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Interparental Hostility and Children's Externalizing Symptoms: Attention to Anger as a Mediator

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Abstract

This study examined children's attention biases to negative emotional stimuli as mediators of associations between interparental hostility and children's externalizing symptoms. Participants included 243 children (M age = 4.60 years) and their parents and teachers across three annual measurement occasions. Cross-lagged latent change analyses revealed that the association between interparental hostility and children's externalizing symptoms was mediated by children's attention to angry, but not sad or fearful, adult faces. Consistent with defensive exclusion models, the multi-method, multi-informant assessment of interparental hostility at Wave 1 specifically predicted decreases in children's attention to angry faces from Waves 1 to 2 in a visual search task. Declines in children's attention to anger, in turn, predicted increases in teacher reports of their externalizing problems across the three waves. Follow-up analyses further indicated that children's decreasing levels of emotional security in the interparental relationship were associated with the decreases in children's attention to angry stimuli. Results are discussed in relation to how they inform and advance information processing and social threat models in developmental psychopathology.

Keywords

interparental conflict; child attention biases; child emotional security; child behavior problems

Witnessing interparental hostility characterized by escalating anger, hostility, and coerciveness increases children's risk for externalizing problems (Fosco & Feinberg, 2015; Grych & Fincham, 1990). Multiple theories share the premise that children's encoding and

processing of social and emotional cues are central explanatory mechanisms linking interparental hostility to children's behavior problems. In the cognitive-contextual framework, children's appraisals of threat in response to interparental conflict are proposed to mediate links between interparental hostility and their psychopathology (DeBoard-Lucas & Grych, 2011; Grych & Fincham, 1990). According to the reformulation of emotional security theory (EST-R; Davies, Martin, & Sturge-Apple, 2016), interparental acrimony poses a risk for children's adjustment by intensifying pessimistic representations of the implications that interparental and broader interpersonal conflicts have for their well-being. Likewise, aggressogenic social information processing models have posited that children's hostile biases in interpreting interpersonal events are risk mechanisms underlying the transmission of hostility from the interparental relationship to children (Jouriles, McDonald, Mueller, & Grych, 2012; Su, Simons, & Simons, 2011).

Research findings support the hypothesis that interparental hostility increases the likelihood of child behavior problems by amplifying children's negative social cognitions in family and extrafamilial contexts. For example, studies have shown that children's representations of family conflict as having negative implications for themselves and their families mediate the prospective associations between interparental hostility and children's externalizing symptoms (e.g., Buehler, Lange, & Franck, 2007; Fosco & Feinberg, 2015). In addition, other studies support the hypothesis that hostile interpretations of stressful peer events partially account for children's increased risk for behavior problems in homes characterized by interparental acrimony (e.g., Fite et al., 2008; Marcus, Lindahl, & Malik, 2001). Despite empirical evidence for the role of social-cognitive mechanisms in the transmission of aggression in families (Lindblom et al., 2017; McCrory & Viding, 2015), little is known about how children's attention to emotion cues while encoding social information may inform an understanding of the risk associated with interparental hostility. In highlighting the significance of this gap, social information processing theories posit that children's attributions, generation of possible solutions, and broader schema within social situations are predicated on how they attend to emotion stimuli (Crick & Dodge, 1994; Horsley, de Castro, & Van der Schoot, 2010). To address this gap, the goal of this paper was to examine whether children's biases in attending to angry, sad, or fearful emotional displays (i.e., adult faces) mediate the link between interparental hostility and their disruptive behavior problems during the early school years.

Early Childhood as a Sensitive Period

Studies on the family antecedents and sequelae of children's affect-biased attention processes have primarily focused on periods during preadolescence and adolescence. However, there are strong bases for positing that early childhood is a sensitive period for understanding the developmental implications of children's emotion processing in models of interparental hostility. Meta-analytic findings have shown that vulnerability to destructive interparental conflict is particularly pronounced during early childhood and continues to intensify in the years following the exposure (Vu, Jouriles, McDonald, & Rosenfield, 2016). Marked growth in understanding emotional states, goals, and intentions of others during this developmental period may further increase children's sensitivity to family adversity and alter their attention to emotional cues (Thompson, 2000). At this age, individual differences

in children's attention to emotions are also theorized to emerge and have substantial implications for their psychological adjustment (Gibb, McGeary, & Beevers, 2016; Todd, Cunningham, Anderson, & Thompson, 2012).

Children's Attention Biases to Emotion Stimuli as Mediators of Interparental Conflict

According to several conceptual models (e.g., Dykas & Cassidy, 2011; McCrory & Viding, 2015; Pollak, 2003), adverse socialization contexts confer risk for children's psychopathology by amplifying their sensitivity to threatening emotional stimuli. Children from hostile home environments are specifically theorized to develop attentional biases to angry stimuli (e.g., faces) over other affective (e.g., sad, fearful, or happy) cues because it is a more reliable forerunner of interpersonal threat (e.g., aggression, hostility). Although conceptual frameworks have postulated that children's attention to angry emotions serves as a key risk mechanism underlying their vulnerability to family adversity, models diverge in their accounts of the form and function of these attentional biases. In sensitization models, exposure to family animosity primes children to devote more attention to subsequent environmental inputs that are threatening and, in turn, increases their risk for psychopathology (e.g., Johnston, Roseby, & Kuehnle, 2009; Pollak, 2003). Thus, when faced with high levels of conflict in the home, children may be vulnerable to psychological problems due to the development of largely unconscious scripts organized around detecting and attending to cues that are potentially threatening. Conversely, defensive exclusion models propose that children exposed to histories of family hostility actively avoid attending to threatening emotional stimuli to alleviate their heightened distress in stressful contexts (Dykas & Cassidy, 2011; Shields, Ryan, & Cicchetti, 2000; Thompson, 2008). In these formulations, constricted emotion processing may increase children's disruptive behavior problems by undermining their understanding of the social ramifications of emotions, limiting their empathetic capacities, and increasing their callousness.

Empirical tests of the relative utility of sensitization and defensive exclusion models have yielded inconsistent results in the broader family risk literature. In support of the sensitization model, some studies have identified hostile socialization contexts (e.g., physical abuse, negative parenting) as predictors of children's attentional biases toward angry stimuli in early childhood (Briggs-Gowan et al., 2015), preadolescence (Shackman, Shackman, & Pollak, 2007), and adolescence (Gulley, Oppenheimer, & Hankin, 2014). However, in support of the defensive exclusion model, Pine and colleagues (2005) reported that attentional avoidance of angry faces was associated with physical abuse in a sample of preadolescent and adolescent children. Other empirical work examining the associations between family difficulties and children's attention to angry stimuli have produced null (Fani, Bradley-Davino, Ressler, & McClure-Tone, 2011) or complex findings that do not readily favor sensitization or defensive exclusion hypotheses (Lindblom et al, 2017). Only one of these studies examined children's emotion-biased attention during early childhood (i.e., Briggs-Gowan et al., 2015). Moreover, although the cross-sectional study by Gulley and colleagues (2014) identified attentional biases toward angry faces as a mediator of the

association between negative parenting and anxiety problems, mediational tests of attention to emotion are rare and, to our knowledge, have yet to be tested within a longitudinal design.

Gains in knowledge are further hindered by the almost exclusive empirical focus on examining how attention to emotions may inform an understanding of the specific risk conferred by parenting difficulties. Therefore, even less is known about the role of children's attention to negative emotional stimuli as a potential risk mechanism of interparental hostility, particularly during the early childhood years. To our knowledge, only two cross-sectional studies have examined children's attention to emotion cues in models of interparental conflict. In an electroencephalogram (EEG) investigation, Schermerhorn, Bates, Puce, and Molfese (2015) reported that preadolescent children exposed to greater interparental conflict exhibited greater P3 amplitude responses in trials depicting interpersonal anger and happiness relative to neutral interpersonal stimuli. Drawing on evidence that P3 amplitude may reflect greater allocation of attentional resources for processing emotionally salient events, the authors interpreted these findings as supporting the notion that children from high conflict homes may have greater stakes in monitoring emotions as a way of defending against potential threat. However, findings from another seminal study revealed that preschool children's attention to angry faces during 500-ms intervals in a dot-probe task were unrelated to their experiences with interparental violence or their anxiety symptoms (Briggs-Gowan et al., 2015). Thus, the empirical inconsistencies on the role of children's attention to emotion in models of interparental conflict mirror the complexity of findings in the larger literature on parenting and other forms of family risk.

