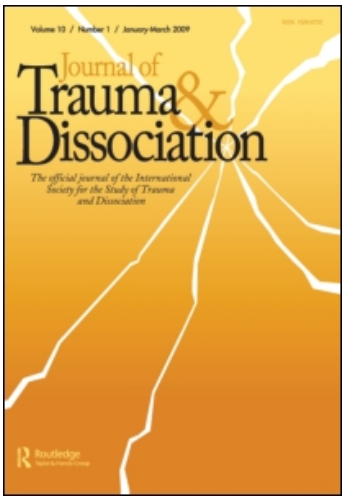

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Affective Responsiveness, Betrayal, and Childhood Abuse

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Affective Responsiveness, Betrayal, and Childhood Abuse

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Several trauma-specific and emotion theories suggest that alterations in children's typical affective responses may serve an attachment function in the context of abuse by a caregiver or close other. For example, inhibiting negative emotional responses or expressions might help the child preserve a relationship with an abusive caregiver. Past research in this area has relied on self-report methods to discover links between affective responsiveness and caregiver abuse. Extending this literature, the current study used facial electromyography to assess affective responsiveness with 2 measures: mimicry of emotional facial expressions and affective modulation of startle. We predicted that women who reported childhood abuse by close others would show alterations in affective responsiveness relative to their peers. We tested 100 undergraduate women who reported histories of (a) childhood sexual or physical abuse by someone close, such as a parent (high-betrayal); (b) childhood abuse by someone not close (low-betrayal); or (c) no abuse in childhood (no-abuse). Especially when viewing women's emotional expressions, the high-betrayal group showed more mimicry of happy and less mimicry of angry faces relative to women who reported no- or low-betrayal abuse, who showed the opposite pattern. Furthermore, women who reported high-betrayal abuse showed

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less affective modulation of startle during pictures depicting men threatening women than did the other two groups. Findings suggest that, as predicted by betrayal trauma theory, women who have experienced high-betrayal abuse show alterations in automatic emotional processes consistent with caregiving-maintenance goals in an abusive environment.

KEYWORDS childhood abuse, betrayal trauma theory, affective response, emotions, facial mimicry, electromyography, affective startle modification

Childhood abuse perpetrated by someone on whom the child depends (such as a parent) places the child in the untenable position of having to rely on the very people who cause harm (Freyd, 1996; Freyd, DePrince, & Gleaves, 2007). Thus, children exposed to abuse by close others (termed *high-betrayal abuse*; see Goldberg & Freyd, 2006) may face unique challenges and, in turn, unique consequences relative to children abused by people not close (e.g., strangers). In fact, high-betrayal abuse has been linked to alterations in cognitive processing, such as memory and attention (e.g., Becker-Blease, Freyd, & Pears, 2004; DePrince & Freyd, 2004). The current article examines associations between high-betrayal abuse and affective responsiveness.

Emotions serve important interpersonal functions, such as helping to establish and maintain social relations (Barrett & Campos, 1987; Campos, Campos, & Barrett, 1989; Campos, Mumme, Kermoian, & Campos, 1994). Therefore, abuse that occurs in the context of a close, interpersonal relationship may be associated with alterations in emotional responsiveness. In fact, high-betrayal abuse is associated with several interpersonal functions that involve affective responsiveness, such as social problems (e.g., Shipman, Zeman, Fitzgerald, & Swisher, 2003), revictimization risk (e.g., Classen, Gronskaya-Palesh, & Aggarwal, 2005), and emotion dysregulation (e.g., Maughan & Cicchetti, 2002). The current article extends past research to examine associations between high-betrayal abuse and (a) facial expressions of emotion that serve social communication goals (e.g., Fridlund, 1994; Kraut & Johnston, 1979) and (b) basic emotional response as shown by atypical startle modulation to affective stimuli (e.g., Bradley, Cuthbert, & Lang, 1996).

BETRAYAL TRAUMA THEORY (BTT)

Several theories point to the likelihood that alterations in children's typical affective responses may serve a function in the context of abuse by a caregiver

or close other. For example, a functionalist approach to emotions (e.g., Barrett & Campos, 1987; Campos et al., 1989, 1994) can be applied to family violence to predict that children will adapt their emotional strategies to respond to the demands of a violent family environment (Shipman, Zeman, Penza, & Champion, 2000). In particular, inhibition of emotional expression (e.g., anger) or disruptions in perceptions of negative emotions may serve to maintain safety and maximize caregiving.

BTT (Freyd, 1996) specifically argues that alterations in typical information processing may aid children in maintaining necessary relationships with close others who are abusive. Drawing on attachment theory (e.g., Bowlby, 1988), BTT highlights the active role that infants and children play in the parent–child attachment relationship (Freyd, 1994; Freyd et al., 2007). Given that attachment relationships require the active input of the child, information-processing strategies that help the child behave in a way that maximizes care and minimizes harm would be advantageous. BTT initially emphasized cognitive alterations (such as decreased awareness of or memory impairment for abuse) that would help the child continue to engage in the behaviors necessary to maintain attachment with an abusive caregiver; good empirical support for the theory has been reported (see Freyd et al., 2007, for a review). However, the logic of BTT also implies that abuse by trusted others will be associated with changes in a range of behaviors that are likely to either decrease negative or increase positive interactions. Alterations in typical affective responsiveness (such as increased response to positive emotions and/or decreased response to negative emotions) may help children navigate and remain engaged in the attachment relationship with abusive close others.

