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ORIGINAL PAPER

A Pilot Study of Responses to Interparental Conflict in Children with Autism Spectrum Disorder

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Abstract

Research supports that parents of children with ASD experience higher rates of marital conflict compared to parents of neurotypically developing (NT) children; however, no known research examining reactions to interparental conflict in children with ASD exists. This study compared emotional, behavioral, and physiological responses to interparental conflict in ASD ($n = 21$) and NT children ($n = 29$). Children were presented with videotaped interactions (constructive vs. destructive conflict) of actors and their reactions were measured. Children with ASD reported higher levels of negative emotions following constructive conflict compared to NT children. Parents of children with ASD rated their child's emotional and behavioral responses to interparental conflict more negatively than parents of NT children. Comparable levels of physiological reactivity were found across both groups.

Keywords Autism spectrum disorder · Interparental conflict · Emotional responses · Behavioral responses · Physiological reactivity

Approximately 1 in 54 children in the US have autism spectrum disorder (ASD; Maenner et al. 2020), a neurodevelopmental disorder characterized by impairments in reciprocal social communication and social interaction as well as restricted and repetitive patterns of behavior, interests, and activities (APA 2013). Parents raising a child with ASD report lower marital quality (Saini et al. 2015; Sim et al. 2016), and have a higher divorce rate compared to parents of neurotypically developing (NT) children (Hartley et al. 2010). Controlling for marital satisfaction, parents of children with ASD also have more severe and less resolved conflict (Hartley et al. 2017a), and fewer positive couple interactions compared to parents of NT children (Hartley et al. 2017b). No studies to date, however, have directly tested how children with ASD react to their parents' disagreements. This is a gap in the literature given that interparental conflict has been reliably linked to NT children's internalizing symptoms (Cummings and Davies 2010; van Eldik et al. 2020), and children with ASD show disproportionately higher levels of depression compared to NT children (Hudson et al. 2019). Thus, the present pilot study examined responses to interparental conflict among children with ASD compared to NT children.

Although conflict occurs in any close relationship, the way parents handle disagreements can negatively impact the family system, including their children. Interparental conflict characterized by *destructive* behaviors (e.g., personal insults) is related to children's adjustment problems (e.g., Cummings et al. 2003; Brock and Kochanska 2016). Not all children, however, are negatively affected by interparental conflict; seeing parents handle conflict *constructively* by respecting each other and problem-solving can provide children with examples of how to resolve conflict and may have benign or even positive effects on children (Bergman et al. 2016).

The way children react to interparental conflict is important for understanding the effects on children's adjustment (Koss et al. 2011). The emotional security theory (Davies and Cummings 1994; Davies et al. 2016) posits that children's responses are indicators of how emotionally secure they are about the family. When interparental conflict threatens their sense of security, this is manifested in negative emotional distress, behavioral strategies such as becoming

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involved in the conflict, and cognitions that the parents' marriage is unstable. These responses, ultimately, can turn into patterns of behavior leading to internalizing or externalizing symptoms (e.g., Cummings et al. 2006; Davies et al. 2015). Rhoades (2008) meta-analysis found that children's emotional, behavioral, and physiological responses to interparental conflict were reliably associated with children's adjustment problems.

The types of responses in NT children that are detrimental to their development, however, rely on the same social and cognitive processes that are impaired in children with ASD. For example, difficulty understanding social interactions is a core symptom of ASD (Koning et al. 2001; Szatmari et al. 1989). Carothers and Taylor (2004) found that children with ASD were less likely to pick up on cues showing benign intent in peer conflict video vignettes and were more likely to appraise the peer in the video as being mean. These deficits may present difficulties for children with ASD in how they interpret and respond to interparental conflict, and their ability to distinguish between destructive and constructive disagreements. Thus, children with ASD may not properly interpret conflict cues and may not react negatively during an interparental disagreement. Alternatively, children with ASD may misinterpret mild or constructive conflict, and react more negatively to interparental conflict. Moreover, children with ASD endorse fewer effective strategies for handling social conflict compared to NT children (Hochhauser et al. 2015), and therefore, may behaviorally respond by becoming involved in interparental conflict or actively avoiding parents during a constructive disagreement.

Research on whether children with ASD show differences in physiological reactivity are limited and the results are mixed (Benevides and Lane 2015; Lydon et al. 2016). In the context of social interactions and conflict, some studies suggest children with ASD have a similar autonomic response compared to NT children (Blair 1999; Levine et al. 2012; Corbett et al. 2019). Compared to NT children, Neuhaus and colleagues (2016), however, found increased sympathetic reactivity in children with ASD when interacting with a familiar partner, whereas Edmiston et al. (2017) found decreased sympathetic arousal in response to a modified Trier Social Stress Test. No study to date has assessed children's autonomic reactivity in the context of interparental conflict.

Present study

The present pilot study examined the extent to which responses to interparental conflict among children with ASD differ from NT children. We used a multi-method, multi-reporter approach to assess children's responses, including emotional, behavioral, and autonomic physiological responses. We collected indices of both parasympathetic (respiratory sinus arrhythmia; RSA) and sympathetic (skin conductance level; SCL) reactivity; these were selected given they have been extensively studied in relation to interparental conflict in NT children (e.g., El-Sheikh et al. 2009; Obradović et al. 2011).

Neurotypically developing children respond more negatively to destructive as compared to constructive interparental conflict (e.g., Goeke-Morey et al. 2003). Given the lack of research among children with ASD and the exploratory nature of this study, however, two plausible (exploratory) hypotheses were considered. Given deficits in processing and interpreting social interactions and others' emotions, children with ASD may show less negative emotional responses, endorse fewer behavioral responses, and exhibit less of an autonomic stress response compared to NT children. Alternatively, impairment in interpreting social interactions among children with ASD, in particular misreading cues that signal benign intent, may result in more negative responses to interparental conflict, including constructive conflict, compared to NT children.