The Present Study

To advance a mechanistic understanding of children's emotion-biased attention in models of interparental conflict, the present study is designed to build on the sparse knowledge base in several ways (please consult the Supplemental On-Line Material for information on the relationship between the current paper and other publications derived from this project). First, the cross-sectional approaches of the earlier studies were not designed to test whether children's attentional biases to negative emotion mediate children's vulnerability to interparental hostility. Because cross-sectional designs produce inaccurate mediational tests (Maxwell & Cole, 2007), longitudinal designs are necessary to address this gap. Accordingly, the current study is designed to provide the first prospective test of whether changes in children's visual processing of negative emotions (i.e., angry, sad, and fearful adult faces) mediate associations between interparental hostility and their subsequent changes in externalizing symptoms. Guided by the salience of anger as a sign of threat in previous models (Davies, Martin, et al., 2016; McCrory & Viding, 2015; Pollak, 2003), we utilized a multi-method (i.e., observations, surveys, semi-structured interviews) and multi-informant (i.e., trained coders, mothers, fathers, and teachers) approach to testing the hypothesis that the longitudinal association between interparental hostility and children's externalizing problems is mediated by their attention to angry, but not sad or fearful, faces. However, due to inconsistencies in the sparse literature on attentional biases, we test the relative utility of the defensive exclusion and sensitization models without offering hypotheses that favor attention toward or away from angry faces as mediators of interparental conflict.

Second, previous research has almost exclusively assessed attention to emotion cues using EEG or reaction time (e.g., dot-probe tasks) paradigms. Although these approaches have produced valuable findings, they provide a limited snapshot of attentional processes at a single time point or narrow temporal window (Gibb et al., 2016). Given that duration of attention is a key parameter for distinguishing between the defensive exclusion and sensitization hypotheses, assessing affect-biased attention processes over longer time spans may resolve some of the inconsistencies in the literature by providing more direct tests of the models. Therefore, we utilized eye-tracking procedures to assess children's attention to negative faces over lengthier stimulus presentation trials of 3500 milliseconds during a visual search task. Because visual search tasks are designed to capture the maintenance of attention to a negative stimulus in a matrix of non-threatening distractors, they offer a viable method for assessing children's duration of attending to negative emotional expressions (Armstrong & Olatunji, 2012; Todd et al., 2012). Thus, in the current study, children identified the mismatching stimulus (i.e., the adult face expressing the negative emotion) within a larger array of five neutral faces (i.e., non-threatening distractors) across trials that each lasted 3500 msec.

Third, demonstrating how attentional biases to emotion are related to family risk factors and psychological outcomes does not directly advance an understanding of their underlying function. For example, greater attention to negative emotions has been interpreted as a sign of preoccupation to threat in some studies and as a manifestation of open, direct, and constructive processing of socially significant emotions in other studies (Lindblom et al., 2017). Likewise, diminished attention to negative emotions has been regarded as serving a maladaptive function of defensively avoiding threatening cues by some investigators (Dykas & Cassidy, 2011), whereas other researchers view it as an adaptive process of effectively disengaging from negative emotion cues after efficiently processing them (Qualter et al., 2013). Thus, toward understanding the underlying meaning, we conducted follow-up tests on significant mediational findings for children's attention to emotion. Defensive exclusion and sensitization models share the assumption that attention biases of threatening affective input are organized by children's concerns about their security (Davies, Winter, & Cicchetti, 2006; Dykas & Cassidy, 2011; Thompson, 2008). In elaborating on this process, EST-R posits that interparental hostility progressively increases defensive processing of threatening social stimuli in extrafamilial settings by undermining children's secure responses to interparental conflict (Davies, Martin, et al., 2016). Given the high saliency of interpersonal threat and protection in early childhood (Bowlby, 1980), the preschool and early school years are regarded as a sensitive period for testing both defensive exclusion and sensitization models (e.g., Bretherton & Munholland, 1999; Davies et al., 2006; Johnston et al., 2009). Thus, to better understand the underlying function of attention biases, we specifically examine whether links between interparental hostility and changes in affect-biased attention are explained, in part, by concomitant decreases in children's emotional security in the interparental relationship during the transition to the early school years.

Fourth, in addition to including demographic characteristics (i.e., child gender, parent education) as covariates in our analyses, we explore two alternative explanations for children's attention to negative emotions as a mediator. As one plausible interpretation, it is possible that any association between interparental hostility and children's visual attention to

emotion is simply an artifact of the more proximal role of negative parenting practices in high conflict homes (Grych, 2002). Given some previously documented links between parenting difficulties and children's affect-biased attention (e.g., Briggs-Gowan et al., 2015; Gulley et al., 2014), we specified negative parenting in the same predictive role as interparental hostility in the follow-up analyses. As a second possibility, mediation involving duration of attention to negative emotions may merely be a spurious product of differences in children's speed in recognizing negative emotion cues. For example, previous research has implicated parental negative emotional expressiveness as a risk factor for children's deficits in emotion recognition (Bariola, Gullone, & Hughes, 2011). Thus, we also include children's latencies to first fixation on the target emotional stimuli as a competing mediator that may account for any pathways involving interparental hostility, children's duration of attention to emotional stimuli, and their behavior problems.

Methods

Participants

Participants included 243 families (i.e., mother, father, and preschool child) from a moderately sized metropolitan area who were recruited through multiple agencies including local preschools, Head Start programs, Women, Infants, and Children (WIC) programs, and public and private daycare providers. The average age of children at Wave 1 was 4.60 years ($SD = .44$; range = 4 to 5 years old), with 56% of the sample consisting of girls. Almost half of the families were Black or African American (48%), followed by families who identified as White (43%), multi-racial (6%), or another race (3%). Approximately 16% of the sample identified as Latino. At Wave 1, 99% of the mothers and 74% of the fathers were biological parents. Median household income was \$33,900 per year, with most families (69%) receiving public assistance. The median education for the sample consisted of a GED or high school diploma, and 19% of the parents did not earn a high school diploma or GED. Parents had lived together with the target child an average of 3.36 years. Approximately half of the adults (47%) were married. Based on comparisons of teachers' reports of child functioning with community samples of children from two US regions, our sample evidenced externalizing symptoms that were, on average, 77% higher in our study (for more details, see Davies et al., 2016). The longitudinal design consisted of three annual measurement occasions beginning when children were in their last year of preschool. Retention rates across contiguous waves of data collection were 97% and 94%.

Procedures

Families visited our research laboratory at each measurement occasion. All research procedures were approved by the Institutional Review Board at the University of Rochester under the title "Children's Development in the Family" prior to conducting the study (Approval #: 00030261). Families and teachers were compensated monetarily for their participation.

Questionnaire assessments of interparental conflict—Mothers and fathers completed questionnaires assessing interparental conflict during the Wave 1 visit.

Interparental disagreement interview—At Wave 1, mothers completed the Interparental Disagreement Interview, a semi-structured, narrative interview designed to assess the frequency, nature, and course of interparental conflicts witnessed by their children (e.g., Davies, Coe, Martin, Sturge-Apple, & Cummings, 2015). After selecting an interparental conflict topic that commonly takes place in front of the child, a trained interviewer presented mothers with a series of open-ended questions (e.g., “How would you describe your disagreements over [topic]?”; “How do you typically feel during these disagreements?”; “How does the disagreement end?”). Interviews were videotaped for later coding of interparental conflict.

Interparental conflict task—At Waves 1 and 2, parents participated in an interparental conflict task in which they discussed common, problematic disagreements in their relationship for 10 minutes (Gordis, Margolin, & John, 2001). While the child was in a separate room, parents selected multiple issues to discuss so they could move on to another topic if they finished discussing a previous one during the task. After topic selection, an experimenter escorted the child into the room to play with a set of toys. Parents then engaged in the video-recorded interparental interaction after the experimenter left the room. Videos were later coded for interparental conflict at Wave 1 and children’s reactivity to interparental conflict at both waves.

Parent-child interaction task—Mothers, fathers, and children participated in a 10-minute task during the first wave in which they were asked to work together to build a model house using LEGO blocks (Schoppe, Mangelsdorf, & Frosch, 2001). Because the objective was to create a context that elicits child bids for parental support and assistance, the model house was selected to ensure that children could not successfully build the house without parental assistance. Video records of the task were later coded for parenting behaviors.

Modified visual search task—At Waves 1 and 2, we assessed attention to negative facial stimuli using a procedure that integrates visual search (Armstrong & Olatunji, 2012) and passive viewing tasks (e.g., Harrison & Gibb, 2015). In the visual search component of the task, children are presented with a series of circular matrices consisting of six faces of the same adult. Each matrix contains five faces showing neutral emotions and one target face in which the adult expressed a negative emotion that varied in form (i.e., anger, sadness, or fear) across the trials. Children were instructed to always watch the screen and find the face that was different than the others with their eyes and without pointing or talking. Consistent with passive viewing tasks, experimenters deliberately refrained from providing instructions on what to do after the children identified the target emotion face other than to watch the screen the entire time (e.g., Harrison & Gibb, 2015). Thus, the visual search part of the task was designed to initially orient children to the negative stimulus while the passive or unstructured nature of the task was designed to capture individual differences in children’s maintenance of attention to negative emotions after identifying them. That is, the goal of our modified task was to have children detect the target emotion faces to assess how they allocate their attention across the faces following detection.