Exposure to high-betrayal abuse is linked to restricted or inhibited emotional responding. For example, women who reported histories of incest also reported greater tendencies to suppress angry feelings relative to norms (Scott & Day, 1996). Furthermore, in self-reports and interview tasks, young girls who were sexually abused by family members reported that they would ignore or avoid negative emotional displays in others; nonmaltreated girls indicated that they would try to help those who are upset (Shipman et al., 2000). More than their nonmaltreated peers, these sexually abused girls also expected more relational conflict with parents if they were to display sadness or anger. Moreover, compared to nonabused girls, girls with histories of sexual abuse appeared to inhibit negative expressions (e.g., anger and sadness) to avoid interpersonal conflict with both mothers and fathers (Shipman et al., 2003). Taken together, Shipman and colleagues' (2000, 2003) work suggests that the foundation for inhibiting facial expressions is laid in childhood and that childhood abuse alters social–emotional communication with significant others. The tendency to avoid or inhibit responses may be functional in the immediate abusive context when characterized by high betrayal. For example, avoiding those who demonstrate

negative emotional displays may aid abused children in navigating a violent family environment. In addition, these children may have come to perceive that open emotional expression would harm either themselves or the caregiving relationship on which they rely (Shipman et al., 2003).

MIMICRY OF EMOTIONAL FACIAL EXPRESSIONS

Emotional mimicry (also referred to as *congruent rapid facial reactions*; see Moody, McIntosh, Mann, & Weisser, 2007) refers to the tendency to produce spontaneous expressions that match those expressed by another person. In other words, people react to another person's smile with increased activity of the zygomaticus major (the muscle that pulls the corners of the mouth up and back) and to a scowl with increased activity of the corrugator supercilii (the muscle that knits the brow; Dimberg & Öhman, 1996; Lundqvist & Dimberg, 1995). Rapid facial reactions (RFRs) are fast (typically occurring within 1 s of stimulus onset; Dimberg, 1982; Moody et al., 2007), automatic responses to facial emotions. Mimicry appears to emerge very early in life (e.g., Meltzoff & Moore, 1977) and continues to function in adulthood (Dimberg, 1982).

RFRs appear to be important for processes that may be disrupted in individuals who have been abused. Matching the facial expression of another may modify a person's emotions (McIntosh, 1996) and potentially modify cognitions (see Barsalou, 1999; Thompson & Varela, 2001). For example, automatic mimicry may be a basis for developing empathy and emotional contagion (e.g., Bavelas, Black, Lemery, & Mullett, 1986; Hatfield, Cacioppo, & Rapson, 1994; McIntosh, Druckman, & Zajonc, 1994; Sonnby-Borgström, 2002). Thus, congruent RFRs create a shared representation of social interactions (Decéty & Chaminade, 2003) that permits interpersonal rapport to develop in the absence of conscious recognition (Lakin & Chartrand, 2003). Furthermore, the ability of an observer to match another's facial expression appears to influence the observer's perception of the other's emotional expressions (Neidenthal, Brauer, Halberstadt, & Innes-Ker, 2001). Thus, affective responsiveness may relate to disruptions in typical social communication through facial expressions as evidenced by atypical RFRs.

When an observer harmonizes with the facial expression of another, emotion-related thoughts and feelings may be modulated or initiated in the observer (McIntosh, 1996). Although emotional responses to angry facial expressions occur rapidly (Moody et al., 2007), adults abused in childhood appear to inhibit emotional expressions (e.g., Luterek, Orsillo, & Marx, 2005; Shipman et al., 2003) and have problems in areas important for mimicry, such as alexithymia (e.g., Berenbaum, 1996). Taking a functional approach, one notes that children victimized by close others may inhibit mimicry of angry expressions as a way of regulating their affective responses. However,

increased mimicry of positive expressions could have important interpersonal consequences, such as reinforcing as well as eliciting additional positive affect in the other person. Thus, it might be to the child's benefit to make early, automatic responses to positive expressions to increase the likelihood of reinforcing and soliciting these emotions. That is, either down-regulation of responsiveness to negative emotional information and/or up-regulation of responsiveness to positive emotional information may help the child navigate a violent environment in which close others perpetrate abuse. In the current study, we predicted decreased responsiveness to angry and increased responsiveness to happy facial expressions among women exposed to high-betrayal abuse relative to their peers exposed to low betrayal or no abuse.

