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The association between parental interaction style and children's joint engagement in families with toddlers with autism

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Abstract

Purpose—This study examines the relationship between parental interaction style (responsive vs directive) and child-initiated joint engagement within caregiver–child interactions with toddlers diagnosed with autism spectrum disorders.

Method—Videotaped interactions of 85 toddler–caregiver dyads were coded for child engagement and both parental responsiveness and directiveness.

Results—Altogether, children spent less than one-third of the interaction jointly engaged. After controlling for child characteristics, parental style was associated with the initiator (child or parent) of joint engagement. Specifically, responsiveness predicted total time in child-initiated joint engagement, while directiveness predicted total time in parent-initiated joint engagement. Children's social behaviours were associated with child-initiated joint engagement.

Discussion—Social initiations are a key target for children with autism spectrum disorders. Results demonstrate that child initiations and global social behaviour ratings are associated with parental responsivity. Responsivity may be a critical factor to facilitate children's initiations.

Keywords

autism spectrum disorder; joint engagement; parental directiveness; parental responsivity; social initiations; toddlers

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Children with autism spectrum disorders (ASDs) display deficits in joint engagement (JE), defined as sustained coordination of an interaction between objects and people. Children

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with ASDs spend less time jointly engaged than typically developing and developmentally delayed children (Adamson et al., 2009) and more frequently reject others' bids for shared engagement (Adamson et al., 2001). For young children, the people they most frequently engage with are their parents. However, little is known about the association between parents' style of interaction and the child's ability to initiate and maintain a state of JE. This study explored the association of parental interaction style with child- and parent-initiated time jointly engaged as well as the association of children's other social behaviours with the joint engaged state.

The constructs of parental responsivity and directiveness

Social pragmatic theory purports that language learning occurs within the context of dyadic interactions (Tomasello, 2001). The quality of these critical interactions can be influenced by parental interaction style. One style associated with positive child outcomes is the 'responsive' caregiver, which generally encompasses the parent's ability to recognize and respond to children's cues by providing emotional–affective support (Warren and Brady, 2007), a style associated with children's language competence (e.g. Fey et al., 2006). Within the continuum of parental interaction style, directiveness is a style that includes actions that influence the child's attention and can interrupt and redirect the natural flow of the interaction (Warren and Brady, 2007). The style in which parents' engage their children with ASDs may influence a child's ability to initiate and maintain a state of JE. Within a joint engaged state where a child attends to both a partner and a shared referent, it is possible for a parent to act in either a directive or a responsive manner. For directive parents, JE may include redirection of the child's attention to parent-selected activities via prompting and test questions. For responsive parents, JE can consist of providing contingent responses to the child's activity choice and communication with positive affect. Subsequently, the nature and quality of parent–child interaction may differ between dyads who demonstrate high levels of responsive or directive behaviour. Yet overall, there has been limited exploration of how parents' responsive and directive behaviours influence the JE of children with ASDs.

Another factor influencing the quality of shared interaction relates to whether it is the parent or the child who initiates the joint engaged state. For children with ASDs, initiations of periods of JE have important developmental consequences evidenced by links to increased receptive and expressive vocabulary (Adamson et al., 2009). Children's initiations of JE may be a positive indicator of the overall quality of the social interaction. In addition, other social behaviours demonstrated by children during social interaction may also serve to describe children's JE. For example, children's cooperation and interest/motivation in an activity have been linked to activity engagement (e.g. Ruble and Robson, 2007), while joint attention skills and affect have been linked to language abilities (e.g. Kasari et al., 2012). Therefore, concurrent measurement of children's initiations of the above-listed social behaviours may serve to highlight the quality of the social interaction.

This study provides a unique examination of the relationship between responsive and directive parenting styles and JE. Furthermore, we explored how indicators of the social quality of the joint engaged state, measured by child and parent initiation of the state and children's social behaviours, are related to overall parenting style. We hypothesized that

higher ratings of parental responsivity during play interactions would be positively associated with total time spent in episodes of child-initiated joint engagement (CIJE). In addition, we hypothesized that higher ratings of children's social behaviours including affect, attention to activity, cooperation, interest, joint attention and persistence would be positively related to CIJE.