Adult faces, which were depicted in color photographs selected from the NimStim Face Stimulus Set (Tottenham et al., 2009), consisted of both female and male adult actors who

varied in race (i.e., Black or White). Face stimuli, which were presented in their original color, were displayed so that they were 8.6 cm high $\times$ 6.7 cm wide and arranged in a circle with .10 cm between each image horizontally and .5 cm vertically. Each trial started with a central fixation image (e.g., a smiley face emoji), which was displayed until the child was focused on the screen. This was followed by the appearance of the circular matrix of adult faces (i.e., 1 emotion face, 5 neutral faces) displayed for 3500 milliseconds. Stimulus presentations of similar duration have been successfully used in previous research with preschool and early elementary school children (e.g., Christou, Wallis, Blair, Zeegers, & McCleery, 2017; Gamble & Rapee, 2009). After five practice trials, 24 target trials were conducted, with each of the target emotions (i.e., anger, sadness, fear) displayed eight times in random order. The position of the target face in the matrix varied randomly across the trials.

The visual search task was developed and administered using Tobii Studios software and a 17-inch TFT Tobii T60 eye-tracking monitor (60 Hz data rate, 1280 $\times$ 1024 pixels) to display stimuli and record eye movements. The Tobii infrared eye tracker uses pupil center corneal reflection to track the center of the pupil and the corneal surface reflection to assess the position of gaze. Participants completed a five-point calibration procedure before the task, during which they were asked to track specific points across the center of the screen to the corners of the monitor. The Tobii eye tracker records gaze data accurate to 0.5 degrees with an error (drift) of 0.1 degree. Participants sat approximately 60 cm from the monitor during the task. For each trial, predefined areas of interest (AOIs) for measurement of attention consisted of each of the six adult faces in the matrix, with the AOIs fit to the contour of the entire face. Fixations were defined as gaze positions that were stable within a 1° visual field for a span of at least 100 ms within an AOI. We used the Tobii Fixation Filter to identify fixations based on a velocity threshold of 35 pixels and a distance threshold of 35 pixels.

Child functioning assessments—At all three waves, children's teachers completed survey assessments of their externalizing symptoms.

Measures

To guard against shared informant variance, different teams of coders rated each of the observational and interview assessments in our multi-method measurement battery.

Interparental Hostility (Wave 1)—We used a multi-method, multi-informant approach to assess hostile interparental conflict. For the observational assessments, trained coders rated interparental hostility during the interparental conflict task using the Anger and Aggression codes from the Interparental Conflict Expressions (ICE; Davies, Coe, et al., 2015) Coding System and the Negative Escalation code from the System for Coding Interactions in Dyads (SCID; Malik & Lindahl, 2004). ICE Anger and Aggression codes were assessed separately for mothers and fathers by different teams of coders along scales ranging from 1 (*Not at all characteristic*) to 9 (*Mainly characteristic*). Whereas the Anger scale was designed to assess facial expressions, verbalizations, and postural and gestural displays of anger and frustration, the Aggression scale indexed verbalizations and behaviors

that were harmful to the partner either physically or psychologically (e.g., insulting, name-calling, threats). The SCID Negative Escalation code was rated along a five-point scale (1 = *Very low*; 5 = *High*) based on the degree to which the couple reciprocates or escalates displays of anger, hostility, and negativity. Interrater reliabilities, based on ICCs of independent ratings on 30% of the interactions, ranged from .80 to .85 across codes. The resulting five codes were standardized and averaged to form a single observational indicator of interparental hostility ($\alpha = .84$).

In the interview part of the assessment, trained coders rated maternal narrative portrayals of conflict during the interparental disagreement interview for maternal Aggression, paternal Aggression, and dyadic Negative Escalation, along seven-point scales ranging from 0 (*None*) to 6 (*High*). Maternal and paternal Aggression codes were defined as the level of hostility and aggression directed toward the partner, whereas Negative Escalation indexed the degree to which the narratives depicted the couple as exhibiting mutual intensification of negativity toward each other. ICCs, indexing reliability between two raters who independently overlapped on 30% of the videos, ranged from .80 to .86 across the codes. The three codes from the interview were standardized and averaged into a single interview assessment of interparental hostility ($\alpha = .85$).

For the questionnaires, mothers and fathers completed the Verbal Aggression, Mild Physical Aggression, and Severe Physical Aggression Subscales from the Conflict and Problem-Solving Scales-Violence Form at Wave 1 (CPS-V; Kerig, 1996). The scales specifically index the frequency with which mother and partner engage in: (a) verbally aggressive conflict tactics (Verbal Aggression Subscale, 20 items; e.g., “Use name-calling, cursing, insulting”); (b) moderate physical aggression (Physical Aggression – Moderate Subscale, 10 items; e.g., “Throw something”); and (c) severe forms of violence (Physical Aggression – Severe Subscale, 16 items; e.g., “Strike, kick, bite partner”). In addition, mothers completed the Negative Escalation scale from the Managing Affect and Disagreements Scale (MADS; Arellano & Markman, 1995) to assess intensification of anger between parents during conflicts. Internal consistencies for the CPS-V and MADS scales ranged from $\alpha = .80$ to .93. The resulting seven measures were standardized and averaged into a single survey composite of interparental hostility ($\alpha = .83$).

Children’s attention to negative emotional stimuli (Waves 1 and 2)—Children’s attention to negative emotional stimuli was assessed through duration of attention measures during the visual search task (Guastella, Carson, Dadds, Mitchell, & Cox, 2009). Duration of attention to negative faces was calculated separately for anger, sadness, and fear trials. Because individual differences in the duration of attending to negative emotions may reflect variations in task engagement or preferences to attend to non-social stimuli (e.g., avoiding faces in the task), our aim was to assess children’s selective attention to negative faces compared to neutral faces. Thus, the duration variable for each negative emotion reflected the average length of participant fixation for each target AOI (i.e., negative face) divided by the sum of the average length of fixation for all the faces (i.e., target face + the five neutral faces). Because we were interested in children’s duration of attention to negative emotions once they were detected in the visual search task, trials were only included in the calculation of proportions if children fixated on the target AOI (i.e., the adult face depicting negative

emotions). In calculating proportion scores, data were considered missing if children did not fixate on at least 3 of 8 (i.e., 38%) of the trials within an emotion condition (range of missing data: 9% to 13% across emotion conditions and waves). Because significant findings for duration of attention to negative emotions may be an artifact of differences in children's speed of identifying mismatching emotion stimuli, we also assessed average latency to fixate on the target emotion for each emotion condition at each wave. Split-half reliabilities for the three duration of attention measures across the two waves (mean $r = .30$; range = .16 for Wave 1 fear stimuli to .47 for Wave 2 anger stimuli) were comparable to previous reports in the literature (i.e., r s in the low .30s; see Gibb et al., 2016).

Children's emotional security (Waves 1 and 2)—At the first two waves, trained coders rated children's behavioral reactivity to the interparental conflict task using two approaches. First, we utilized the Q-sort measurement approach to assess children's emotional security from the Children's Reactions to Interparental Disagreements Coding System (CRID; Davies, 2012). Trained coders independently sorted descriptors of children's responses to interparental conflict into predesignated piles based on the relative salience of each response characteristic for each child. The CRID Q-sort consists of twelve dimensions of child reactivity to interparental conflict that are designed to index individual differences in emotional security: Comfort, Fearful Distress, Sadness, Hostility, Autonomy, Coercive Control, Affected Behavior, Appeasing Behavior, Submissive Disengagement, Behavioral Dysregulation, Mediation, and Relatedness. Each of these codes contained a detailed description of the response dimension (see Electronic Appendix). Coders ranked the twelve descriptors into five categories based on their relative salience for the target child: 1 = *very uncharacteristic of the child* (2 descriptors); 2 = *somewhat uncharacteristic of the child* (2 descriptors); 3 = *neither characteristic nor uncharacteristic of the child* (4 descriptors); 4 = *somewhat characteristic of the child* (2 descriptors); and 5 = *very characteristic of the child* (2 descriptors). Consistent with previous research (Kobak, Zajac, & Smith, 2009), we calculated a dimensional Q-sort measure of child security by correlating coder ratings of each child with a sort of a prototypically secure child that was derived from six experts on emotional security theory. Higher correlations reflected greater security.

