 5 = Disagreeable; 1 = Sincere, 5 = Sarcastic). Once again, we found high correlations between partners’ ratings (loudness, $r = .80, p < .001$; criticism, $r = .83, p < .001$; disagreement, $r = .86, p < .001$; sarcasm, $r = .70, p < .001$), and we created composite measures of each variable for the dyads. The intraclass correlation coefficients measuring consistency indicated that the five judges’ evaluations were reliable on all four indicators: soft to loud ($\rho = .95, M = 2.87, SD = .79$), supportive to critical ($\rho = .94, M = 2.91, SD = .96$), cooperative
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to disagreeable ($\rho = .92, M = 3.01, SD = .87$), sincere to sarcastic ($\rho = .87, M = 2.67, SD = 1.21$).

Cortisol reactivity
To measure the participants’ stress responses to conflict interactions with romantic relationship partners, three salivary cortisol samples were collected from each participant. Sample 1 was collected 10 minutes into the data collection session, after all consent forms were completed ($M = .12, SD = .63$). Sample 2 was collected 15 minutes after the completion of the conflict interaction task ($M = .28, SD = .76$). The final sample was collected 20 minutes after the completion of the conflict interaction task ($M = .33, SD = .97$).

Relational distress
Because relational distress influences conflict interactions, we specified it as a covariate within our hypotheses. We operationalized relational distress using the Dyadic Adjustment Scale (Spanier, 1976), a frequently used instrument for measuring disorder in relationships (e.g., Baxter & Bullis, 1986; Dindia, Fitzpatrick, & Kenny, 1997; Ting-Toomey, 1983). Participants reported on the amount of agreement or disagreement ($5 = $Always agree$, 4 = $Almost always agree$, 3 = $Occasionally disagree$, 2 = $Frequently disagree$, 1 = $Almost always disagree$, 0 = $Always disagree$) that existed within the relationship for a variety of topics, including matters of recreation, religious matters, sexual intimacy, and career decisions. The CFA results indicated that the 13 items formed a unidimensional composite scale ($M = 3.75, SD = .45, \alpha = .76$).

Realism
In the postinteraction questionnaire, participants indicated how typical the conflict interaction was compared to other conflicts that they had experienced with their romantic partner (e.g., “This conversation was realistic in my relationship”; Knobloch & Solomon, 2003). Participants responded to these statements using a 5-point Likert-type scale where higher numbers reflected more agreement ($1 = $Strongly disagree$, 5 = $Strongly agree$). The confirmatory factor analysis (CFA) results indicated that a composite scale of realism was unidimensional ($M = 4.12, SD = .87, \alpha = .96$).

Results
We first report preliminary analyses that evaluated the validity of our data. Then, after describing our analytical strategy, we report tests of our hypotheses.

Preliminary analyses
First, we evaluated the realism of the conflict interaction for participants in the study. On average, participants perceived the interactions as moderately realistic ($M = 4.12$, $SD = .87$), and a one-sample $t$-test revealed that the mean realism score was significantly greater than the scale’s midpoint, $t(99) = 16.60$, $p < .001$. These results suggest that the laboratory interactions were realistic to participants. As a further check of the
impact of potential artificiality in the method, we also evaluated realism as a covariate in our hypotheses tests.

Second, we examined potential sources of error in the cortisol samples. One participant was an extreme outlier for the first measure of cortisol ($M = .17$, $SD = .10$, outlier = .58), and one participant was an extreme outlier for the third measure of cortisol ($M = .37$, $SD = .11$, outlier = .74). We excluded data from these participants and their partners from the analyses.

We also examined behavior one hour prior to the research session based on the screening question responses. Four participants reported eating a meal within 1 hour of saliva collection, 20 participants stated that they had taken prescription medication prior to saliva collection, and 27 participants reported using hormone contraceptives. To evaluate the impact of these behaviors, we compared the cortisol samples from the participants who reported engaging in the behavior to the cortisol samples from the participants who did not. Consistent with previous research (Seltzer et al., 2010; Kirschbaum & Hellhammer, 1989; Kirschbaum, Klauer, Filipp, & Hellhammer, 1995; Mommersteeg, Keijsers, Heijnen, Verbraak, & van Doomen, 2006; Nicoloson, 1992), none of these tests revealed a significant impact on any of the cortisol samples, $t(98) < ±1.90, ns$. Following the example provided by these studies, we retained these participants in the sample. To evaluate whether engaging in these activities affected the trajectory of cortisol change, we also evaluated them as covariates in our hypotheses tests (Seltzer et al., 2010).

Finally, we examined the correlations between the conflict intensity variable and the four discriminators of conflict. Conflict intensity was significantly and positively correlated with loudness ($r = .65, p < .001$), criticism ($r = .72, p < .001$), disagreement ($r = .74, p < .001$), and sarcasm ($r = .60, p < .001$). These patterns speak to the validity of the conflict intensity measure.