MODIFIED STARTLE RESPONSE

Reflexive startle is a set of actions that contribute to motivating defensive behavior in response to negative environmental stimuli. Affective information reliably modulates the reflexive startle response; startle responses are amplified following the presentation of negative stimuli and inhibited following the presentation of positive stimuli (Cuthbert, Bradley, & Lang, 1996; Lang, 1995; Lang, Bradley, & Cuthbert, 1997). Lang and colleagues (1997) suggested that negative stimuli activate the aversive motivational system to prepare the individual for defensive response. Increased startle to negative stimuli (usually pictures) in laboratory tasks is believed to reflect activation of the aversive system. Positive, arousing stimuli activate the appetitive motivational system and thus decrease motivation for defensive reaction with the result being attenuated startle response (Lang et al., 1997). High arousal paired with intensely negative stimuli creates the largest startle amplitudes; in contrast, high arousal paired with very positive stimuli generates the smallest startle responses (Lang et al., 1997).

When confronted with high-betrayal abuse, children may develop atypical startle patterns that serve to help them navigate the abusive relationships. In the face of chronic potential danger in abusive relationships, the aversive motivation system may become overactive. In such instances, enhanced startle responses may occur to any emotionally arousing stimuli (negative or positive), demonstrating increased affective reactivity overall. Alternatively, children living in abusive environments may experience a dampening of the aversive motivational system for several reasons. First, chronic arousal of this system due to ongoing threat may provide little unique information over time (i.e., if the system is always aroused, there is no new information available), thus leading to a decreased responsiveness of the system. Second, dampening aversive motivational system responses may help children maintain and engage in the behaviors necessary to preserve attachments

in the context of a violent family environment. In the case of an overactive aversive motivational system, one would expect to see increased startle modification to negative stimuli. In contrast, a dampened aversive system would be expected to yield attenuated startle responses to negative stimuli, thus indicating decreased affective reactivity. Additionally, one may see a reduction in the typical diminishment of startle to positive stimuli, perhaps because individuals who have experienced betrayal trauma may have learned that positive stimuli are not diagnostic of good outcomes or safety.

As with RFRs, we tested modified startle responses as a way to assess basic affective responses. Given our interest in whether high-betrayal abuse is associated with alterations in basic affective processes, modified startle offers a clean, involuntary response to assess.

CURRENT STUDY

Drawing on a BTT framework, this study builds on research by Shipman, Zeman, and colleagues (2000, 2003) that found alterations in emotional responses in girls who experienced childhood sexual abuse. Our study also examined the effect of childhood abuse (sexual and/or physical) on emotional responsiveness; however, we utilized psychophysiological measures to assess quick, automatic affective responses. Previous research has tended to rely on self-reports of affective responses or coding of overt behaviors that are temporally far along in the emotion response; however, self-reports and overt measures assess outcomes that may be consciously modified. Such data cannot disentangle whether the emotional responses are intentionally altered because of presentational or safety concerns or whether the basic affective responses of individuals who have been abused have been influenced. Furthermore, these methods cannot capture alterations in early, automatic affective responsiveness.

To assess affective responsiveness, we used facial electromyography (EMG) in two objective measures of affective reactivity—mimicry of emotional facial expressions and affective modulation of startle—that are psychophysiological markers of the early and automatic affective responses that underlie the complex task of processing and responding to internal and external emotion information. Although psychophysiological methodology has been utilized in previous violence research (e.g., Soler-Baillo, Marx, & Sloan, 2005), we are not aware of the use of EMG specifically to assess psychophysiological correlates of affective processes in violence-exposed samples. Considerable research has demonstrated that EMG is a suitable method for studying affective responsiveness (and not just facial expressions) in typical populations (e.g., Winkielman & Cacioppo, 2001), thus warranting its application here.

Previous research on affective responsiveness has tended to compare those who report high-betrayal abuse (e.g., caregiver abuse) to nonabused peers. The lack of a comparison group exposed to low-betrayal abuse makes it difficult to infer whether alterations in processing are related to the experience of abuse generally or to high-betrayal abuse specifically. Therefore, we compared three groups of women who reported (a) childhood sexual or physical abuse by someone close, such as a parent (high-betrayal); (b) childhood abuse by someone not close (low-betrayal); or (c) no childhood abuse (no-abuse).

We tested two major predictions derived from the assumption that high betrayal would be associated with alterations in affective responsiveness that might serve to maintain the relationship with the perpetrator. As reviewed previously, we predicted that relative to women in the low-betrayal and no-abuse groups, women in the high-betrayal group would show decreased emotional mimicry of angry expressions and increased mimicry of happy expressions as well as diminished startle modification to negative stimuli. Although the aversive motivational system may be overactive or dampened in high-betrayal abuse, an automatic decrease in aversive motivational responses seems more likely than an increase in response that must be followed by a more controlled strategy to mask the reaction to preserve a relationship with a close other.

METHOD

Participants

All study materials and procedures were reviewed and approved by our university institutional review board. A total of 100 female undergraduate students were recruited from psychology courses and by advertisement flyers. Students received extra credit for psychology courses or $20 for their participation. Participants ranged in age from 18 to 46 (M = 20.2, SD = 3.3), were primarily White (75%), and reported having been raised in middle- to upper class backgrounds (83%). Six participants were excluded from the study due to equipment failure, three due to inattention to multiple stimuli (inattention was assessed by video coding participants' eye gaze direction when the stimuli appeared), and one due to lack of eyeblink to the auditory startle.