Method

Participants

Participants included 85 caregivers and their toddlers (mean age = 31 months, *SD* = 3 months) diagnosed with an ASD (autism: *n* = 65, ASD: *n* = 20), confirmed by trained clinicians independent of the research team using the *Autism Diagnostic Observation Scale* (*ADOS*: Lord et al., 1999). Study inclusion criteria required that children had no other sensory or genetic disorders (e.g. seizure disorder). The majority of children were male (*n* = 70) from a mix of racial/ethnic backgrounds comprised African American (*n* = 2), Asian (*n* = 10), Caucasian (*n* = 52), Hispanic (*n* = 7) and mixed race (*n* = 14). Children demonstrated a range of standard scores on the *Mullen Scales of Early Learning* (*MSEL*) (mean = 68.16, *SD* = 20.41) with receptive and expressive language age equivalent scores at a mean of 18.23 months (*SD* = 10.96 months) and 17.32 months (*SD* = 9.40 months), respectively (see Table 1 for participant characteristics).

Caregivers primarily included mothers (*n* = 76) as well as fathers (*n* = 8) and one grandmother. Caregivers were primarily college educated (*n* = 38 undergraduate, *n* = 27 graduate) with several parents completing some college (*n* = 14), specialized training (*n* = 2) or high school (*n* = 3).

Procedures

Children completed two assessments for this present study: the *MSEL* (Mullen, 1995) and a 10-min parent–child play interaction with a standard set of toys (including a ball, pop-up toy, blocks, figurines with bikes, dinosaurs, dishes, dolls, furniture, shape sorter and bus). Parents were instructed to play with their child as they normally would. The play interactions were coded for parental interaction style as well as children's JE and social behaviours.

Caregiver style—The Maternal Behaviour Rating Scale (MBRS: Mahoney and Perales, 2003) characterizes caregivers' interactive behaviour. The scale has been used with both families of children with developmental delays and ASDs, demonstrating high reliability (e.g. Mahoney and Perales, 2003). The scale includes 12 items related to responsiveness, affect, achievement orientation and directiveness. Items are scored from 1 to 5 where higher scores represent greater demonstration of the behaviour over the 10-min interaction. Two items examining responsiveness and directiveness are used in this study (see Appendix 1 for item descriptions and coding anchors). Responsiveness and directiveness codes are not mutually exclusive. As such, each caregiver received a score from 1 to 5 for each item whereby parents may demonstrate some responsive and some directive behaviours. Two raters independently coded the data after reliability had been established using training

videos. Inter-rater reliability (Cohen's Kappa (κ)) was calculated based on double coding of 25% ($n = 22$) of the sample. Intra-class correlations (ICCs) indicate high reliability for MBRS responsivity (0.87) and directiveness (0.80).

Child engagement—Children's JE was coded using a schema adapted from Adamson et al. (2009). An engagement state was defined as three or more consecutive seconds in one of 11 mutually exclusive states. The study hypotheses centre on JE, and as such, the analysis included a composite variable 'JE' composed of the four joint states: supported joint (SJ), symbol-infused supported joint (SJS), coordinated joint (CJ) and symbol-infused coordinated joint (CJS) (see Appendix 1 for descriptions and coding anchors). Total time spent in two other common engagement states was also tracked including the following: (1) unengaged – where children are not engaged with people or objects and (2) object engagement – where children are focused exclusively on objects. Additionally, the initiator of the state (child or parent) was noted. The analysis focused on the total time spent jointly engaged. Reliability was established between two independent coders on 25% of the dyad's videotapes with ICCs for engagement variables ranging from 0.82 to 0.99 (see Appendix 1).