Method

Participants

Participants were 21 children with ASD and 29 NT children and their primary caregiver (90% mothers) who were recruited from the community through local schools, flyers, and online advertisements. Eligibility criteria were that children were between the ages of 8 and 13, the parent was married or living with a romantic partner for at least 2 years, children lived with the parent the majority of the time, and both parents and children could complete measures in English. Children in the ASD group needed to have a community diagnosis of ASD (e.g., diagnosis received from psychologist, psychiatrist, or other community source), no diagnosis of an intellectual disability, and have complex language. Children in the NT group needed to be free of any developmental, intellectual, or learning disability. The inclusion criteria for both groups were confirmed via parent report. To ensure that children could understand study tasks, both groups of children were also required to have a receptive vocabulary score greater than 70 to participate in the study, which was determined during the study visit. Although not an eligibility criterion, all parents were in a heterosexual relationship.

Children in the ASD group were, on average, 10.95 years old (SD = 1.90) and 76.2% were male. Parents were 71.5% White, 9.5% Black/African American, and 19% Hispanic/Latino. Children in the NT group were, on average, 9.93 years old (SD = 1.52) and 72.4% were male. Parents were

65.5% White, 10.3% Black/African American, 17.2% Hispanic/Latino, 3.4% Asian, and 3.4% reported more than one race. The median annual family income for both groups was $80,001–$100,000.

Procedure

Families interested in the study completed an eligibility phone screen. Next, the primary caregiver and child completed a 2-h laboratory visit. Prior to the visit, parents provided informed consent and completed some questionnaires online. Children provided assent at the study visit. All procedures were approved by the Southern Methodist University and Texas Christian University Institutional Review Boards (Project title: My Family Study, Approval No. 2016-004-KOUC and 1601-006-1602). Families were paid $50 and the child received a toy valued at approximately $10.

Children first completed the Peabody Picture Vocabulary Test (PPVT-4; Dunn and Dunn 2007) to assess receptive language skills. Families whose child had a standard score < 70 were paid $20 for their time, the study ended, and they were not included in the sample presented above ($n_{NT} = 2$, $n_{ASD} = 4$). Children completed questionnaires in an interview format with the help of a research assistant. Physiological sensors were placed on children before completing questionnaires so they could acclimate to the sensors.

Two baseline measures of children's autonomic reactivity were acquired during a 3-min quiet sitting baseline and while watching a 2-min nature video. This length of time is consistent with previous psychophysiological research (e.g., Patriquin et al. 2011). Next, an experimental videotape analog method was used to assess children's responses to interparental conflict. Experimental analog tasks, in which children are exposed to simulated conflict in a laboratory-setting (via audiotape, videotape, or live actors) is a common method for assessing NT children's responses to interparental conflict (e.g., Cummings et al. 1985; Davies et al. 1999; Grych 1998; see also Cummings 1995) and has the advantage of standardizing children's conflict exposure to better compare responses across children. These simulated conflict interactions are typically 1 to 5 min in length, and have been used across a wide age range of children, as young as two years old up to emerging adults (Cummings et al. 1985; Cummings 1991; Davies et al. 1999). Analog video tasks have been used in research with children with ASD to assess reactions to social conflict (e.g., Carothers and Taylor 2004).

In the present study, children were shown two 2-min videos (counterbalanced) of a male and a female actor having a disagreement and were told to pretend the actors were their parents. The topic of disagreement (finances and division of household labor) and story arch was the same in both videos. In one video, the actors used destructive conflict tactics, such as verbal and nonverbal anger, personal insults, and threats; the conflict was unresolved and ended with the father leaving the home. In the other video, the actors used constructive conflict tactics, such as calm discussion, support, physical affection, and problem-solving; the conflict ended with a resolution and the parents hugging. Afterward, children answered questions about their emotional and behavioral responses. A 3-min recovery period occurred before the second video. As a validity check, children rated the difficulty in pretending the actors were their parents on a 7-point scale (1= *easy* and 7 = *hard*). On average, children rated the task as 4.12 (SD = 2.19), suggesting that it was not difficult for them to imagine the actors were their parents. There was no significant difference in children's ability to imagine the actors were their parents based on diagnosis, $t(48) = 0.32$, $p = .75$.

Measures of Children's Responses to Interparental Conflict

Child Self-Report

Children completed the Security in the Interparental Subsystem (SIS; Davies et al. 2002), and rated a list of statements about their responses to interparental conflict during the past year using a 4-point Likert scale (1 = *not at all true of me* to 4 = *very true of me*). The following subscales were used: Emotional Reactivity (7-items; e.g., "I feel scared"; α = 0.66), Behavioral Dysregulation (3 items; e.g., "I hit, kick, slap, or throw things at people in my family"; α = 0.68), Avoidance (7 items; e.g., "I try to get away from them (for example, by leaving the room)"; α = 0.70), and Involvement (6 items; e.g., "I try to solve the problem for them"; α = 0.75).

Parent Report About Child

Parents completed the Security in the Marital Subsystem- Parent Report (SIMS-PR; Davies et al. 2002), and rated a list of statements about their children's reactions to witnessing interparental conflict during the past year on a scale ranging from 1 (*not at all like him or her*) to 5 (*a whole lot like him or her*). The SIMS-PR includes four subscales assessing children's Overt Emotional Reactivity (10 items, e.g., "appears frightened"; α = 0.78), Behavioral Dysregulation (5 items, e.g., "starts hitting, kicking, slapping, or throwing things at family members"; α = 0.85), Overt Avoidance (4 items, e.g., "goes off by him- or herself"; α = 0.69), and Overt Involvement (9 items, e.g., "Ends up taking sides with one of us"; α = 0.74).

Analog Measure of Children's Responses

After each video, children rated how much they felt each of the following emotional responses on a 7-point Likert scale (1 = *not at all* to 7 = *a whole lot*): happy, angry, sad, afraid, anxious. Angry, sad, afraid, and anxious responses were summed to create a negative emotional response composite. To assess children's behavioral responses, children were asked, "What would you do if you were in the same room with your parents during this disagreement?" Responses were coded for level of mediation of parents' conflict and avoidance of conflict on a 5-point scale (0 = *no element of mediation/avoidance* and 5 = *extreme insecurity in the form of mediation/avoidance*; Shelton et al. 2006). An example of a mediation response was "I would try to get my dad not to leave and try to help them figure something out" and for avoidance was "I would walk away [and] stay in a different room until everything is better." Three trained research assistants coded responses and codes were averaged. Interclass Correlation Coefficients (ICC; two-way random, average) for ratings were excellent for mediation (ICC = 0.91) and avoidance (ICC = 0.99). Similar interview questions have been used following simulated conflict videos even among young children (e.g., ages 4–5; Cummings 1987; Davies et al. 1999), suggesting that the children in our study were able to understand and answer the interview questions.