Initially, we tested all women who were interested in the study (provided they had normal or corrected vision and hearing). To ensure adequate representation of women with abuse histories, we initiated a prescreening protocol after 55 participants completed the study. During the prescreen, potential participants were asked to respond by e-mail with a simple yes or no to the following three questions: (1) Are you 18 years of age or older? (2) Have you ever been deliberately attacked by someone so severely as to result in marks, bruises, blood, broken bones, or broken teeth? and (3) Have you

ever been made to have some form of sexual contact, such as touching or penetration? (Questions 2 and 3 are taken from the Brief Betrayal-Trauma Survey [BBTS], Goldberg & Freyd, 2006). When e-mailed the prescreening questions, participants were advised that they could decline to answer the questions and opt out of participation. Women who answered yes to Question 1 *and yes to either Question 2 or 3* were invited to participate. Every fourth woman who answered yes to Question 1 *and* no to *both* Questions 2 and 3 was also invited to participate to ensure the continued recruitment of non-victimized women throughout the testing period.

Materials

Seven miniature Ag/AgCl surface electrodes were used to record EMG data. Raw EMG activity was amplified at the headbox, filtered on-line with a 10- to 500-Hz bandpass filter, sampled at a rate of 2,048 points per second, and stored in continuous computer files using Neuroscan 4.1. For the mimicry data, the signals for each muscle channel were integrated and magnitudes were computed using the CNS Suite 5.51 data reduction program (Ohio State University Social Neuroscience Laboratory, 1999). For the startle data, peak detection was calculated using Neuroscan 4.1. E-Prime software was used in the computer-prompted portions of the experiment.

The startle probe was 50 ms of white noise with an instantaneous rise presented through Beyerdynamic TDE-65 headphones. The startle probe was adjusted idiographically to the minimum level needed to generate an eyeblink to the tone from individual participants (mode = 95 db, range = 95–105 db).

Stimuli

Ekman and Friesen's (1975) facial affect stimuli were used to prompt emotional mimicry. The images were 319 pixels wide × 389 pixels high with a resolution of 71 dpi. Eight happy faces (four male) and eight angry faces (four male) were selected for the stimulus group. The same eight Caucasian models were shown with both angry and happy expressions. These stimuli are generally recognized quickly and accurately by adult women (Palermo & Coltheart, 2004).

The International Affective Picture System (IAPS; Center for the Study of Emotion and Attention, 1994; Lang, Öhman, & Vialt, 1988) was used in the affective startle modification paradigm. The images were 1,024 pixels wide × 768 pixels high with a resolution of 72 dpi. A total of 24 neutral, negative (threat), and positive (happy) images[1] were presented. All eight images in each valence category depicted social stimuli (people). Images were chosen based on normative data for women's pleasantness and arousal ratings (Center for the Study of Emotion and Attention, 1999; Lang,

Bradley, & Cuthbert, 1999). Threat and happy stimuli were matched for similar levels of arousability. These pictures were a subgroup of a larger study that included additional IAPS stimuli (e.g., nonsocial images).

Stimuli in affective startle studies are generally neutral, positive, and negative in valence. Although following this pattern, our stimuli showed people (i.e., they were social) and evoked neutral, happy, or threat responses. Threat stimuli showed a Caucasian man menacing or physically attacking a Caucasian woman. We used pictures of people in happiness- and threat-evoking scenes to consider whether alterations in affective process may be related to an abuse-specific context rather than an altered response to negative or positive stimuli in general.

Measures

Participants completed the BBTS (Goldberg & Freyd, 2006), a self-report measure that assesses exposure to potentially traumatic events before and after age 18. The BBTS was used to group participants into the three childhood abuse groups: no-abuse (n = 51), sexual or physical abuse by a close other (high-betrayal; n = 26), and abuse by someone not close (low-betrayal; n = 13). Table 1 details specific items used in groupings.

Design and Procedure

EMG attachment and recording. Participants were shown the psychophysiological equipment, and informed consent was obtained. Facial regions of interest were exfoliated with electrode prep gel and cleaned with alcohol. Three pairs of electrodes and a single ground electrode were filled with saline gel and attached over the left facial muscles (Dimberg & Pettersen,

TABLE 1 Categorization of Participants by Childhood Abuse Status Based on the Brief Betrayal-Trauma Survey

Abuse group	n	At least 1 item reported for 1 occurrence prior to age 18
No-abuse	51	No victimization items reported during childhood.
Low-betrayal	13	You were deliberately attacked that severely (*to result in marks, bruises, blood, broken bones, or broken teeth*) by someone with whom you were not close.
		You were made to have such sexual contact (*such as touching or penetration*) by someone with whom you were not close.
High-betrayal	26	You were deliberately attacked that severely (*to result in marks, bruises, blood, broken bones, or broken teeth*) by someone with whom you were very close.
		You were made to have some form of sexual contact, such as touching or penetration, by someone with whom you were very close (such as a parent or lover).