Second, coders provided molar ratings of children using the CRID Security scale based on the degree to which the organization of children's behaviors during the conflict corresponded with a pattern of security along a nine-point scale (1 = *Not at all characteristic*; 9 = *Highly Characteristic*). The Security rating is defined by behavioral expressions that reflect children's confidence in parents to effectively manage disputes in ways that maintain or improve family harmony. Specific manifestations of Security included negligible or mild levels of fearful distress, little or no vigilance, and minimal efforts to avoid or intervene in the conflict. As indices of inter-rater reliability, ICCs of the ratings of over 20% of the videos by two coders ranged from .82 to .89 for the two codes across the two waves. Child reactivity ratings at Wave 2 were only included in analyses when the same two parents from Wave 1 participated in the task at Wave 2. As a result, 20 children had missing data for these ratings.

Negative parenting (Wave 1)—To assess negative parenting, coders independently rated mother and father behaviors in the Parent-Child Interaction Task along nine-point scales (1 = *Not at all characteristic*; 9 = *Mainly characteristic*) of Sensitivity and Disorganized Caregiving. Derived from the well-established Iowa Family Interaction Scales (IFIRS; Melby & Conger, 2001), the Sensitivity scale assesses individual differences in parental awareness of their children's needs, emotional states, and abilities. The Disorganized Caregiving scale was adapted from the Atypical Maternal Behavior Instrument for Assessment and Classification (Lyons-Ruth, Bureau, Riley, & Atlas-Corbett, 2009). It consists of unpredictable parental emotional displays, behaviors, and verbalizations that are asynchronous with the quality and intensity of the children's behaviors. To evaluate interrater reliabilities, a second coder independently rated 21% of the parent-child interactions. ICCs ranged from .86 to .95 across the four codes. Sensitivity was reverse-scored so that higher scores reflected greater Insensitivity. The four resulting codes were specified as manifest indicators of a latent construct of negative parenting.

Child externalizing problems (Waves 1, 2, and 3)—At each wave, teachers completed the Externalizing scale from the MacArthur Health and Behavior Questionnaire (HBQ; Ablow et al., 1999). The Externalizing scale is comprised of the average of the 30 items that encompass Oppositional Defiant (e.g., "Has temper tantrums or hot temper"), Conduct Problems ("Lies or cheats"), Overt Hostility ("Kicks, bites, or hits other children"), and Relational Aggression ("Tries to get others to dislike a peer") subscales. Response choices for each scale were: 0 (*Never or not true*), 1 (*Sometimes or somewhat true*), and 2 (*Often or very true*). Following HBQ guidelines, the mean responses across the four subscales were averaged together to form an externalizing symptoms measure at each wave. Internal consistency for the HBQ externalizing symptoms scale was .95 at each of the three waves.

Analysis Plan

Structural equation modeling (SEM) was used with full-information maximum likelihood (FIML) in Amos 22.0 to estimate missing data (i.e., data were missing for 8.7% of the values) and retain the full sample for primary analyses (Enders, 2001). FIML methods of estimating data successfully minimize bias in regression and standard error estimates for all types of missing data (i.e., MCAR, MAR, NMAR) when the rate does not exceed 20% (Schlomer, Bauman, & Card, 2010). In our SEM analyses, we specified a latent assessment of children's exposure to interparental hostility using multiple informants and methods. In addition, we examined the slope of change in teacher reports of children's externalizing symptoms across the three waves using latent growth curve analyses (LGC). To estimate the linear slope, basis weights of 0, 1, and 2 were respectively designated for the Wave 1, 2, and 3 measures to correspond with time elapsed since the first measurement occasion (McArdle, 2009). Finally, we used latent difference score (LDS) modeling to capture individual differences in intraindividual change for duration of child attention to angry, sad, and fearful faces from Wave 1 to Wave 2 (McArdle, 2009). Following standard procedures, the two components of our LDS change model consisted of: (1) a growth parameter indexing change in level of the variable across the two measurement occasions (i.e., latent indices in Figure 1), and (2) a proportional change component estimating the effect of the initial status of the

variable on itself at the subsequent time point (i.e., paths running from the initial assessment of the attention construct to the latent index of attention in Figure 1).

In highlighting its flexibility, the LDS approach allows for specification of LDS change scores as both predictors and endogenous variables (Selig & Preacher, 2009). Thus, as illustrated in Figure 1, Wave 1 interparental hostility was specified as a predictor of LDS change in the three duration of attention variables and externalizing symptoms. LDS changes in attention to the three negative emotions from Waves 1 to 2, in turn, were specified as predictors of the LGC slope parameter of externalizing symptoms across all three waves. In addition, we estimated correlations between: (1) the Wave 1 main constructs (i.e., interparental hostility, duration of processing variables, child externalizing symptoms), (2) the residuals of LDS growth parameters for the three emotion-biased attention variables, and (3) the LGC intercept and slope factors for children's externalizing symptoms. Child gender and parental education levels (i.e., mean educational attainment of mother and partner) were initially included as covariates of all endogenous variables for both the primary and follow-up analyses. However, because inclusion of the covariates did not alter the pattern of significant findings in the analyses, parent education level and child gender were dropped from the analytic models.

Results

Table 1 shows the means, standard deviations, and correlations for the primary variables.

Primary Analyses: Attention to Negative Affect as Mediators of Interparental Hostility

The model described in the analysis plan provided an adequate representation of the data, $\chi^2(38, N = 243) = 60.08, p = .01, RMSEA = .05$ (90% confidence interval [CI] = .02 – .07), $CFI = .94$, and χ^2/df ratio = 1.58. Figure 1 depicts the results of the primary analyses. Supporting the measurement model, loadings of the latent construct of interparental hostility were significant ($p < .001$) and moderate in strength (mean loading = .66). For clarity, only significant correlations among the constructs are included in the Figure. Significant relations were evident among some Wave 1 predictors. Longer attention to angry faces was related to lower externalizing problems at Wave 1. Significant correlations also emerged for: (a) children's attention to angry, sad, and fearful emotions at Wave 1 and (b) the residuals of the LDS attention changes to each emotion.

In testing the role of the attention variables as mediators, the findings did not support changes in children's attention to sad or fearful emotions as mechanisms accounting for the link between interparental hostility and subsequent change in externalizing symptoms. Interparental hostility at Wave 1 was a negligible predictor of Wave 1 to Wave 2 changes in children's duration of attention to fearful and sad faces. Changes in children's attention to fear and sadness, in turn, did not predict the LGC slope of their externalizing symptoms across the three waves.

Consistent with hypotheses, the results of the structural paths revealed a mediational pathway involving interparental hostility, duration of attention to angry faces, and externalizing symptoms. Interparental hostility at Wave 1 specifically predicted decreases in

children's attention duration to angry faces from Waves 1 to 2, $\beta = -.15$, $p = .01$. In turn, reductions in children's duration of attending to anger from Waves 1 to 2 predicted increases in their externalizing symptoms across the three waves, $\beta = -.25$, $p = .007$. Bootstrapping tests of the indirect path involving interparental hostility, attention to anger, and externalizing symptoms was significantly different from zero, 95% *CI* [.001, .017].

Follow-Up Analyses: Mechanisms Underlying Attention to Anger as a Mediator

We conducted follow-up analyses to further understand the psychological correlates of children's attention to anger as a mediator of their vulnerability to interparental hostility. Given our focus on attention to angry emotions as a mediator, we retained the structural paths estimating: (a) interparental conflict at Wave 1 as a predictor of subsequent changes in duration of children's attending to angry faces and their externalizing symptoms and (b) change in their attention to anger from Waves 1 to 2 as a predictor of increasing externalizing symptoms across all three waves. For parsimony, children's attention to sad and fearful faces were dropped from analyses based on their null associations with interparental hostility and changes in externalizing symptoms in Figure 1. The streamlined analysis permitted a more powerful and targeted analysis of three potential explanatory mechanisms underlying the mediational role of children's diminished attention to anger.

To test our primary hypothesis that decreases in children's emotional security underlie their diminished attention to angry faces, we introduced into the model LDS estimates of Wave 1 to Wave 2 change in children's emotional security in the interparental relationship and latency to fixate on angry faces. Because there were two measures of children's security at each wave, a second-order LDS model was specified for the proposed outcome. The first order component of the LDS consisted of the loadings of the manifest indicators of the two security measures onto the latent emotional security constructs at Waves 1 and 2. Factor loadings of the manifest indicators of security across the two time points were constrained to be equal to maximize measurement equivalence. Consistent with the primary analyses, the second-order component consisted of: (1) a growth parameter indexing change in level of the variable across the two measurement occasions and (2) a proportional change component estimating the effect of the initial status of the variable on itself at the subsequent time point. As depicted in Figure 2, we specified interparental hostility as a predictor of LDS changes in children's emotional security in the interparental relationship from Waves 1 to 2. In turn, the growth parameter of emotional security was examined as a predictor of concomitant change in children's duration of attention to angry faces and the LGC slope indexing change in their externalizing symptoms.