Physiological Reactivity to Interparental Conflict

The length of our video stimuli (2 min) allowed us to acquire children's physiological responses to each video. Children's SCL and RSA were assessed following standard guidelines (Berntson et al. 2007) and using Mindware mobile equipment (Model 50-2303-00; Mindware Technologies, Inc, Gahanna, OH). To reduce movement artifacts, children were seated throughout, and electrode lead cables were looped and taped down. Baseline SCL and RSA were calculated by averaging the quiet sitting and neutral video baselines. Two children in the ASD group did not have useable SCL data for either video or RSA data for the destructive video.

Skin conductance level, measured in microSiemens, is an index of sympathetic nervous system (SNS) activity and was assessed using two disposable Ag-AgCl electrodes (1" × 1" foam, 0% chloride wet gel) placed on the lower palm of the child's nondominant hand. Data were analyzed using the Mindware EDA 3.1.6 analysis software in 30-s epochs and then averaged. To calculate reactivity (SCL-R) to the destructive and constructive conflict videos, we subtracted children's baseline SCL from their SCL while watching each video. Higher scores indicated higher SNS reactivity. As a manipulation check that the conflict videos elicited reactivity in children, we conducted a paired samples *t*-test separately for ASD and NT children. Both groups showed significant reactivity in response to the constructive (ASD: $t(18) = 2.86$, $p = .01$; NT: $t(28) = 4.37$, $p < .001$) and destructive (ASD: $t(18) = 2.68$, $p = .015$; NT: $t(28) = 3.11$, $p = .004$) conflict videos. Approximately 79% of children with ASD and 79.3% of NT children showed an increase in SCL from baseline to the constructive video, and 78.9% of children with ASD and 72.4% of NT children showed an increase in SCL from baseline to the destructive video. Thus, the majority of participants in the study exhibited physiological reactivity to the conflict videos.

Respiratory sinus arrhythmia is an index of parasympathetic nervous system (PNS) activity and reflects the influence of the PNS on heart rate variability via the vagus nerve, which is responsible for regulating cardiac activity (Porges 1991). Levels of RSA were assessed using three disposable ECG electrodes (1 5/8" tape, 1% Chloride wet gel) placed on the child's torso. Data were analyzed using Mindware HRV 3.1.5 analysis software. Research assistants visually inspected the data for artifacts and missing or misplaced *R* peaks were corrected. Levels of RSA were calculated in 60-second epochs and then averaged. To calculate RSA reactivity (RSA-R), we subtracted children's baseline RSA from RSA while watching each video. Positive scores indicate increased PNS activity (vagal augmentation; i.e., under-arousal) and negative scores reflect decreased PNS activity (vagal withdrawal; i.e., higher arousal). Thirty-three percent of children with ASD and 32.1% of NT children showed PNS under-arousal to the constructive video, and 57.9% of children with ASD and 25.0% of NT children showed under-arousal to the destructive video. Paired samples t-tests showed that whereas NT children showed a significant change from baseline to video (Constructive $t(28) = 2.97$, $p = .006$; Destructive $t(28) = 3.35$, $p = .002$), children with ASD did not show a significant change in RSA levels to either video (Constructive $t(20) = 1.58$, $p = .13$; Destructive $t(18) = .86$, $p = .40$).

Results

Preliminary Analyses

Descriptive statistics by group are in Table 1. Children with ASD were approximately one year older than NT children, $t\ (48) = 2.10$, $p = .041$, and NT children had significantly higher receptive language scores ($M = 113.31$, SD = 16.64) compared to children with ASD ($M = 103.57$, SD = 14.44), $t(48) = 2.16$, $p = .036$. Children's ASD symptom severity was measured using parent reported scores on the Social Communication Questionnaire (SCQ; Rutter et al. 2003) and children with ASD had significantly greater ASD symptom severity ($M = 19.52$, SD = 7.04) compared to NT children ($M = 3.79$, SD = 3.31), $t(48) = 10.56$, $p < .001$. We also

Table 1 Descriptive statistics for study variables

	ASD ($n = 21$[a])		NT ($n = 29$)	
	M	SD	*M*	SD
Child report (SIS)				
Emotional reactivity	13.48	4.31	11.52	3.05
Behavioral dysregulation	4.43	1.94	3.59	1.76
Avoidance	17.90	5.09	17.00	4.28
Involvement	14.62	4.96	14.45	3.83
Parent report (SIMS-PR)				
Emotional reactivity	21.71	7.27	16.28	4.25
Behavioral dysregulation	10.10	5.18	7.52	2.61
Avoidance	8.48	3.83	7.79	3.51
Involvement	23.57	6.42	20.45	6.32
Baseline[b] physiological responses				
Baseline SCL	10.54	7.63	10.74	5.80
Baseline RSA	6.85	1.17	7.36	1.16
Child responses to constructive video				
Negative emotionality	6.81	4.09	4.07	1.75
Behavioral involvement	1.25	1.07	.72	.97
Behavioral avoidance	.25	.60	.38	.86
SCL-R	3.20	4.86	3.15	3.88
RSA-R	− .23	.66	− .39	.71
Child responses to destructive video				
Negative emotionality	10.67	5.14	10.86	4.67
Behavioral involvement	.92	1.31	.93	1.29
Behavioral avoidance	1.16	1.08	1.24	.98
SCL-R	2.43	3.95	2.35	4.08
RSA-R	− .10	.53	− .32	.52

SIS Security in the Interparental Subsystem, *SIMS-PR* Security in the Marital Subsystem-Parent Report

[a]For analyses involving RSA-R the sample size for the ASD group is 21 and for SCL-R the sample size for the ASD group is 19

[b]Baseline SCL and RSA is the average value from the 3-min quite sitting baseline and the neutral video

tested whether regular medication use, which may influence physiological responses, was associated with RSA and SCL; no significant associations were found (all *p*s > .05).