Notes: Words in italics are our additions to improve clarity of items taken out of context.

2000). Electrical activity was measured over the corrugator supercilii (brow), obicularis oculi (eye corner), and zygomaticus major (cheek) muscles. The ground electrode was placed in the center of the forehead. Placement of electrode pairs adhered to the guidelines recommended by Fridlund and Cacioppo (1986).

Electrode impedance readings for each muscle group were accepted if less than 15 kOhm; the modes for impedances were less than 5 kOhm on all channels. Participants adjusted their chairs to reach the computer keyboard without moving their bodies back and forth. Electrode wires were secured to participants' shoulders with tape. Participants were asked to limit their movement to avoid disrupting the signal measurement.

Mimicry of emotional facial expressions. Participants viewed eight happy and eight angry facial expressions in blocked form by valence (Dimberg, 1982). The order of expressions within blocks was randomly presented, and the order of valence blocks was counterbalanced between participants. Each stimulus was shown for 5 s; the interstimulus interval was 15 or 20 s, randomly selected. The screen was blank during the interstimulus interval. A quiet tone (50 ms in duration) sounded 500 ms prior to the presentation of stimuli to alert participants to attend to the screen. Participants completed the mimicry portion and then the startle modification portion.

Affective startle modification. Before data collection, a habituation period and sound test was conducted to verify eyeblink to the auditory startle. During data collection, participants viewed pictures from the IAPS (Center for the Study of Emotion and Attention, 1994; Lang et al., 1988) to evoke different emotions (neutral, happy, threatening) in four blocks. Pictures were presented for 6 s, with an interstimulus interval of 10 to 20 s. A tone (startle probe) loud enough to generate a startle eyeblink reflex was presented either 2.5 s or 4.5 s after stimulus onset for two thirds of the stimuli. No startle probe sounded for the other one third of the stimuli. Additionally, the startle probe sounded during approximately one fifth of the interstimulus intervals to increase unpredictability. Time of startle (none, 2.5 s, and 4.5 s) within each individual stimulus was balanced across participants. After each startle probe block of pictures, participants rated the same pictures for pleasantness (negative to positive, 1–9). Ratings were recorded using E-Prime software.

Questionnaires. Participants completed the BBTS via the computer and answered demographic questions using pencil and paper.

Physiological Data Scoring

Participants were videotaped during procedures to minimize error due to inattention. Each trial was coded for participant attention to the computer monitor. An individual trial was excluded if the participant was not looking at the monitor during the presentation of stimuli (emotional facial expressions

during mimicry or the auditory startle probe during affective startle modulation). Less than 1% of data were excluded due to obvious inattention as indicated by eye direction.

Emotional mimicry. Facial responses were measured by standardized baseline-corrected congruent activity (i.e., zygomaticus activity to happy faces or corrugator activity to angry faces) averaged across 100-ms intervals from 500 to 1,000 ms after stimulus onset (in concordance with findings from Dimberg, 1982, and Moody et al., 2007). Standardization within individual and muscle group baseline activity was recorded from 1,000 to 500 ms before stimulus onset; the baseline measurement did not include the orienting tone.

Startle modification. Peak amplitude of eyeblink was measured on the obicularis within 180 ms after presentation of the startle tone. Typically, startle has a latency of 30 to 50 ms after stimulus onset (Berg & Balaban, 1999). The startle window was lengthened to capture individual variation, such as double blink patterns. Amplitude data were standardized, baseline corrected, and then averaged for each of the valence categories (i.e., neutral, happy, and threatening). Baseline activity was measured during the 180 ms before stimulus presentation.

RESULTS

Affective Mimetic Responses

We compared corrugator (scowl) and zygomaticus (smile) activity during presentation of the angry and happy faces with an abuse group (3: no-abuse, low-betrayal, and high-betrayal) by stimulus valence (2: happy, angry) analysis of variance (ANOVA). Supporting the hypothesis that women in the high-betrayal group would mimic the angry faces less and the happy faces more than women in the other two groups, a significant Group × Valence interaction, $F(2, 87) = 4.02$, $p = .02$, was observed (see Figure 1). The high-betrayal

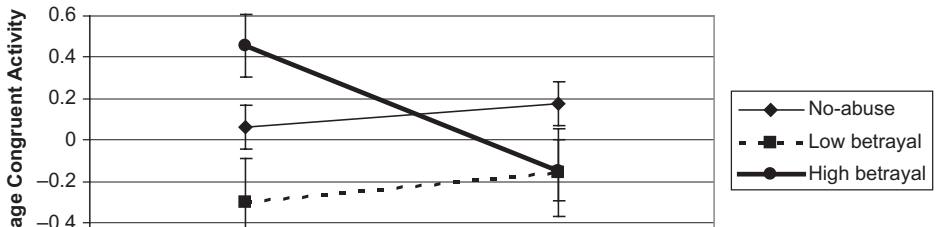

FIGURE 1 Matching facial responses by childhood abuse group. Error bars represent standard error.

group showed more mimicry to happy faces and less to angry faces relative to the other two groups, who showed the opposite pattern.