In the same analysis, we examined whether the mediational role of children's diminished attention to anger was an artifact of concomitant changes in identifying negative emotions in the visual search task. To capture this construct, we included an LDS estimate of Wave 1 to Wave 2 change in children's latency to fixate on angry faces. In accord with our treatment of the security variable, we estimated a path from interparental hostility to LDS change from Waves 1 to 2 in latency to fixate on angry faces. Because decreases in children's security may undermine their speed of recognizing angry emotions, we also included a structural path running from change in children's insecurity to latency to identify angry faces. In turn,

we specified LDS change in child latency to fixate on angry faces as a predictor of the LDS change in children's duration of attention to angry faces and the LGC slope of change in their externalizing symptoms.

As a second alternative explanation to our primary hypothesis, we examined whether the mediational role of children's attention to anger was an extraneous product of the more proximal role of negative parenting as a predictor of the cascade. Thus, the latent construct of negative parenting, comprised of mother and father insensitive and disorganized caregiving, was specified as a predictor of change in all the downstream variables, including children's diminished attention to anger, latency to fixate on anger, emotional security, and externalizing symptoms. Finally, consistent with the primary analysis, correlations were specified between: (1) each of the Wave 1 variables and (2) the intercept and slope factors for externalizing problems.

The resulting model provided a good fit with the data, $\chi^2(109, N = 243) = 169.97, p < .001$, $RMSEA = .05$ (90% CI = .04 – .06), $CFI = .94$, and χ^2/df ratio = 1.56 (see Figure 2). As hypothesized, interparental hostility at Wave 1 predicted decreases in children's secure patterns of responding to interparental conflict from Waves 1 to 2, $\beta = -.22, p = .003$. Reduced security in response to interparental conflict, in turn, was associated with concurrent decreases in children's duration of attention to anger from Waves 1 to 2, $\beta = .11, p = .04$, even after including negative parenting and concomitant changes in latencies to identify anger. In accord with the results in Figure 1, Wave 1 to 2 reductions in children's duration of attending to angry faces continued to predict increases in their externalizing symptoms across the three waves, $\beta = -.25, p = .008$.

Negative parenting or children's difficulties identifying mismatched stimuli did not account for the mediational pathways involving interparental hostility, children's diminished attention to anger, and their externalizing symptoms. First, although increases in children's latencies to identify anger from Waves 1 to 2 predicted concurrent reductions in their duration of attention to the angry faces, $\beta = -.34, p < .001$, it did not predict changes in their externalizing symptoms from Waves 1 to 3, $\beta = .04, p = .64$. Moreover, Wave 1 interparental conflict was a negligible predictor of changes in children's latencies to detect angry faces, $\beta = .06, p = .25$. Second, although Wave 1 negative parenting was associated with greater interparental hostility at Wave 1 ($r = .36, p < .001$) and subsequent increases in children's externalizing symptoms, $\beta = .23, p = .04$, it was not a significant predictor of children's attention to angry faces, $\beta = -.06, p = .29$. However, in reflecting a more complex set of pathways, negative parenting at Wave 1 and change in emotional security from Waves 1 to 2 were indirectly associated with children's diminished attention to angry faces through their roles as significant predictors of increases in the latency to fixate on angry faces ($\beta = .16, p = .02$ and $\beta = -.13, p = .04$, respectively).

Discussion

Although theory and research have underscored the significance of children's social information processing biases as pathogenic mechanisms underlying children's aggressive problems in homes marked by interparental conflict (Jouriles et al., 2012), little is known

about how their attention to emotions during the encoding stages of emotional events informs an understanding of their vulnerability to interparental hostility. Toward addressing this gap, we aimed to break new ground by examining whether eye tracking indices of children's attention to angry, sad, and fearful adult faces during a visual search task mediated the prospective link between interparental hostility and their externalizing symptoms during the preschool and early school years. Consistent with mediational hypotheses, interparental hostility predicted subsequent decreases in children's attention to anger but not fear or sadness. Declines in attending to the adult angry faces, in turn, predicted increases in their externalizing symptoms. Follow-up analyses indicated that the mediational role of diminished attention to anger was not simply a spurious product of negative parenting or child difficulties identifying mismatching stimuli in the search task. Rather, in accord with the defensive exclusion hypothesis, the findings demonstrated that decreases in children's attention to adult angry faces varied as a function of concomitant declines in their emotional security in the interparental relationship.

According to multiple conceptualizations, children who repeatedly experience family hostility show greater dispositions to organize their processing of emotional cues around future interpersonal threats (e.g., Davies et al., 2006; Pollak, 2003). In these models, angry displays are more likely than expressions of sadness or fear to portend threat. Therefore, we hypothesized that children's attention to angry cues would serve as a more robust mediator of associations between family adversity and their behavioral problems than would attention to other negative emotional displays. In support of these frameworks, the present results indicated that the mediational role of children's attention to negative emotions in the pathway between interparental hostility and children's externalizing symptoms was specific to angry faces. More specifically, interparental conflict at Wave 1 predicted changes in children's attention to angry, but not sad or fearful, faces from Waves 1 to 2. Likewise, across the three types of negative emotional displays, only changes in children's attention to angry faces served as a predictor of their externalizing symptoms across the three waves. Thus, our longitudinal findings are consistent with cross-sectional research supporting the primacy of children's attention to anger stimuli in linkages with family risk factors and their psychopathology (e.g., Briggs-Gowan et al., 2015; Gulley et al., 2014).

Despite the growing evidence for the primacy of attention to anger as a mechanism underlying family risk factors, disagreement exists in the literature on the nature of the attentional biases. Whereas sensitization models propose that children's vulnerability to family adversity is underpinned by increasing tendencies to devote more attention to anger (Davies et al., 2006; Johnston et al., 2009; Pollak, 2003), defensive exclusion models posit that children exposed to stressful family events are more likely to develop behavior problems by avoiding processing of subsequent threatening stimuli as a way to preemptively limit the experience of anxiety and insecurity (Dykas & Cassidy, 2011; Thompson, 2008). Research has yet to directly test the applicability of these frameworks in models of family adversity using recommended quantitative practices for validly testing mediation (Maxwell & Cole, 2007). In addressing this gap, our prospective mediational findings yielded definitive support for the defensive exclusion model over the sensitization framework. Wave 1 interparental conflict predicted decreases in children's attention to angry adult faces from Waves 1 to 2.

Decreasing attention, in turn, predicted higher levels of children's externalizing symptoms across the three waves.

Although findings on diminished attention to anger as a mediator were consistent with defensive exclusion models, documenting the form of the bias does not elucidate its possible function. If defensive exclusion is operating, then reductions in children's security should be lawfully related to their declines in attention to anger. However, it is also possible that attentional bias away from anger serves no actual function and is merely a byproduct of a set of other processes. For example, it is plausible that parenting difficulties may be more proximal agents underlying the attention bias (Briggs-Gowan et al., 2015; Gulley et al., 2014). Likewise, our primary analyses do not address the possibility that reduced attention is a spurious result of a tendency for family (e.g., interparental hostility, negative parenting) risk factors to impair children's cognitive abilities to quickly identify mismatching stimuli (i.e., the angry face within a matrix of neutral faces). Results of our follow-up analyses testing the relative viability of these explanations provided additional support for defensive exclusion. First, children's diminished attention to anger continued to mediate the link between interparental hostility and their externalizing symptoms even with the inclusion of negative parenting and children's latency to detect angry faces in the analyses. Second, results were inconsistent with the two alternative explanations. Negative parenting failed to predict children's duration of attention to anger, while change in latencies to identify the angry stimuli was unrelated to interparental hostility or their externalizing symptoms. Third, consistent with defensive exclusion models, declines in children's security in the interparental relationship were predicted by their previous exposure to interparental hostility and were also concurrently linked with decreased attention to angry faces.

Taken together, our findings testify to the potential value of integrating defensive exclusion with EST-R. According to EST-R (Davies, Martin, et al., 2016), interparental hostility increases children's risk for psychopathology by undermining their sense of emotional security in the interparental relationship and ultimately how they process threatening stimuli in broader social contexts. However, it does not offer a consistent account of the nature of the attention biases and their implications for the development of children's externalizing symptoms. For example, earlier versions of EST emphasized the sensitization of attention to threatening stimuli as consequences of experiences with insecurity (Davies et al., 2006), whereas the more recent EST-R suggests that children experiencing declines in security may disengage from threat (Davies, Martin, et al., 2016). Defensive exclusion models provide further guidance by more decisively proposing that insecurity in family contexts underpins efforts to proactively minimize attention to distressing environmental input (Dykas & Cassidy, 2011).