Group Differences in Children's Responses to Interparental Conflict

Analysis of covariance (ANCOVA) was used to test group differences in children's emotional and behavioral reactions, controlling for child age and receptive language. We used the Benjamini-Hochberg (1995) false discovery rate to account for the number of group comparisons conducted. There were no significant group differences for child-reported responses on the SIS. Parents of children with ASD, however, reported their child showed significantly higher overt emotional reactivity, $F(1, 46) = 11.55$, $p = .001$ (Benjamini-Hochberg corrected $p = .004$), and greater behavioral dysregulation, $F(1, 46) = 7.72$, $p = .008$ (Benjamini-Hochberg corrected $p = .016$), in response to interparental conflict as compared to NT children.

Children with ASD reported a significantly higher negative emotional reaction to watching the constructive video compared to NT children, $F(1, 46) = 7.78$, $p = .008$ (Table 2 and Fig. 1). Follow-up post-hoc analyses found that, specifically, children with ASD reported significantly greater sadness, $F(1, 46) = 12.15$, $p = .001$ (Benjamini-Hochberg corrected $p = .004$), compared to NT children. No significant group differences in children's negative emotional responses were found for the destructive video, $F(1, 46) = .21$, $p = .648$. Children's self-reported behavioral responses to interparental conflict videos also did not differ between groups (*p*s > .05).

Separate ANCOVAs tested for group differences in children's physiological responses to the videos (Table 3). Children's SCL-R and RSA-R scores were entered as the

Table 2 Group differences in child self-report and parent-report of children's responses to interparental conflict

	Emotional reactivity			Behavioral dysregulation			Avoidance			Involvement		
	$F(1, 46)$	p	η^2	$F(1,46)$	p	η^2	$F(1,46)$	p	η^2	$F(1,46)$	p	η^2
Child report (SIS) model												
Child Age	.97	.776	.001	.01	.933	.000	.96	.333	.020	1.01	.320	.021
PPVT	**7.79**	**.008**	**.135**	3.73	.060	.071	.69	.410	.014	.29	.593	.006
ASD vs. TD	1.24	.271	.022	.94	.338	.018	.01	.910	.000	.06	.802	.001
Parent report (SIMS-PR) model												
Child Age	1.17	.286	.020	**5.49**	**.024**	**.096**	.03	.873	.001	.28	.600	.006
PPVT	.05	.832	.001	.08	.782	.001	.02	.879	.001	.25	.619	.005
ASD vs. TD	**11.55**	**.001**	**.199**	**7.72**	**.008**	**.135**	.25	.619	.005	2.42	.127	.049

Group coded such that ASD = 1 and NT = 2. Bold represents significant effect at $p < .05$.

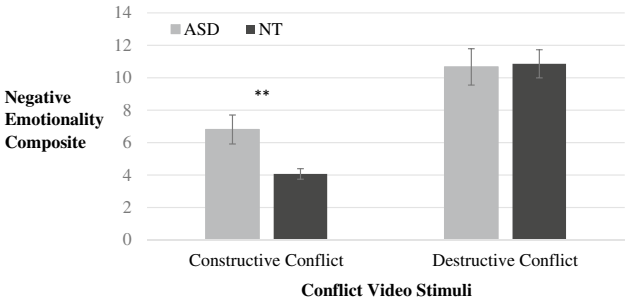

Fig. 1 Children's negative emotional responses to constructive and destructive conflict stimuli. *ASD* children on the autism spectrum; *NT* neuro-typically developing children. Negative emotionality composite is the sum of children's angry, sad, afraid, and anxious ratings. ** p =.008

dependent variable. Group membership was entered as the between-subjects factor. Child age, receptive language, and baseline RSA or SCL levels were entered as covariates. Children's SCL-R and RSA-R did not significantly differ between groups for either video (ps > .05).

Discussion

This multi-method, multi-reporter study compared responses to interparental conflict in children with ASD and NT children. Whereas the two groups of children showed similarities in their self-reported responses to interparental conflict on a retrospective questionnaire, parents of children with ASD reported more child negative emotional and behavioral reactivity to conflict as compared to parents of NT children. In response to the constructive conflict video, children with ASD reported significantly higher negative emotions compared to NT children; however, children in both groups reported comparable levels of negative emotions to the destructive conflict video. No differences in children's self-reported behavioral responses or objective measures of autonomic reactivity were found. The findings have implications for the potential impact of interparental conflict on children with ASD's emotional development during middle childhood.

Compared to parents of NT children, parents of children with ASD reported their child showed higher levels of emotional reactivity and behavioral dysregulation in response to parents' disagreements. Co-occurring externalizing behaviors are common among children with ASD (Kaat and Lecavalier 2013), and may manifest during interparental conflict, accounting for increased emotional and behavioral reactivity. Another potential explanation for why interparental conflict may elicit greater negative responses in children with ASD may be because some children with ASD can be hypersensitive to everyday loud noises (e.g., a person yelling), whereas other children may become distressed due to changes in their routines as a result of their parents engaging in an argument. Compared to parents of NT children, it is also possible that parents of children with ASD may over-report their child's emotional reactivity and behavioral dysregulation due to expectations of the emotional and behavioral challenges associated with an ASD diagnosis.

In contrast to parents' reports, there were no significant group differences for children's self-reported reactions to interparental conflict on the SIS. Parents of children with ASD typically report higher levels of stress and depression compared to parents of NT children (Davis and Carter 2008). Reporter bias may account for the findings as it is possible that parents interpret their child's behavior as more dysregulated because of their own distress. Children with ASD also may not be as adept at responding to questions that ask them to recall their responses over a one-year period. There is some research to suggest that individuals with ASD have differences in episodic memory (Millward et al. 2000) and in memory for complex social information (Williams et al. 2005). Finally, the lack of congruence between parent- and child-report may be a function of the measurement instruments used. Although the measures contain similar items