We next examined whether mimetic responses differed across abuse groups depending on the gender and valence of the face to be mimicked. We conducted two post hoc repeated measures ANOVAs to examine male and female stimuli separately. No significant effects were observed for male stimuli (see Figure 2A). In contrast, when stimuli were female, a significant Valence (happy or angry) × Abuse Group interaction, $F(2, 87) = 8.40$, $p < .001$, revealed that participants with histories of high betrayal showed greater mimicry of happy female faces and less mimicry of angry female faces relative to the other two groups (see Figure 2B).

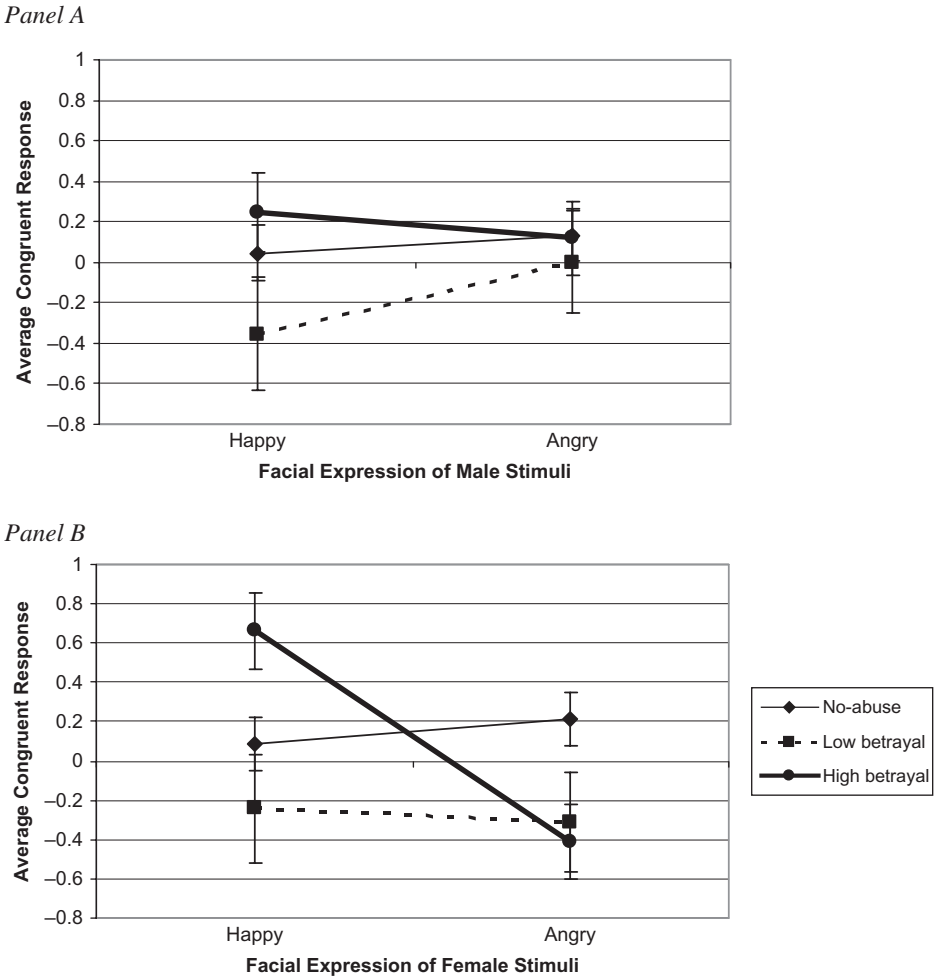

FIGURE 2 Matching facial responses by abuse group to male (A) and female (B) facial expressions. Error bars represent standard error.

Affective Startle Modification

We compared baseline corrected, standardized average blink amplitudes to acoustic startle to determine whether women in the high-betrayal group showed a different response pattern during the presentation of happy, neutral, and threat pictures compared to the other two groups. Consistent with our predictions, an omnibus repeated measures ANOVA of valence (happy, neutral, threat) by abuse group (no-abuse, low-betrayal, high-betrayal) revealed a difference in the overall patterns of affective startle modification, $F(4, 174) = 2.89$, $p = .02$ (see Figure 3).

Follow-up ANOVAs showed that the three abuse groups did not differ in blink amplitude to happy pictures, $F(2, 87) = 0.44$, $p = .65$; nor in response to neutral pictures, $F(2, 87) = 2.21$, $p = .12$. However, groups did differ in startle eyeblink to threat pictures, $F(2, 87) = 4.26$, $p = .02$. Post hoc Tukey honestly significant difference comparisons showed that the high-betrayal group differed significantly in startle response to threat stimuli relative to the no-abuse (mean difference = –.21, $p = .03$) and low-betrayal (mean difference = –.37, $p = .007$) groups. That is, women who had histories of childhood sexual or physical abuse by someone close were less responsive than women in the other two groups to pictures depicting men threatening women. The low-betrayal and no-abuse groups did not differ from one another in startle enhancement to threat pictures.