In advancing an understanding of the second link in our mediational findings, defensive exclusion models further propose that limited attention to negative emotions are manifested in subsequent externalizing problems through two primary pathways. First, diminished attention to aversive emotional stimuli is proposed to increase children's externalizing problems by limiting their ability to process the relational meaning of emotional experiences in ways that undermine emotion understanding, self-regulation, social perspective taking, and empathy (Bons et al., 2013; Saxbe, Negri, Susman, & Trickett, 2015; Thompson,

2008). Second, limiting attention to threatening stimuli may be an indicator of a broader distancing style of coping with adversity that may increase externalizing problems by engendering callousness, emotional detachment, and moral disengagement (Boxer & Sloan-Power, 2013). Third, excluding affective information as a means of self-protection is also posited to increase tendencies to rigidly enlist implicit schemata of relationships to compensate for the lost information and provide a sufficient database for interpreting and responding to social situations (Bretherton & Munholland, 1999). Biases favoring the use of insecure schemata over attention to emotion cues during social information processing may, in turn, increase children's tendencies to more quickly interpret subsequent social situations in aggressogenic ways (Crick & Dodge, 1994; Dykas & Cassidy, 2011; Horsley et al., 2010). Consistent with this explanation, attenuated attention and encoding of negative cues has been linked with children's greater attributions of hostile intent during ambiguous interpersonal transgressions, lower recall of benign features of peer situations, and higher externalizing symptoms (e.g., Horsley et al., 2010; Schippell, Vasey, Cravens-Brown, & Bretveld, 2003).

In accord with these interpretations, early and middle childhood is regarded as a period of heightened saliency for interpersonal threats and the operation of defensive exclusion (Bowlby, 1980; Bretherton & Munholland, 1999; Davies, Martin, et al., 2016). Relative to older children and adolescents, children in early and middle childhood respond to conflicts between adults with greater fear, distress, and threat, poorer perceived competence, and limited abilities to utilize coping strategies (Davies, Martin, et al., 2016). Given the developmental constraints on coping efficacy, restricting attention to threatening stimuli is proposed to be one of the few viable strategies for managing heightened insecurity in early childhood (Bowlby, 1980; Bretherton & Munholland, 1999). For example, in a sample of 4- to 7-year-old children, Christou et al. (2017) found that younger children exhibited greater attentional avoidance to negative stimuli. As adverse experiences become less overwhelming with development, it is possible that attentional avoidance to threats diminishes or even shifts toward sensitization as children age adolescence (e.g., Gulley et al., 2014; Schermerhorn et al., 2015; Shackman et al., 2007). Thus, caution should be exercised in evaluating the generalizability of our findings to older children.

Although decreases in attention to angry faces were associated with concomitant reductions in children's emotional insecurity and subsequent increases in their externalizing symptoms, it is also possible that diminished attention to angry stimuli may not have uniformly pathogenic functions. As a complementary interpretation to defensive exclusion, some of the children in the sample may be exhibiting a self-protective form of disengagement that enhances resiliency in some domains. For example, under some conditions, limiting attention to anger may be part of a distraction strategy that effectively regulates distress and increases children's emotional well-being (Derryberry & Reed, 2002; Lindblom et al., 2017). Likewise, although an appreciable number of children in our sample exceeded the average levels of behavior problems reported in previous clinical samples, increases in some externalizing problems may reflect risky behaviors that have developmental advantages for some children (Frankenhuis & Del Giudice, 2012). In support of this possibility, the modest effect sizes for our findings suggest that there is heterogeneity in the mechanisms underlying the mediational role of attentional biases.

Other limitations of our study also merit discussion. First, although the children in the present sample were diverse in their racial and demographic backgrounds and experienced relatively high levels of family adversity, it is unclear whether our findings generalize to either higher risk or more privileged samples of children. Second, despite the strengths of utilizing a multi-method assessment of interparental conflict, it is possible that having parents consciously select conflict topics for the observational assessment may have resulted in some loss of ecological validity. Third, testing all our research questions within a single model would have required estimation of an excessive number of parameters and instability in model solutions. Thus, although our a priori strategy of testing the aims in two interlocking steps is consistent with previous studies (e.g., Buehler et al., 2007; Fosco & Feinberg, 2015), larger sample sizes might afford opportunities to examine all the central pathways in our aims simultaneously. Fourth, because our measurement of attention biases consists of a relatively novel synthesis of visual search and passive viewing tasks, replication of our findings is a critical next step. Finally, consistent with previous research (Gibb et al., 2016), reliabilities for our emotion-biased attention measures were in the modest range. Therefore, refining and improving the reliability of emotion-biased attention assessments is an important future direction for research (see Rodebaugh et al., 2016).

In conclusion, although attending and encoding emotional stimuli are conceptualized as central risk mechanisms in many social information processing models, little is known about the role of attention biases to emotion in accounting for children's vulnerability to risky family processes. Therefore, our multi-method, multi-informant study was designed to provide the first longitudinal test of children's attention to negative emotions as a mediator of the association between interparental hostility and their externalizing symptoms. Consistent with the defensive exclusion models, diminished attention to angry emotions was a key explanatory mechanism linking interparental hostility with children's externalizing difficulties, even after accounting for alternative risk factors. Moreover, the documented association between declines in children's insecurity and attention to anger offered further support for the hypothesis that children were defensively disengaging from the aversive stimuli to limit experiences with distress. These results highlight the value of incorporating eye-tracking indices of children's attention to emotions as a way of advancing family and developmental psychopathology models. More specifically, the findings have important implications for addressing theoretical discrepancies regarding the nature of attentional biases that account for pathogenic repercussions of interparental hostility for children's externalizing symptoms.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

- Ablow J, Measelle JR, Kraemer HC, Harrington R, Luby J, Smider N, ... Kupfer DJ. The MacArthur Three-City Outcome Study: Evaluating multi-informant measures of young children's symptomatology. *Journal of the American Academy of Child and Adolescent Psychiatry*. 1999; 38:1580–1590. DOI: 10.1097/00004583-199912000-00020 [PubMed: 10596259]
- Arellano CM, Markman HJ. The managing affect and differences scale (MADS): A self-report measure assessing conflict management in couples. *Journal of Family Psychology*. 1995; 9:319–334. DOI: 10.1037/0893-3200.9.3.319
- Armstrong T, Olatunji BO. Eye tracking of attention in the affective disorders: A meta-analytic review and synthesis. *Clinical Psychology Review*. 2012; 32:704–723. DOI: 10.1016/j.cpr.2012.09.004 [PubMed: 23059623]
- Bariola E, Gullone E, Hughes EK. Child and adolescent emotion regulation: The role of parental emotion regulation and expression. *Clinical Child and Family Psychology Review*. 2011; 14:198–212. DOI: 10.1007/s10567-011-0092-5 [PubMed: 21424275]
- Bons D, van den Broek E, Scheepers F, Herpers P, Rommelse N, Buitelaar JK. Motor, emotional, and cognitive empathy in children and adolescents with autism spectrum disorder and conduct disorder. *Journal of Abnormal Child Psychology*. 2013; 41:425–443. DOI: 10.1007/s10802-012-9689-5 [PubMed: 23096764]
- Bowlby, J. *Attachment and loss: Vol. 3: Loss, sadness and depression*. New York, NY: Basic Books; 1980.
- Boxer P, Sloan-Power E. Coping with violence: A comprehensive framework and implications for understanding resilience. *Trauma, Violence, & Abuse*. 2013; 14:209–221. DOI: 10.1177/1524838013487806
- Bretherton, I., Munholland, KA. Internal working models in attachment relationships: A construct revisited. In: Cassidy, J., Shaver, PR., editors. *Handbook of attachment: Theory, research, and clinical implications*. New York: Guilford; 1999. p. 89–111.
- Briggs-Gowan MJ, Pollak SD, Grasso D, Voss J, Mian ND, Zobel E, ... Pine DS. Attention bias and anxiety in young children exposed to family violence. *Journal of Child Psychology and Psychiatry*. 2015; 56:1194–1201. DOI: 10.1111/jcpp.12397 [PubMed: 26716142]
- Buehler C, Lange G, Franck KL. Adolescents' cognitive and emotional responses to marital hostility. *Child Development*. 2007; 78:775–789. DOI: 10.1111/j.1467-8624.2007.01032.x [PubMed: 17517004]
- Christou AI, Wallis Y, Bair H, Zeegers M, McLeery JP. Serotonin 5-HTTLPR genotype modulates reactive visual scanning of social and non-social affective stimuli in young children. *Frontiers in Behavioral Neuroscience*. 2017; 11:1–12. DOI: 10.3389/fnbeh.2017.00118 [PubMed: 28174525]
- Crick NR, Dodge KA. A review and reformulation of social information-processing mechanisms in children's social adjustment. *Psychological Bulletin*. 1994; 115:74–101. DOI: 10.1037/0033-2909.115.1.74
- Davies, PT. Unpublished manuscript. University of Rochester; 2012. *The Children's Reactions to Interparental Disagreements Coding System (CRID)*.
- Davies PT, Coe JL, Hentges RF, Sturge-Apple ML, van der Kloet E. The interplay among children's negative family representations, visual processing of negative emotions, and externalizing symptoms. *Child Development*. in press.
- Davies PT, Hentges RF, Coe JL, Martin MJ, Sturge-Apple ML, Cummings EM. The multiple faces of interparental conflict: Implications for cascades of children's insecurity and externalizing problems. *Journal of Abnormal Psychology*. 2016; 125:664–678. <http://dx.doi.org/10.1037/abn0000170>. [PubMed: 27175983]
- Davies, PT., Martin, MJ., Sturge-Apple, ML. Emotional security theory and developmental psychopathology. In: Cicchetti, D., editor. *Developmental Psychopathology: Vol. 1. Theory and Methods*. 3. New York: Wiley; 2016. p. 199–264.
- Davies PT, Winter MA, Cicchetti D. The implications of emotional security theory for understanding and treating childhood psychopathology. *Development and Psychopathology*. 2006; 18:707–735. DOI: 10.1017/S0954579406060354 [PubMed: 17152397]