Table 3 Group differences in children's responses to the conflict videos

	Negative emotion			Mediation/Involvement			Avoidance			SCL-R			RSA-R		
	F (1,46)	*p*	η^2	*F* (1,46)	*p*	η^2	*F* (1,46)	*p*	η^2	*F* (1,43)	*p*	η^2	*F* (1, 45)	*p*	η^2
Construc-tive															
Child age	.00	.948	.000	.01	.945	.000	.36	.553	.007	.01	.906	.000	.47	.496	.009
PPVT	.14	.713	.002	.33	.570	.007	1.84	.182	.038	2.58	.115	.056	2.82	.100	.055
Baseline SCL/ RSA	–	–	–	–	–	–	–	–	–	.22	.645	.005	1.08	.305	.020
ASD vs. TD	**7.78**	**.008**	**.138**	2.26	.139	.046	.00	.978	.000	.22	.642	.005	.01	.919	.000
Destructive															
Child age	.54	.467	.011	3.86	.056	.077	1.54	.221	.032	.87	.357	.017	.64[a]	.430	.012
PPVT	.20	.658	.004	.56	.458	.011	.26	.612	.005	3.54	.067	.070	1.95[a]	.170	.037
Baseline SCL/ RSA	–	–	–	–	–	–	–	–	–	3.47	.069	.068	3.60[a]	.065	.068
ASD vs. TD	.21	.648	.005	.09	.760	.002	.21	.649	.004	.75	.392	.015	.62[a]	.434	.012

Group coded such that ASD = 1 and NT = 2

Bold represents significant effect at $p < .05$

[a]The *df* for these analyses were (1, 43)

and subscales, Davies and colleagues (2002) reported only moderate correlations between parent and child reports. In the present sample, only parents' and children's reports of involvement were significantly correlated, $r = 0.51$, $p < .001$; whereas reports of emotional reactivity, behavioral dysregulation, and avoidance were not significantly correlated ($p = .12–.71$). Further research on the degree of convergent validity between measures is needed.

Both groups reported comparable levels of emotional distress after watching the destructive conflict video. Although individuals with ASD show difficulties in processing emotional information, the intensity of the emotional display may impact responses (Nuske et al. 2013). The results of this study suggest that children with ASD are equally affected by overt negative conflict cues compared to NT children. After watching the constructive conflict, however, children with ASD reported significantly higher negative emotions compared to NT children. In the constructive video, the parents calmly discussed their disagreement, reached a resolution, and engaged in a physical display of affection. Previous research shows that during dynamic emotional displays, children with ASD show impaired emotion recognition (Tardif et al. 2007) which may be due to focusing on people's bodies or background objects (e.g., Rice et al. 2012). Children with ASD also have difficulties recognizing emotions when presented with audio recordings (for review see Lartseva et al. 2015). Thus, it is possible that children with ASD are misinterpreting constructive conflict as more negative than it is. These findings are consistent with previous research demonstrating that children with ASD have difficulty interpreting benign intention cues during peer conflict vignettes (Carothers and Taylor 2004). Thus, it may be important for clinicians working with children with ASD to teach them about constructive conflict skills. This may not only benefit children when exposed to interparental conflict, but it may also help them navigate other forms of social conflict, such as with peers.

Children's negative emotional responses to constructive interparental conflict is particularly concerning because research with NT children shows that exposure to parents' constructive disagreements has a benign, or even positive, effect on children (Bergman et al. 2016). Constructive conflict increases children's sense of emotional security about the family and provides children with positive examples for resolving conflict. The findings from this study suggest that children with ASD may miss the opportunity to benefit from these interactions. It is possible that in an effort to avoid distressing their children, parents do not engage in conflict, even if a minor disagreement, in the presence of their ASD child. However, disagreements are unavoidable in close relationships and despite parents' best efforts, children do see or hear parents' conflicts (Papp et al. 2002). Therefore, parents of children with ASD may need to ensure their child understands when the conflict has ended and that the parents have resolved their disagreement. In light of these findings, clinicians working with families of children with ASD may want to also focus on teaching parents how to engage in constructive conflict tactics in the presence of their children and emphasizing the importance of communicating with their children that the conflict has been resolved.

Children with ASD and NT children showed comparable levels of autonomic reactivity to interparental conflict. Consistent with expectations that the task was valid and elicited arousal, a similar number of children in each group showed increases in SCL in response to the videos and both groups were able to imagine that the actors were their parents. It appears that exposure to interparental conflict mounts a sympathetic response in children, regardless of whether they have a diagnosis of ASD. Previous research utilizing SCL, however, has yielded conflicting results, as some studies find that individuals with ASD show a heightened SCL response to faces (Mathersul et al. 2013), whereas others show a blunted SCL response when asked to judge emotions (Hubert et al. 2009). To our knowledge, there are no studies examining SCL responses to dynamic social stimuli (i.e., videos) and further research is warranted to determine whether these findings generalize to other social situations.

We found no significant differences between groups in levels of RSA during either conflict video. The PNS serves a regulatory function in recovering from arousal (Kahle et al. 2016), and vagal withdrawal promotes active engagement and coping processes whereas vagal augmentation may reflect poor regulation (Beauchaine 2015). Although there was no overall group difference in RSA-R, NT children, on average, showed vagal withdrawal during both conflict videos, suggesting they were engaged in regulatory processes. Children with ASD, however, did not show any significant changes in RSA for either video. Indeed, in response to the destructive conflict video, the majority of children with ASD (57.9%) showed vagal augmentation whereas only 25% of children with NT showed a similar response. Although not a consistent finding, some research suggests children with ASD have difficulty engaging in physiological regulation and show poor social adaptation in social context. Neuhaus and colleagues (2016) found that children with ASD showed consistent levels of RSA when interacting with a familiar or novel partner whereas levels of RSA increased for NT children when interacting with the novel partner. This is consistent with early descriptions provided by Lord (1984), in which children with ASD were found to show little response to unfamiliar adults in naturalistic settings. The lack of a significant difference in the present study may be due to low power, as the separate analyses suggest differential responding between groups. Further research is needed to replicate these findings.

Limitations and Future Directions

Limitations of the present study provide directions for future research. This was a pilot study, reflected by the small sample size. The sample size may have constrained the power to detect true group differences. Nonetheless, several significant differences were detected, and remained significant after adjusting for the number of group differences tested. The small sample size also limited our ability to conduct more sophisticated analyses. For example, there may be differences that exist *within* the group of children with ASD such that children may react differently to interparental conflict based on their specific ASD symptom profile. Another limitation is that children's ASD diagnosis was not independently confirmed. Although parents were asked to provide their child's diagnostic paperwork, diagnoses were conducted in the community and there may be variability in how diagnoses were determined. Another limitation is the use of videos of interparental conflict. Our videos were 2 min in length and therefore included various conflict behaviors throughout the video (grouped by destructive or constructive tactics). This approach does not allow us to isolate specific conflict behaviors to test the extent to which some behaviors are more or less distressing for children. Our analog measures, however, provide a more ecologically valid presentation of conflict, as couples often display multiple behaviors during an interaction. Although children with ASD may have difficulties with imaginary situations (APA 2013), in this study the two groups were equally able to imagine the actors were their parents. Nonetheless, future research is needed to examine how children react to witnessing their own parents engage in disagreement.