DISCUSSION

Drawing on BTT, functionalist notions about emotion, and previous findings, we predicted that women who reported sexual or physical abuse in childhood by a close other would show differences in early and automatic

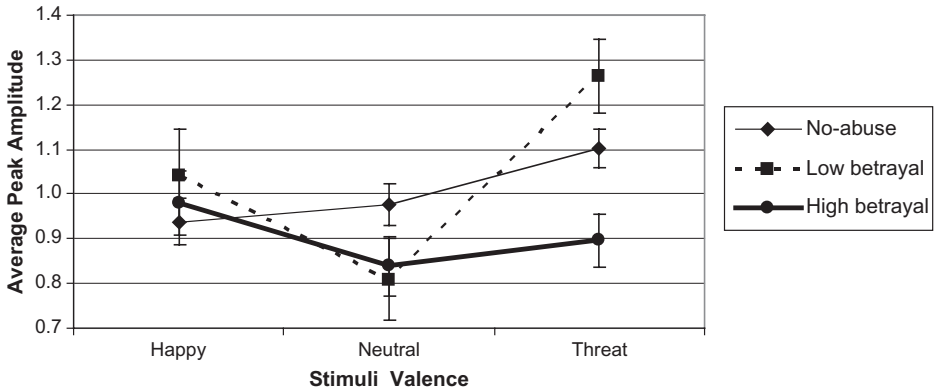

FIGURE 3 Affective startle modification by abuse group and stimuli valence. Error bars represent standard error.

affective responsiveness relative to nonabused women and to women abused in childhood by someone not close. Furthermore, we predicted that the pattern of differences would relate theoretically to the need for children to maintain attachments to abusers with whom they are close and upon whom they are likely dependent (e.g., parents). Thus, alterations in affective responsiveness should support continued engagement with a relationally close perpetrator. Ultimately, we found differences in basic affective processes, including those that serve social communication, in women who experienced childhood maltreatment by a close other compared to nonabused women and women abused by someone not close.

Emotional Mimicry

Several findings were consistent with our predictions. Most generally, unlike the other two groups, women with histories of high-betrayal abuse responded with different degrees of mimicry to angry versus happy expressions. In particular, women with histories of high-betrayal abuse in childhood were *more reactive* to happy expressions than were non-victimized women and women with histories of low-betrayal abuse in childhood. Increased mimicry to happy faces may reflect affective biases to positive emotions in the service of trying to reinforce and elicit such behaviors in others. In contrast to our predictions, women in the high-betrayal group did not show less reactivity to angry expressions compared to women in the other two groups; however, a trend showed that women who experienced abuse in childhood (betrayal-type or not) were less responsive to angry expressions than women who did not experience childhood abuse. Future studies should determine if this difference is consistent between those who were victimized in childhood and those who were not victimized.

It is interesting that participants' reactions to female pictures, but not male pictures, may provide additional insight into the specificity of responses to betrayal. Women with a history of high-betrayal abuse were more likely to mimic happy female faces and less likely to mimic angry female faces. To understand this result, we can consider an extension of the functionalist view: Positive emotions may be amplified in this population to foster interpersonal relationships. Zeman and Shipman (1996) found that expectations of another's response to emotional expression dictate whether emotions are displayed facially. Perhaps women with high-betrayal abuse histories develop a prepotent tendency to exhibit positive emotions and inhibit negative emotional expressions in the presence of women because of interpersonal dynamics at the time of the abuse. Typically, children rely on mothers to relieve distress (Gekoski, Rovee-Collier, & Carulli-Rabinowitz, 1983); an abusive home environment may amplify this reliance. When male caregivers perpetrate abuse, non-offending mothers may become a primary source of positive relational interchange, regardless of whether mothers

engage in protective behaviors. Furthermore, mimicry of smiles, but not negative expressions, is greater when the observer likes the person expressing the emotion (McIntosh, 2006). By default, a child who experienced abuse and the non-offending female caregiver are likely to have a more positive relationship compared to the victim–perpetrator; enhanced mimetic responses to happy expressions by women may be a manifestation of this relational experience. In sum, a decreased response to angry female faces and increased response to happy female faces may reflect the challenges children face in trying to evoke caregiving behaviors in the context of family violence (Freyd, 1996). However, an acknowledged limitation of this study is that the gender of the perpetrator of the childhood abuse was not assessed; thus, this interpretation will have to be tested in future research. Further examination of facial responsiveness to male and female faces (happy and angry) in adult participants—with consideration of the gender of the perpetrator of the childhood abuse—may prove to be a fruitful line of inquiry for future research.

We did not assess specific types of caretaking behaviors; however, attachment styles may further alter emotional mimicry in a systematic manner (e.g., Sonnby-Borgström & Jonsson, 2004). Research by Sonnby-Borgström and Jonsson suggested differences in emotional mimicry and empathy dependent upon attachment style (e.g., fearful-avoidant, dismissing-avoidant). Future examination of attachment types may be central to discriminating relational influences that differentially contribute to affective response deviations in women with varied histories of childhood abuse.