**Analytical strategy**

Because our data included multiple cortisol measures from individuals and dependence between partners in dyads, we required an analytical method that accommodated correlated errors. Multilevel modeling provides a method to assess rates of change in cortisol within individuals and also variables that affect rates of change, while accounting for covariance between interaction partners. In particular, we used a two-level hierarchical linear growth model (HLM 6.0) that specified an intercept for each member of the dyad (see Gunlick-Stoessel & Power, 2009). Because all of our couples were heterosexual, we distinguished individuals in relationships as male or female.

The Level-1 model, which represented the change in cortisol levels over time for each participant within the dyad, was represented by the following equation:

$$Y_{ij} = \beta_{f1j} (\text{female intercept})_{ij} + \beta_{m2j} (\text{male intercept})_{ij} + \beta_{f3j} (\text{female linear trend})_{ij} + \beta_{m4j} (\text{male linear trend})_{ij} + e_{ij},$$
where $Y_{ij}$ is the cortisol score $i$ for couple $j$, with $i = 1, \ldots, 6$ data points and $j = 1, \ldots, 50$ couples. For female participants, $\beta_{fij}$ is the model intercept representing the predicted baseline cortisol level; for male participants, $\beta_{mij}$ is the model intercept. $\beta_{fij}$ and $\beta_{mij}$ are the linear growth trajectories for female and male participants, respectively. These values denote the relationship between the linear effect of time and cortisol reactivity. Finally, $e_{ij}$ represents the residual component of the model.

The Level-2 model included predictors to explain the variance in the Level 1 coefficients. The Level-2 equations treat the intercepts and the linear growth trajectories from the Level-1 equation as outcome variables. We were interested in testing the effect of a history of familial verbal aggression and conflict intensity on cortisol reactivity; therefore, we added variables to the Level-2 model to predict differences in the change in cortisol over time. In the Level-2 models, we included the following control variables: each participants’ perceived realism of the conflict interaction, potential sources of error in the cortisol sample (i.e., eating a meal within one hour of saliva collection, taking prescription medication prior to saliva collection, and using hormone contraceptives), and each participants’ relational distress.

Coefficients for perceived realism and potential sources of error in the cortisol sample were nonsignificant, $p > .10$. Hence, they were removed from the analysis. Coefficients indexing variance explained by male and female relational distress scores were significant in the multilevel model, so we retained them in the analysis.

In the final Level-2 models, the $\gamma$ parameters reference participants’ relational distress ($\gamma_{1j}$), participants’ childhood exposure to familial verbal aggression ($\gamma_{2j}$), the dyad’s rated level of conflict intensity ($\gamma_{3j}$), and the interaction between exposure to family verbal aggression and conflict intensity (computed as the product of those two variables; $\nu_{ij}$). Specifically, the Level-2 models were represented by the following equations:

\[
\begin{align*}
\beta_{fij} &= \gamma_{10} + \gamma_{11} + \gamma_{12} + \gamma_{13} + \nu_{ij} \\
\beta_{fij} &= \gamma_{20} + \gamma_{21} + \gamma_{22} + \gamma_{23} + \nu_{2j} \\
\beta_{mij} &= \gamma_{30} + \gamma_{31} + \gamma_{32} + \gamma_{33} + \nu_{3j} \\
\beta_{mij} &= \gamma_{40} + \gamma_{41} + \gamma_{42} + \gamma_{43} + \nu_{4j}
\end{align*}
\]

Before testing the hypotheses, we fit an unconditional HLM model with no predictors at Level-2. This test was conducted to determine if there was variance across individuals in the coefficients defining cortisol trajectories unexplained by the Level-1 model. We found significant individual variation in the levels of cortisol at the intercept and linear growth trajectory for both males and females. This significant variation means that participants did not all respond to the conflict interactions in the same manner, and that it is useful to examine if conflict intensity, a history of exposure to familial verbal aggression, and their interaction might explain a significant proportion of variance in the participants’ stress trajectories.
Tests of hypotheses
Results for the multilevel model are reported in Table 1. The first panel in Table 1 shows the association between variables in the model and the value of the equation’s intercept for female participants, and the second panel shows corresponding results for the intercept for males. We observed a positive association between females’ baseline cortisol levels and both male and female reports of relational distress. In addition, females’ reported history of family verbal aggression was positively associated with baseline cortisol. For males, the associations between baseline cortisol and males’ relational distress and males’ reported history of family verbal aggression were significant.