Implications

The present findings have implications about the appropriateness of extending existing theory and research related to marital conflict to children with ASD. For example, the emotional security theory (Davies and Cummings 1994) argues that when exposed to interparental conflict, children may feel emotionally insecure about their family. These feelings of insecurity motivate children's emotional and behavioral responses; thereby, indirectly leading to internalizing problems. It is not yet clear, however, the extent to which this theory fully extends to children with ASD, as we did not find evidence to support that constructive conflict increases children's feelings of security about the family. Thus, the dimensions of interparental conflict that may threaten children's emotional security may differ for NT vs ASD children. In addition, children's appraisals of conflict (e.g., self-blame; Grych 1998) may be particularly relevant, but have yet to be studied. Given evidence that children with ASD may be exposed to more interparental conflict, there is a clear need for additional studies on the impact on children's development and the extent to which theoretical models based on studies with NT children extend to children with ASD. In light of the paucity of studies of children with ASD, the mechanisms by which interparental conflict are hypothesized to affect children's socioemotional health may need to be broadened to account for differences between children with ASD and NT children in their processing of, and responses, to interparental conflict.

The findings from this pilot study have implications for our understanding of emotional development in children with ASD. Previous research with NT children shows that exposure to destructive forms of interparental conflict is linked to anxiety and depression (e.g., Brock and Kochanska 2016). Elevated rates of co-occurring anxiety and depression are often reported in children with ASD (Hudson et al. 2019); however, the mechanisms that explain these co-occurring symptoms are unknown. Research is needed to determine whether exposure to interparental conflict, irrespective of type, is related to anxiety and depression in children with ASD. In the current study, we found that children with ASD and NT children showed some similar emotional and physiological reactions to destructive conflict, suggesting that interparental conflict might also be related to co-occurring adjustment problems among children with ASD. Moreover, based on parent report, children with ASD showed greater behavioral dysregulation, and in the context of constructive conflict, children with ASD reported greater negative emotional reactivity, compared to NT children. Thus, children with ASD may be more adversely affected by exposure to interparental conflict. Therefore, family-level processes may be particularly informative to study for understanding internalizing symptoms in children with ASD.

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References

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Beauchaine, T. P. (2015). Respiratory sinus arrhythmia: A transdiagnostic biomarker of emotion dysregulation and psychopathology. *Current Opinion in Psychology, 3,* 43–47. https://doi.org/10.1016/j.copsyc.2015.01.017.

Benevides, T. W., & Lane, S. J. (2015). A review of cardiac autonomic measures: Considerations for examination of physiological responses in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders, 45,* 560–575. https://doi.org/10.1007/s10803-013-1971-z.

Benjamini, Y., & Hochberg, Y. (1995). Controlling the false discovery rate: A practical and powerful approach to multiple testing. *Journal of the Royal Statistical Society. Series B (Methodological), 57,* 289–300. https://doi.org/10.1111/j.2517-6161.1995.tb02031.x.

Bergman, K. N., Cummings, E. M., Warmuth, K. A. (2016). The benefits of marital conflict: Constructiveness and resolution as predictors of positive child outcomes. In D. Narvaez, J. M. Braungart-Reiker, L. E. Miller-Graff, L. T., Gettler, & P. D. Hastings (Eds.), *Contexts for young child flourishing: Evolution, family, and society* (pp. 223-245). New York, NY: Oxford University Press.

Berntson, G. G., Quigley, K. S., & Lozano, D. (2007). Cardiovascular psychophysiology. In J. Cacioppo, L. G. Tassinary, & G. G. Berntson (Eds.), *Handbook of psychophysiology* (pp. 182–210). New York: Cambridge University Press.

Blair, R. J. R. (1999). Psychophysiological responsiveness to the distress of others in children with autism. *Personality and Individual Differences, 26,* 477–485. https://doi.org/10.1016/S0191-8869(98)00154-8.

Brock, R. L., & Kochanska, G. (2016). Interparental conflict, children's security with parents, and long-term risk of internalizing problems: A longitudinal study from ages 2 to 10. *Development and Psychopathology, 28,* 45–54. https://doi.org/10.1017/S0954579415000279.

Carothers, D. E., & Taylor, R. L. (2004). Social cognitive processing in elementary school children with Asperger syndrome. *Education and Training in Developmental Disabilities, 39,* 177–187.

Corbett, B. A., Muscatello, R. A., & Baldinger, C. (2019). Comparing stress and arousal systems in response to different social contexts in children with ASD. *Biological Psychology, 140,* 119–130. https://doi.org/10.1016/j.biopsycho.2018.12.010.

Cummings, E. M. (1987). Coping with background anger in early childhood. *Child Development*, *58*, 976–984.

Cummings, E. M. (1995). Usefulness of experiments for the study of the family. *Journal of Family Psychology, 9,* 175–185. https://doi.org/10.1037/0893-3200.9.2.175.

Cummings, E. M., Ballard, M., El-Sheikh, M., & Lake, M. (1991). Resolution and children's responses to interadult anger. *Developmental Psychology, 27,* 462–470. https://doi.org/10.1037/0012-1649.27.3.462.

Cummings, E. M., & Davies, P. T. (2010). *Marital conflict and children: An emotional security perspective*. New York, NY: Guilford Press.

Cummings, E. M., Geoke-Morey, M. C., & Papp, L. M. (2003). Children's responses to everyday marital conflict tactics in the home. *Child Development, 74,* 1918–1929. https://doi.org/10.1046/j.1467-8624.2003.00646.x.

Cummings, E. M., Iannotti, R. J., & Zahn-Waxler, C. (1985). Influence of conflict between adults on the emotions and aggression of young children. *Developmental Psychology, 21,* 495–507. https://doi.org/10.1037/0012-1649.21.3.495.

Cummings, E. M., Schermerhorn, A. C., Davies, P. T., Goeke-Morey, M. C., & Cummings, J. S. (2006). Interparental discord and child adjustment: Prospective investigations of emotional security as an explanatory mechanism. *Child Development, 77,* 132–152. https://doi.org/10.1111/j.1467-8624.2006.00861.x.