- DeBoard-Lucas RL, Grych JH. Children's perceptions of intimate partner violence: Causes, consequences, and coping. *Journal of Family Violence*. 2011; 26:343–354. DOI: 10.1007/s10896-011-9368-2
- Derryberry D, Reed MA. Anxiety-related attentional biases and their regulation by attentional control. *Journal of Abnormal Psychology*. 2002; 111:225–236. DOI: 10.1037//0021-843X.111.2.225 [PubMed: 12003445]
- Dykas MJ, Cassidy J. Attachment and the processing of social information across the life span: Theory and evidence. *Psychological Bulletin*. 2011; 137:19–46. DOI: 10.1037/a0021367 [PubMed: 21219056]
- Enders CK. A primer on maximum likelihood algorithms available for use with missing data. *Structural Equation Modeling*. 2001; 8:128–141.
- Fani N, Bradley-Davino B, Ressler KJ, McClure-Tone EB. Attention bias in adult survivors of childhood maltreatment with and without posttraumatic stress disorder. *Cognitive Therapy and Research*. 2011; 35:57–67. DOI: 10.1007/s10608-010-9294-2
- Fite JE, Bates JE, Holtzworth-Munroe A, Dodge KA, Nay SY, Pettit GS. Social information processing mediates the intergenerational transmission of aggressiveness in romantic relationships. *Journal of Family Psychology*. 2008; 22:367–376. DOI: 10.1037/0893-3200.22.3.367 [PubMed: 18540765]
- Fosco GM, Feinberg ME. Cascading effects of interparental conflict in adolescence: Linking threat appraisals, self-efficacy, and adjustment. *Development and Psychopathology*. 2015; 27:239–252. DOI: 10.1017/S0954579414000704 [PubMed: 25017469]
- Frankenhuis WE, Del Giudice M. When do adaptive developmental mechanisms yield maladaptive outcomes? *Developmental Psychology*. 2012; 48:628–642. DOI: 10.1037/a0025629 [PubMed: 21967567]
- Gamble AL, Rapee RM. The time-course of attentional bias in anxious children and adolescents. *Journal of Anxiety Disorders*. 2009; 23:841–847. doi/10.1016/j.janxdis.2009.04.001. [PubMed: 19447004]
- Gibb BE, McGeary JE, Beevers CG. Attentional biases to emotional stimuli: Key components of the RDoC constructs of sustained threat and loss. *American Journal of Medical Genetics*. 2016; 171:65–80. DOI: 10.1002/ajmg.b.32383
- Gordis EB, Margolin G, John RS. Parents' hostility in dyadic marital and triadic family settings and children's behavior problems. *Journal of Consulting and Clinical Psychology*. 2001; 69:727–734. DOI: 10.1037/0022-006X.69.4.727 [PubMed: 11550741]
- Grych, JH. Marital relationships and parenting. In: Bornstein, M., editor. *Handbook of parenting: Volume 4. Social conditions and applied parenting*. 2. Mahwah, NJ: Erlbaum; 2002. p. 203–225.
- Grych JH, Fincham FD. Marital conflict and children's adjustment: A cognitive- contextual framework. *Psychological Bulletin*. 1990; 108:267–290. DOI: 10.1037/0033-2909.108.2.267 [PubMed: 2236384]
- Guastella AJ, Carson DS, Dadds MR, Mitchell PB, Cox RE. Does oxytocin influence the early detection of angry and happy faces? *Psychoneuroendocrinology*. 2009; 34:220–225. DOI: 10.1016/j.psyneun.2008.09.001 [PubMed: 18848401]
- Gulley LD, Oppenheimer CW, Hankin BL. Associations among negative parenting, attention bias to anger, and social anxiety among youth. *Developmental Psychology*. 2014; 50:577–585. DOI: 10.1037/a0033624 [PubMed: 23815705]
- Harrison AJ, Gibb BE. Attentional biases in currently depressed children: An eye-tracking study of biases in sustained attention to emotional stimuli. *Journal of Clinical Child & Adolescent Psychology*. 2015; 44:1008–1014. DOI: 10.1080/15374416.2014.930688 [PubMed: 25010145]
- Horsley TA, de Castro BO, Van der Schoot M. In the eye of the beholder: Eye-tracking assessment of social information processing in aggressive behavior. *Journal of Abnormal Child Psychology*. 2010; 38:587–599. DOI: 10.1007/s10802-009-9361-x [PubMed: 19823928]
- Johnston, J., Roseby, V., Kuehnle, K. In the name of the child: A developmental approach to understanding and helping children of conflict and violent divorce. New York, NY: Springer Publishing; 2009.

- Jouriles EN, McDonald R, Mueller V, Grych JH. Youth experiences of family violence and teen dating violence perpetration: Cognitive and emotional mediators. *Clinical Child & Family Psychology Review*. 2012; 15:58–68. DOI: 10.1007/s10567-011-0102-7 [PubMed: 22160838]
- Kerig PK. Assessing the links between interparental conflict and child adjustment: The conflicts and problem-solving scales. *Journal of Family Psychology*. 1996; 10:454–473. DOI: 10.1037/0893-3200.10.4.454
- Kobak R, Zajac K, Smith C. Adolescent attachment and trajectories of hostile-impulsive behavior: Implications for the development of personality disorders. *Development and Psychopathology*. 2009; 21:839–851. DOI: 10.1017/S0954579409000455 [PubMed: 19583886]
- Lindblom J, Peltola MJ, Vanska M, Hietanen JK, Laasko A, Tiitinen A, Tulppala M, Punamaki R-L. Early family system types predict children's emotional attention biases at school age. *International Journal of Behavioral Development*. 2017; 41:245–256. DOI: 10.1177/0165025415620856
- Lyons-Ruth K, Bureau JF, Riley CD, Atlas-Corbett AF. Socially indiscriminate attachment behavior in the Strange Situation: Convergent and discriminant validity in relation to caregiving risk, later behavior problems, and attachment insecurity. *Development and Psychopathology*. 2009; 21:355–372. DOI: 10.1017/S0954579409000376 [PubMed: 19338688]
- Malik NM, Lindahl KM. System for coding interactions in dyads (SCID). Couple observational coding systems. 2004:173–188.
- Marcus NE, Lindahl KM, Malik NM. Interparental conflict, children's social cognitions, and child aggression: A test of a mediational model. *Journal of Family Psychology*. 2001; 15:315–333. DOI: 10.1037/0893-3200.15.2.315 [PubMed: 11458636]
- Maxwell SE, Cole DA. Bias in cross-sectional analyses of longitudinal mediation. *Psychological Methods*. 2007; 12:23–44. DOI: 10.1037/1082-989X.12.1.23 [PubMed: 17402810]
- McArdle JJ. Latent variable modeling of differences and changes with longitudinal data. *Annual Review of Psychology*. 2009; 60:577–605. DOI: 10.1146/annurev.psych.60.110707.163612
- McCrary EJ, Viding E. The theory of latent vulnerability: Reconceptualizing the link between childhood maltreatment and psychiatric disorder. *Development and Psychopathology*. 2015; 27:493–505. DOI: 10.1017/S0954579415000115 [PubMed: 25997767]
- Melby, JN., Conger, RD. The Iowa interaction rating scales: Instrument summary. In: Kerig, PK., Lindahl, KM., editors. *Family observational coding systems: Resources for systemic research*. Mahwah, NJ: Erlbaum; 2001. p. 33–58.
- Pine DS, Mogg K, Bradley BP, Montgomery L, Monk CS, McClure E, ... Kaufman J. Attention bias to threat in maltreated children: Implications for vulnerability to stress-related psychopathology. *American Journal of Psychiatry*. 2005; 162:291–296. DOI: 10.1176/appi.ajp.162.2.291 [PubMed: 15677593]
- Pollak SD. Experience-dependent affective learning and risk for psychopathology in children. *Annals of the New York Academy of Sciences*. 2003; 1008:102–111. DOI: 10.1196/annals.1301.011 [PubMed: 14998876]
- Qualter P, Rotenberg K, Barrett L, Henzi P, Barlow A, Stylianou M, Harris RA. Investigating hypervigilance for social threat of lonely children. *Journal of Abnormal Child Psychology*. 2013; 41:325–338. DOI: 10.1007/s10802-012-9676-x [PubMed: 22956297]
- Rodebaugh TL, Sculin RB, Langer JK, Dixon DJ, Huppert JD, Bernstein A, ... Lenze EJ. Unreliability as a threat to understanding psychopathology: A cautionary tale of attentional bias. *Journal of Abnormal Psychology*. 2016; 125:840–851. DOI: 10.1037/abn0000184 [PubMed: 27322741]
- Saxbe DE, Negri S, Susman EJ, Trickett PK. Attenuated hypothalamic-pituitary-adrenal axis functioning predicts accelerated pubertal development in girls 1 year later. *Development & Psychopathology*. 2015; 27:819–828. DOI: 10.1017/S0954579414000790 [PubMed: 25154521]
- Schermerhorn AC, Bates JE, Puce A, Molfese DL. Neurophysiological correlates of children's processing of interparental conflict cues. *Journal of Family Psychology*. 2015; 29:518–527. DOI: 10.1037/fam0000088 [PubMed: 26121533]
- Schlomer GL, Bauman S, Card NA. Best practices for missing data management in counseling psychology. *Journal of Counseling Psychology*. 2010; 57:1–10. DOI: 10.1037/a0018082 [PubMed: 21133556]