Affective Startle Modification

Women who reported high-betrayal abuse were less responsive to pictures depicting men threatening women than were women in the other two groups, who did not significantly differ from one another; however, the low-betrayal group showed a pattern of greater response to threat stimuli than did the no-abuse group. The decrease in startle relative to the other groups suggests a dampening of the aversive motivational system to interpersonal threat in the high-betrayal group. Dampening responses to threat is consistent with a BTT perspective insofar as such an approach may help victims decrease awareness of and attention to abuse (see Freyd, 1996). In the short run, a dampening of the defensive system may help victims to remain engaged with close others who are abusive. Overall, diminished responsiveness to threat stimuli needs to be confirmed as specific adaptation to the abuse environment rather than a general disengagement of the aversive motivational system to any negative stimulus. Inattention to threat stimuli is a plausible alternative explanation for the diminished startle response in the high-betrayal group compared to the others. Additional study is needed to better assess the underlying mechanism for the observed

differences, including differences in attentional processes and potential alterations at the appraisal stage of emotion processing in the high-betrayal group.

Limitations

We relied on participants' self-reports of abuse exposure. Although retrospective accounts of childhood experiences appear to be reasonably reliable (e.g., Brewin, Andrews, & Gotlib, 1993), they are likely to suffer from false-negative reports (e.g., Femina, Yeager, & Lewis, 1990; Fergusson, Horwood, & Woodward, 2000; Sjöberg & Lindblad, 2002). Thus, some individuals with abuse histories may have been assigned to the no-abuse group (or misassigned to the low- rather than the high-betrayal group), leading to an increase in error variance and making group differences appear weaker than they were.

Some research suggests that stimuli that are racially or ethnically mismatched to participants may evoke different affective responses than racially matched stimuli. Compared to racially mismatched stimuli, racially matched stimuli appear to enhance basic affective response, such as increased autonomic nervous system activity and facial EMG responses (Brown, Bradley, & Lang, 2006; Roberts & Levenson, 2006). Because the current study relied on IAPS stimuli showing Caucasian actors, women of color (n = 24) saw stimuli mismatched to them on the dimension of race, whereas Caucasian women (n = 66) saw stimuli matched on race. Our ability to evaluate the impact of racial match/mismatch was limited. We found no overall differences between women of color and Caucasian women on startle and mimicry; however, limited cell sizes did not allow us to do more nuanced analyses of race by abuse type. Future research is needed to test the impact of racial match/mismatch on these findings.

We used the BBTS to assess childhood abuse exposure, which allowed us to classify women into groups based on their reports of whether the perpetrator was someone close (such as a parent) or not. This measure has been used widely in studies evaluating betrayal traumas, though caregiving/dependence in the victim–perpetrator relationship is not directly assessed. Thus, future research should adopt interview strategies or extended questionnaires to more thoroughly discriminate between levels of dependence on the perpetrator. Greater dependence would be predicted to be more strongly associated with alterations in affective responsiveness.

The current study was grounded in formulations about the nature of child abuse and the development of alterations in affective responses over time, though we tested adults using a cross-sectional design. Cross-sectional designs are inherently limited in the extent to which one can infer causal relationships. Although following children prospectively after caregiver or other child abuse would be the most desirable design, the current cross-sectional study offers several advantages to balance out the usual constraints

of these methods. If the alterations in affective responsiveness observed in this study were a risk factor for abuse generally, we should have seen that the high- and low-betrayal groups performed comparably; they did not. By examining adults, we were also able to examine whether differences in affective responsiveness exist later in development. Although observing such differences earlier in development would be informative, the observation that these alterations exist in young adulthood is important.

Conclusion

These data point to disruptions in both basic affective and emotion-as-communication processes in women exposed to childhood high-betrayal abuse relative to their peers. Furthermore, these differences occur very early in the information-processing stream, as assessed by mimicry and startle responses. It is interesting that affective responses to both positive (e.g., happy faces) and negative (e.g., women experiencing physical attack) stimuli were disrupted; thus, high-betrayal abuse appears broadly associated with emotional responsiveness, not just in response to negative affect or threat. At present, BTT provides a compelling theoretical framework for beginning to understand alterations in affective responsiveness to both positive and negative stimuli in women exposed to high-betrayal abuse. This study underscores that foundations of social–emotional functioning are likely altered by early betrayal abuse experiences. As we as researchers and clinicians come to better understand the changes in affective processes associated with high-betrayal abuse, we will likely identify new inroads for treatment.

NOTE

1. IAPS stimuli: Neutral: 2214, 2383, 2385, 2487, 2514, 2840, 4605, 7550; Happy: 1340, 2150, 2550, 2660, 4603, 5830, 5831, 8496; Threat: 4621, 6312, 6360, 6530, 6540, 6550, 6560, 6561.

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