Davies, P. T., Coe, J. L., Martin, M. J., Sturge-Apple, M. L., & Cummings, E. M. (2015). The developmental costs and benefits of children's involvement in interparental conflict. *Developmental Psychology, 51,* 1026–1047. https://doi.org/10.1037/dev0000024.

Davies, P. T., & Cummings, E. M. (1994). Marital conflict and child adjustment: An emotional security hypothesis. *Psychological Bulletin, 116,* 387–411. https://doi.org/10.1037/0033-2909.116.3.387.

Davies, P. T., Forman, E. M., Rasi, J. A., & Stevens, K. I. (2002). Assessing children's emotional security in the interparental relationship: The security in the interparental subsystem scales. *Child Development, 73,* 544–562. https://doi.org/10.1111/1467-8624.00423.

Davies, P. T., Martin, M. J., & Sturge-Apple, M. L. (2016). Emotional security theory and developmental psychopathology. In D. Cicchetti & D. J. Cohen (Eds.), *Developmental psychopathology, Vol. 1. Theory and method*(3rd ed., pp. 199-264). New York, NY: Wiley.

Davies, P. T., Myers, R. L., Cummings, E. M., & Heindel, S. (1999). Adult conflict history and children's subsequent responses to conflict: An experimental test. *Journal of Family Psychology, 13,* 610–628. https://doi.org/10.1037/0893-3200.13.4.610.

Davis, N. O., & Carter, A. S. (2008). Parenting stress in mothers and fathers of toddlers with autism spectrum disorders: Associations with child characteristics. *Journal of Autism and Developmental Disorders, 38,* 1278–1291. https://doi.org/10.1007/s10803-007-0512-z.

Dunn, L. M., & Dunn, D. M. (2007). *Peabody picture vocabulary test* (4th ed.). Bloomington, MN: Pearson.

Edmiston, E. K., Muscatello, R. A., & Corbett, B. A. (2017). Altered pre-ejection period response to social evaluative threat in adolescents with autism spectrum disorder. *Research in Autism Spectrum Disorders, 36,* 57–65. https://doi.org/10.1016/j.rasd.2017.01.008.

El-Sheikh, M., Kouros, C. D., Erath, S., Cummings, E. M., Keller, P. S., & Elmore-Staton, L. (2009). Marital conflict and children's externalizing behavior: Interactions between parasympathetic and sympathetic nervous system activity. *Monographs of the Society for Research in Child Development, 74,* 1–101.

Goeke-Morey, M. C., Cummings, E. M., Harold, G. T., & Shelton, K. H. (2003). Categories and continua of destructive and constructive marital conflict tactics from the perspective of U.S. and Welch children. *Journal of Family Psychology, 17,* 327–338. https://doi.org/10.1037/0893-3200.3.327.

Grych, J. H. (1998). Children's appraisals of interparental conflict: Situational and contextual influences. *Journal of Family Psychology, 12,* 437–453. https://doi.org/10.1037/0893-3200.12.3.437.

Hartley, S. L., Barker, E. T., Seltzer, M. M., Floyd, F., Greenberg, J., & Orsmond, G. (2010). The relative risk and timing of divorce in families of children with an autism spectrum disorder. *Journal of Family Psychology, 24,* 449–457. https://doi.org/10.1037/a0019847.

Hartley, S. L., Papp, L. M., Mihaila, I., Bussanich, P. M., Goetz, G., & Hickey, E. J. (2017). Couple conflict in parents of children with versus without autism: Self-reported and observed findings. *Journal of Child and Family Studies, 26,* 2152–2165. https://doi.org/10.1007/s10826-017-0737-1.

Hartley, S. L., Smith DeWalt, L., & Shultz, H. M. (2017). Daily couple experiences and parent affect in families of children with versus without autism. *Journal of Autism and Developmental Disorders, 47,* 1645–1658. https://doi.org/10.1007/s10803-017-3088-2.

Hochhauser, M., Weiss, P. L., & Gail, W. E. (2015). Negotiation strategies of adolescents with high-functioning autism spectrum disorder during social conflicts. *Research in Autism Spectrum Disorder*, *10*, 7–14. https://doi.org/10.1016/j.rasd.2014.10.022.

Hubert, B. E., Wicker, B., Monfardini, E., & Deruelle, C. (2009). Electrodermal reactivity to emotion processing in adults with autistic spectrum disorders. *Autism, 13,* 9–19. https://doi.org/10.1177/1362361308091649.

Hudson, C. C., Hall, L., & Harkness, K. L. (2019). Prevalence of depressive disorders in individuals with autism spectrum disorder: A meta-analysis. *Journal of Abnormal Child Psychology, 47,* 165–175. https://doi.org/10.1007/s10802-018-0402-1.

Kaat, A. J., & Lecavalier, L. (2013). Disruptive behavior disorders in children and adolescents with autism spectrum disorders: A review of the prevalence, presentation, and treatment. *Research in Autism Spectrum Disorders, 7,* 1579–1594. https://doi.org/10.1016/j.rasd.2013.08.012.

Kahle, S., Miller, J. G., Lopez, M., & Hastings, P. D. (2016). Sympathetic recovery from anger is associated with emotion regulation. *Journal of Experimental Child Psychology, 142,* 359–371. https://doi.org/10.1016/j.jecp.2015.10.004.

Koning, C., & Magill-Evans, J. (2001). Social and language skills in adolescent boys with Asperger syndrome. *Autism, 5,* 23–36. https://doi.org/10.1177/1362361301005001003.

Koss, K. J., George, M. R. W., Bergman, K. N., Cummings, E. M., Davies, P. T., & Cicchetti, D. (2011). Understanding children's emotional processes and behavioral strategies in the context of marital conflict. *Journal of Experimental Child Psychology, 109,* 336–352. https://doi.org/10.1016/j.jecp.2011.02.007.

Lartseva, A., Dijkstra, T., & Buitelaar, J. K. (2015). Emotional language processing in autism spectrum disorders: a systematic review. *Frontiers in Human Neuroscience, 8,* 991. https://doi.org/10.3389/fnhum.2014.00991.