Tests of the hypothesized associations are provided in the third and fourth panels of Table 1. For both females and males, the rate of increase in cortisol was significantly accelerated as a function of males’ and females’ relational distress. In addition, we found that females’ history of family verbal aggression and males’ history of family verbal aggression were significantly associated with, respectively, females’ and males’ cortisol reactivity. As predicted by H1, conflict intensity was positively associated with the amplitude of stress reactivity to conflict interactions for both males and females. As per H2, the interaction between females’ history of verbal aggression and conflict intensity was significantly associated with females’ cortisol reactivity, and the interaction between males’ history of verbal aggression and conflict intensity was significantly associated with males’ cortisol reactivity.

Figures 1 and 2 depict the trajectories of cortisol across the three time points for females and males, respectively, as a function of conflict intensity and childhood exposure to family aggression. As illustrated in Figure 1, cortisol levels increased most rapidly and to the highest level when the conflict interaction was rated as relatively intense and the female participant’s childhood exposure to familial verbal aggression was relatively low; these findings are mirrored in the results for males depicted in Figure 2. Both figures also clarify that, within high or low levels of childhood exposure to familial verbal aggression, high intensity conflicts produce a greater cortisol response than low intensity conflicts. Thus, H1 was supported.

Consistent with H2, results indicate that the difference in cortisol reactivity associated with low versus high intensity conflicts depends on childhood exposure to familial verbal aggression. For both males and females, the difference between the trajectories for low versus high intensity conflict is greater when childhood exposure to familial verbal aggression is low rather than high. More specifically, the amplitude of the effect associated with conflict intensity is attenuated for individual who report being exposed to relatively high levels of familial verbal aggression in childhood.

Discussion
The conflict interactions in this study occurred in a laboratory setting and were limited to 10 minutes; nonetheless, these experiences were sufficient to evoke a stress response. Moreover, conflict intensity was positively associated with the amplitude of cortisol reactivity to conflict interactions for both male and female participants.
Table 1 Final Estimation of Level-2 Predictors on Participants’ Cortisol Reactivity

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These findings speak to the validity of our procedures and the assumption that the stress response system is reactive to variation in the intensity of the threat caused by interpersonal conflict environments.

More importantly, the results of this investigation highlight the utility of drawing upon the physiological model of stress to advance theory about people's experience of interpersonal communication. Floyd and his colleagues (Floyd, 2006; Floyd et al., 2007; Floyd & Riforgiate, 2008) have demonstrated that expressing affectionate messages is associated with the body's ability to handle stress. Johnson (2009) observed that the explicitness, immediacy, and elaboration of support messages received from a romantic partner accelerated people's recovery from a stressful experience, as indexed by cortisol levels. Priem, McLaren, and Solomon (2010) found that the relational meanings attached to hurtful messages and feelings of hurt predicted increases in cortisol in response to hurtful interactions. Considered alongside these studies, our findings underscore the close connection between qualities of communication episodes and the physiological imprint of interpersonal interactions.

Although this study found that qualities of conflict interactions map onto the physiological stress response, the magnitude of that reaction varied as a function of reported exposure to family verbal aggression in childhood. Specifically, the amplitude of stress reactivity was attenuated for individuals who reported comparatively high levels of familial verbal aggression, and the association between conflict intensity and cortisol reactivity was especially pronounced among people who reported limited exposure to familial verbal aggression during childhood.
The physiological model of stress suggests that whether a stress response occurs depends on the individual's internal adaptive capacity to cope with those demands. Our results imply that coping capacity can develop from a history of exposure to a potential stressor that proves surmountable. In this way, children who are exposed to noxious family communication may become desensitized to it (Huesmann, 1998). In other words, surviving the threats of verbally aggressive communication in childhood may render adults more capable of weathering intense conflicts in adulthood.

Evidence that childhood experiences can desensitize people to conflict in adulthood has important implications. Desensitization processes shed light on people's ability to become resilient in the face of adversity, and they may point to avenues for helping victims of traumatic experiences. In fact, desensitization has been used strategically and intentionally to help people manage sources of stress (Weersing & Weisz, 2002; Wolpe, 1973). At the same time, desensitization to conflict appears to recalibrate the physiological systems that inform and constrain a person's own behavior during conflict. More specifically, individuals who are less affected by the negative consequences of intense conflict behavior may be more likely to behave aggressively themselves (cf. Ng-Mak et al., 2002).

These observations highlight how desensitization has both advantages and disadvantages. Through exposure to conflict in childhood, people can learn to engage disagreements without being physiologically overwhelmed; consequently, experiences of family conflict may be an important foundation for effective conflict management in adulthood. Gross insensitivity to the threats imposed by intense conflict,
however, may result in unconstrained aggressive behavior. Although speculative, we wonder if children benefit most from exposure to family conflicts that illustrate the nonthreatening nature of ethical and responsible disagreement, as well as the dangers of intense conflict.