- Schippell PL, Vasey MW, Cravens-Brown LM, Bretveld RA. Suppressed attention to rejection, ridicule, and failure cues: A unique correlate of reactive but not proactive aggression in youth. *Journal of Clinical Child & Adolescent Psychology*. 2003; 32:40–55. DOI: 10.1207/S15374424JCCP3201_05 [PubMed: 12573931]
- Schoppe SJ, Mangelsdorf SC, Frosch CA. Coparenting, family process, and family structure: Implications for preschoolers' externalizing behavior problems. *Journal of Family Psychology*. 2001; 15:526–545. DOI: 10.1037/0893-3200.15.3.526 [PubMed: 11584800]
- Selig JP, Preacher KJ. Mediation models for longitudinal data in developmental research. *Research in Human Development*. 2009; 6:144–164. DOI: 10.1080/15427600902911247
- Shackman JE, Shackman AJ, Pollak SD. Physical abuse amplifies attention to threat and increases anxiety in children. *Emotion*. 2007; 7:838–852. DOI: 10.1037/1528-3542.7.4.838 [PubMed: 18039053]
- Shields A, Ryan RM, Cicchetti D. Narrative representations of caregivers and emotion dysregulation as predictors of maltreated children's rejection by peers. *Developmental Psychology*. 2001; 37:321–337. DOI: 10.1037/0012-1649.37.3.321 [PubMed: 11370909]
- Su X, Simons RL, Simons LG. Interparental aggression and antisocial behavior among African American youth: A simultaneous test of competing explanations. *Journal of Youth and Adolescence*. 2011; 40:1489–1502. DOI: 10.1007/s10964-011-9673-3 [PubMed: 21567215]
- Thompson RA. The legacy of early attachments. *Child Development*. 2000; 71:145–152. DOI: 10.1111/1467-8624.00128 [PubMed: 10836568]
- Thompson RA. Attachment-related mental representations: Introduction to the special issue. *Attachment & Human Development*. 2008; 10:359–377. DOI: 10.1080/14616730802461334 [PubMed: 19016047]
- Todd RM, Cunningham WA, Anderson AK, Thompson E. Affect-biased attention as emotion regulation. *Trends in Cognitive Sciences*. 2012; 16:365–372. DOI: 10.1016/j.tics.2012.06.003 [PubMed: 22717469]
- Tottenham N, Tanaka JW, Leon AC, McCarry T, Nurse M, Hare TA, ... Nelson C. The NimStim set of facial expressions: Judgments from untrained research participants. *Psychiatry Research*. 2009; 168:242–249. DOI: 10.1016/j.psychres.2008.05.006 [PubMed: 19564050]
- Vu NL, Jouriles EN, McDonald R, Rosenfield D. Children's exposure to partner violence: A meta-analysis of longitudinal associations with child adjustment problems. *Clinical Psychology Review*. 2016; 46:25–33. DOI: 10.1016/j.cpr.2016.04.003 [PubMed: 27136293]

Figure 1.

A structural equation model examining mediational pathways involving interparental hostility, children's duration of attention to angry, sad, and fearful emotions, and their subsequent externalizing symptoms. $^*p < .05$.

Figure 2.

A follow up structural equation model examining children's decreases in emotional security as a mechanism underlying children's diminished attention to anger as a mediator of the association between interparental hostility and children's subsequent externalizing symptoms. * $p < .05$.

Table 1

Means, standard deviations, and correlations among the variables in the primary analyses of the study.

	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Interparental Conflict																					
1. Observation	0.00	0.78	--																		
2. Interview	0.00	0.88	.40*	--																	
3. Questionnaire	0.00	0.70	.26*	.57*	--																
Wave 1 Attention to Negative Stimuli																					
4. Anger Duration	0.33	0.10	.06	-.02	-.05	--															
5. Sadness Duration	0.35	0.10	-.04	.00	-.12	.33*	--														
6. Fear Duration	0.40	0.10	-.02	-.02	-.08	.20*	.43*	--													
Wave 2 Attention to Negative Stimuli																					
7. Anger Duration	0.36	0.11	-.06	-.18*	-.13	.12	-.02	.14*	--												
8. Sadness Duration	0.37	0.09	.02	-.08	.06	.00	.08	.26*	.41*	--											
9. Fear Duration	0.41	0.10	-.08	-.08	-.02	.13	.12	.10	.30*	.31*	--										
Wave 1 Negative Parenting																					
10. Mom Insensitivity	6.14	2.14	.14*	.17*	.21*	-.01	.04	-.09	-.16*	-.02	-.23*	--									
11. Mom Disorganized	3.51	2.02	.27*	.25*	.14*	.03	-.05	-.07	-.09	.00	-.06	.60*	--								
12. Dad Insensitivity	5.45	2.05	.15*	.18*	.12	-.13	.00	.00	-.11	-.06	-.13*	.41*	.38*	--							
13. Dad Disorganized	3.62	2.06	.19*	.16*	.17*	-.10	.01	-.04	-.11	-.11	-.07	.29*	.28*	.48*	--						
Wave 1 Child Security																					
14. Rating Scale	5.31	1.96	-.15*	-.07	-.02	-.09	.00	-.11	-.02	-.01	.11	-.05	-.08	-.05	-.07	--					
15. Q-sort	0.38	0.33	-.08	-.08	.02	-.07	-.07	-.06	.01	.00	.10	-.08	-.16*	-.11	-.09	.77*	--				
Wave 2 Child Security																					
16. Rating Scale	4.96	2.05	-.25*	-.27*	-.19*	.05	.03	-.01	.26*	.06	.17*	-.13	-.19*	-.19*	-.20*	.27*	.20*	--			
17. Q-sort	0.37	0.37	-.16*	-.19*	-.15*	.01	.01	-.01	.17*	.07	.16*	-.08	-.18*	-.14*	-.15*	.24*	.21*	.80*	--		
Child Externalizing Symptoms																					
18. Wave 1	0.25	0.35	-.03	.00	.17*	-.15	.08	.06	-.09	-.07	-.07	.13	.13	.13	.06	.04	.08	-.04	-.05	--	

	<i>Mean</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
19. Wave 2	0.26	0.37	.01	.10	.17*	-.03	.08	.04	-.07	.02	-.02	.10	.12	.23*	.09	-.21*	-.20*	-.16*	-.16*	.50*	--
20. Wave 3	0.24	0.36	.12	.09	.10	-.06	.04	-.05	-.22*	-.07	-.07	.22*	.29*	.30*	.19*	-.20*	-.26*	-.19*	-.16*	.40*	.65*

Note.

*
p .05.