Child social behaviour—The Child Behaviour Rating Scale (CBRS: Mahoney and Perales, 2003) was used to provide codes for children's overall social behaviour. Items (see Appendix 1) included attention, affect, cooperation, initiations, persistence, joint attention skills and activity interest. Items were each scored on a scale of 1–5. The initiations item was removed due to its moderate correlation ($r = 0.438$) and redundancy with the engagement measure. Cohen's κ was calculated between two independent raters on 25% of the sample with scores ranging from 0.73 to 0.94 (see Appendix 1).

Results

Parental style

On average, parents obtained higher scores for directiveness (mean = 3.33, $SD = 1.09$) than responsiveness (mean = 2.70, $SD = 1.12$), and these scores were statistically different from one another ($t(84) = 3.40$, $p < 0.01$).

JE: descriptives

Descriptives are summarized in Table 2. Episodes of CIJE lasted for a mean duration of 100.64 s ($SD = 89.81$ s) or 16.7% of the total interaction, while episodes of parent-initiated joint engagement (PIJE) lasted for a mean duration of 78.09 s ($SD = 80.92$ s) or 13% of the total interaction. In addition, children spent a large portion of the interaction in two other states, including a mean of 75.85 s ($SD = 81.54$ s) unengaged (12.6% of the total interaction) and a mean of 300.72 s ($SD = 99.04$ s) focused exclusively on objects (50% of the total interaction). Overall, children were spending a combined average of about 3 min of the 10-min interaction in a joint engaged state. The other two-thirds of the interaction was spent in lower states of engagement including time unengaged (e.g. wandering) and time exclusively focused on objects to the exclusion of their caregiver.

Child social behaviours: descriptives

Children's social behaviours were rated using the CBRS (see Table 2 for summary). On average, children obtained moderate scores for attention (mean = 3.57, SD = 1.04), interest (mean = 3.00, SD = 1.08) and affect (mean = 3.07, SD = 0.88). Low-to-moderate mean scores were found for persistence (mean = 2.43, SD = 1.09), cooperation (mean = 2.70, SD = 1.15) and joint attention (mean = 2.08, SD = 1.16).

Child initiations and parental style

To examine the relationship between parental behaviour and CIJE, the responsiveness and directiveness items were entered into a series of three regression models predicting CIJE. Model 1 included the child's receptive and expressive language scores from the *MSEL*. Model 2 included both child parameters (receptive and expressive language) and, in addition, parents' responsivity score from the MBRS. Finally, model 3 included the parameters from model 2 plus parents' directiveness score. Values for the final models can be found in Table 3. Model 1 indicated that children's receptive and expressive language did not account for a significant amount of CIJE variance. An F test was applied to determine whether there was a significant increase in the amount of variance (R^2) of CIJE that was accounted for by the additional parent interaction parameters added in each of the larger models (responsivity in model 2 and directiveness in model 3) compared to the initial nested model. The addition of parental responsivity (β = 0.364, t = 3.57, p < 0.001) in model 2 on top of children's receptive language (β = 0.171, t = 1.07, p = 0.287), and expressive language (β = 0.031, t = 0.192, p = 0.828) then accounted for a significantly greater portion of CIJE variance (R^2 change = 0.132, F change = 12.74, p < 0.001) compared to model 1. However, model 3 (addition of directiveness) did not account for a significant additional portion of CIJE variance compared to model 2 (p = 0.112) (see Table 3 for the detailed final regression model for CIJE).

Parent initiations and parental style

Similar to CIJE, a series of three nested models was applied with the total time in PIJE as the outcome where model 1 included children's *MSEL* receptive and expressive language scores. For PIJE, model 2 added parents' directiveness score and model 3 subsequently added parents' responsivity score. Child's receptive and expressive language did not explain a significant amount of the variation in PIJE (model 1, p = 0.399). However, model 2 (the addition of parental directiveness: β = 0.361, t = 3.44, p < 0.001) accounted for a significant portion of the variance in PIJE over model 1 (R^2 change = 0.148, F change = 11.80, p < 0.001). The addition of parental responsivity in model 3 did not significantly explain (p = 0.906) an additional amount of variation compared to model 2 (see Table 3 for the final model applied to PIJE).