This study also offers suggestions for addressing problematic conflict behavior in adulthood. By recognizing that some individuals have pronounced physiological reactions to conflicts in romantic associations, practitioners might offer conflict skills training that emphasizes stress management and relaxation techniques to prevent emotional flooding—a condition that causes an individual to be overwhelmed with emotion and unable to process information effectively (Gottman, 1994). In addition, interventions could help people decrease the intensity of the conflict experience by reducing competitive or distributive conflict management techniques (e.g., Canary, Cupach, & Serpe, 2001).

For those individuals desensitized to the negativity of conflict experiences, promoting the ability to perceive indicators of conflict escalation and patterns of negative reciprocity (e.g., Sabourin et al., 1993) might offset the lack of internal physiological information available to these individuals. By teaching these individuals to recognize signs of escalatory communication behavior that they might not experience physiologically, intense conflicts that grow into aggressive episodes might be averted.

The present investigation complements a previous study (Aloia & Solomon, in press), which found that childhood exposure to family aggression corresponded with the emotions people associated with expressing versus suppressing a verbally aggressive response to provocation, as well as their reported recovery from the interaction episode. We are encouraged that these two studies can inform the development of a theory that integrates subjective experiences of conflict communication and physiological processes, while also recognizing the role of family communication history in calibrating those experiences.

Although the claim that childhood experiences predict the conduct of adult relationships is not novel (e.g., Collishaw et al., 2007; Colman & Widom, 2004; Danese et al., 2009), we seek to link childhood communication experiences more precisely to emotional, physiological, and cognitive aspects of adults’ interpersonal interactions. Because emotional and physiological processes are often primary and nonconscious reactions to stimuli, they may play a critical role in framing higher-order cognitive assessments of communication episodes.

Thus, we are working toward a theoretical model that illustrates the impact of family history on physiological and emotional systems, which in turn inform secondary cognitive appraisals and frame communicative action in high stakes episodes, such as interpersonal conflict. To this end, we see value in efforts to further clarify the relevance of childhood experiences to adult conflict management, as well as other stressful interpersonal interaction episodes, and to evaluate emotional experiences, physiological processes, and cognitive appraisals as mechanisms within that theoretical model.

As a final point, we note that the patterns observed in this study were apparent after controlling for the well documented effects of relational distress on conflicts...
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in personal relationships. As anticipated by prior research, we found that female relational distress scores were significantly associated with female baseline cortisol, female cortisol reactivity, and male cortisol reactivity. In addition, male relational distress scores were significantly associated with baseline cortisol and cortisol reactivity for both male and female participants. These patterns remind us that the climate of the couple's relationship is important to understanding the dyad's experience of conflict, and that conflict experiences both arise from and serve to reinforce relational distress.

At the same time, the results of this study show that knowing relationship quality offers only general insight into partners' experiences of conflict. The individual communication histories that partners bring to the dyad and the qualities of the communication episode that they experience explain variance in physiological outcomes over and above the predictive ability of relationship distress. Thus, these results serve as evidence that communication experiences, both past and present and with nuanced appreciation for the tenor of interactions, need to be incorporated into research seeking to illuminate the foundations of relationship well-being.

Of course, the conclusions we offer are qualified by limitations and the need for further research. For example, the self-report and retrospective nature of the measure of family communication history poses a threat to internal validity in this study. Accordingly, we are currently conducting research to compare self-reports provided by siblings as an index of the validity of this measure. Longitudinal data linking childhood exposure to conflict and adult outcomes would provide more definitive insight into the developmental patterns at the core of our thinking.

We also see a need to tease out the mutually influential association between conflict escalation and physiological arousal. In this study, we positioned conflict intensity as a causal factor that resulted in greater physiological reactivity; this reasoning follows directly from the physiological model of stress. Within ongoing and dynamic interaction, however, physiological states may shape communication behaviors in ways that affect the course of a conflict. Teasing out the interplay of physiological and emotional states with regard to an unfolding interaction remains an ambitious agenda for future research. Finally, we see utility in future work that evaluates both desensitization and sensitization as interventions to help individuals develop more accurate assessments of conflict-related threats and, correspondingly, the communication skills to manage those threats effectively.

To summarize, this study suggests that physiological stress reactions to conflict between college-aged romantic partners are influenced by conflict intensity, which indexes the environmental threat posed by the conflict, and childhood exposure to familial verbal aggression, as a factor influencing the individual's internal capacity to cope with those demands. Our conclusions are limited by the self-report retrospective measure of childhood experiences, our reliance on conflict interactions staged within a laboratory setting, and the particular characteristics of our sample. Nonetheless, we are encouraged that this study contributes to efforts aimed at understanding variation in the negativity of the outcomes associated with interpersonal conflicts.

References


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