Levine, T. P., Sheinkopf, S. J., Pescosolido, M., Rodino, A., Elia, G., & Lester, B. (2012). Physiologic arousal to social stress in children with autism spectrum disorders: a pilot study. *Research in Autism Spectrum Disorders, 6,* 177–183. https://doi.org/10.1016/j.rasd.2011.04.003.

Lord, C. (1984). The development of peer relations in children with autism. In F. J. Morrison, C. Lord, & D. P. Keating (Eds.), *Advances in applied developmental psychology* (pp. 75–97). New York: Academic Press Inc.

Lydon, S., Healy, O., Reed, P., Mulhern, T., Hughes, B. M., & Goodwin, M. S. (2016). A systematic review of physiological reactivity to stimuli in autism. *Developmental Neurorehabilitation, 19,* 335–355. https://doi.org/10.3109/17518423.2014.971975.

Maenner, M.J., Shaw, K.A., Baio, J. et al. (2020). Prevalence of autism spectrum disorder among children aged 8 years - Autism and developmental disabilities monitoring network, 11 sites, United States, 2016. *MMWR Surveillance Summaries, 69(No. SS-4)*, 1-12. https://doi.org/https://doi.org/10.15585/mmwr.ss6904a1

Mathersul, D., McDonald, S., & Rushby, J. A. (2013). Autonomic arousal explains social cognitive abilities in high-functioning adults with autism spectrum disorder. *International Journal of Psychophysiology, 89*(3), 475–482. https://doi.org/10.1016/j.ijpsycho.2013.04.014.

Millward, C., Powell, S., Messer, D., & Jordan, R. (2000). Recall for self and other in autism: Children's memory for events experienced by themselves and their peers. *Journal of Autism and Developmental Disorders, 30,* 15–28. https://doi.org/10.1023/A:1005455926727.

Neuhaus, E., Bernier, R. A., & Beauchaine, T. P. (2016). Children with autism show altered autonomic adaptation to novel and familiar social partners. *Autism Research, 9,* 579–591. https://doi.org/10.1002/aur.1543.

Nuske, H. J., Vivanti, G., & Dissanayake, C. (2013). Are emotion impairments unique to, universal, or specific in autism spectrum disorder? A comprehensive review. *Cognition & Emotion, 27,* 1042–1061. https://doi.org/10.1080/02699931.2012.762900.

Obradović, J., Bush, N. R., & Boyce, W. T. (2011). The interactive effect of marital conflict and stress reactivity on externalizing and internalizing symptoms: The role of laboratory stressors. *Development and Psychopathology, 23,* 11–114. https://doi.org/10.1017/S0954579410000672.

Papp, L. M., Cummings, E. M., & Goeke-Morey, M. C. (2002). Marital conflict in the home when children are present versus not. *Developmental Psychology, 38,* 774–783. https://doi.org/10.1037/0012-1649.38.5.774.

Patriquin, M. A., Scarpa, A., Friedman, B. H., & Porges, S. W. (2011). Respiratory sinus arrhythmia: A marker for positive social functioning and receptive language skills in children with autism spectrum disorders. *Developmental Psychobiology, 55,* 101–112. https://doi.org/10.1002/dev.21002.

Porges, S. (1991). Vagal tone: An autonomic mediator of affect. In J. A. Garber & K. A. Dodge (Eds.), *The development of affect regulation and dysregulation* (pp. 111–128). New York: Cambridge University Press.

Rice, K., Moriuchi, J. M., Jones, W., & Klin, A. (2012). Parsing heterogeneity in autism spectrum disorders: visual scanning of dynamic social scenes in school-aged children. *Journal of the American Academy of Child & Adolescent Psychiatry, 51,* 238–248. https://doi.org/10.1016/j.jaac.2011.12.017.

Rhoades, K. A. (2008). Children's responses to interparental conflict: A meta-analysis of their associations with child adjustment. *Child Development*, *79*, 1942–1956. https://doi.org/10.1111/j.1467-8624.2008.01235.x.

Rutter, M., Bailey, A., & Lord, C. (2003). *Social Communication Questionnaire (SCQ)*. Los Angeles: Western Psychological Services.

Saini, M., Stoddart, K. P., Gibson, M., Morris, R., Barrett, D., Muskat, B., & Zwaigenbaum, L. (2015). Couple relationships among parents of children and adolescents with Autism Spectrum Disorder: Findings from a scoping review of the literature. *Research in Autism Spectrum Disorders, 17,* 142–157. https://doi.org/10.1016/j.rasd.2015.06.014.

Shelton, K. H., Harold, G. T., Goeke-Morey, M. C., & Cummings, E. M. (2006). Children's coping with marital conflict: The role of conflict expression and gender. *Social Development, 15,* 232–247. https://doi.org/10.1046/j.1467-9507-2006-00338.x.

Sim, A., Cordier, R., Vaz, S., & Falkmer, T. (2016). Relationship satisfaction in couples raising a child with autism spectrum disorder: A systematic review of the literature. *Research in Autism Spectrum Disorders, 31,* 30–52. https://doi.org/10.1016/j.rasd.2016.17.004.

Szatmari, P., Bartolucci, G., & Bremner, R. (1989). Asperger's syndrome and autism: Comparison of early history and outcome. *Developmental Medicine & Child Neurology*, *31*, 709–720. https://doi.org/10.1111/j.1469-8749.1989.tb04066.x.

Tardif, C., Lainé, F., Rodriguez, M., & Gepner, B. (2007). Slowing down presentation of facial movements and vocal sounds enhances facial expression recognition and induces facial–vocal imitation in children with autism. *Journal of Autism and Developmental Disorders, 37,* 1469–1484. https://doi.org/10.1007/s10803-006-0223-x.

van Eldik, W. M., de Haan, A. D., Parry, L. Q., Davies, P. T., Luijk, M. P. C. M., Arends, L. R., & Prinzie, P. (2020). The interparental relationship: Meta-analytic associations with children's adjustment and responses to interparental conflict. *Psychological Bulletin, 146,* 553–594. https://doi.org/10.1037/bul0000233.

Williams, D. L., Goldstein, G., & Minshew, N. J. (2005). Impaired memory for faces and social scenes in autism: Clinical implications of memory dysfunction. *Archives of Clinical Neuropsychology, 20,* 1–15. https://doi.org/10.1016/j.acn.2002.08.001.