Child social behaviour and JE

Children's social behaviours measured by CBRS items were significantly correlated with CIJE including affect (r = 0.373, p < 0.01), attention (r = 0.274, p < 0.05), joint attention (r = 0.257, p < 0.05), imitation (r = 0.470, p < 0.01) and interest (r = 0.360, p < 0.01). Child

behaviours significantly correlated with PIJE were cooperation ($r = 0.294$, $p < 0.01$) and persistence ($r = 0.253$, $p < 0.05$).

Discussion

The primary aim of this study was to examine how child-initiated and parent-initiated periods of JE were associated with parental interaction style. Extending periods of JE initiated by the child may be critical for children with ASDs who are spending under one-third of the interaction jointly engaged and over two-thirds of the interaction primarily unengaged or focused only on objects to the exclusion of others in the environment. Within the extant literature, typically developing children at the age of 30 months spend an average of 76% of their play-based interactions jointly engaged with their caregiver (Adamson et al., 2004), and even language-matched children with Down's syndrome spend an average of 78% of time jointly engaged (Adamson et al., 2009). When the current findings are compared to the published literature, the paucity of JE for children with ASDs is notable such that interventions have been developed to target this state (e.g. Kasari et al., 2010). Targeted JE intervention has led to increases in JE as well as concurrent increases in joint attention skills. Considering the established links demonstrated between both JE and later language development (e.g. Adamson et al., 2004) as well as joint attention skills and later language skills (e.g. Kasari et al., 2012), increases in JE could have important implications for children's development.

After accounting for children's overall language level within the model, parents' interaction style was differentially related to JE. Consistent with our study hypotheses, CIJE was related to responsivity, while PIJE was related to directiveness. Due to the nature of directive versus responsive interaction styles, the divergent association with the initiator of the joint engaged state is reasonable. PIJE is fitting with a directive interaction style where the parent leads the play and communication via prompting and commands, placing the child in the role of the responder and leading to fewer opportunities for children to initiate. Two other child behaviours, cooperation and persistence (CBRS items), were correlated with PIJE, an unanticipated finding. However, higher scores on these items indicate compliance and activity repetition, respectively, rather than social behaviour. Children with such characteristics may spend longer periods of time focused on objects, requiring additional parental support to broaden their focus to include shared engagement states.

In addition, it is fitting that responsivity is related to CIJE. Responsiveness creates an environment that focuses on responding to children's social behaviour across domains including play, communication, affect and joint attention, thereby providing children with the opportunity to both drive the interaction and practise initiating critical social behaviours that are difficult for children with ASDs to learn (Kasari et al., 2010). Consistent with the study hypotheses, examination of specific child social behaviour within the interaction demonstrates that desirable social behaviours are correlated with CIJE including increased affect, attention, interest, and joint attention skills (including coordinated gaze and gestures). Overall, these multiple social behaviours are positive indicators of the high social quality of CIJE which in turn is associated with parental responsivity.

The importance of focusing on *how* parents foster JE with their children has important implications for parent-mediated interventions. Kasari et al (2010) recently demonstrated that parents can learn to effectively facilitate JE with their children with ASD. To further describe these types of interactions, this study demonstrates that a responsive interaction style is associated with CIJE, indicating that responsivity may afford children critical opportunities to practise social initiations. Explicitly focusing first on strategies to facilitate JE and parental responsivity within intervention may help provide the necessary foundation for parents to effectively implement a broader array of strategies to support children's social development. Increasing parent effectiveness is critical in order to decrease the tendency of toddlers with ASDs to be primarily object focused and to increase their initiations and opportunities for language learning (Kasari et al., 2010).

Limitations and future directions

This study has several limitations including the need for a comparison group composed of children who are typically developing and measurement across multiple time points so that the direction of the association can be examined. Future work should examine the interplay of parental style and engagement over time and how this may differ between dyads with children with ASDs and dyads with typically developing children. Longitudinal examination of responsivity may provide information regarding the stability of interaction style over time and in response to interventions.

Conclusions

In summary, this study demonstrates that parental responsivity is a predictor of CIJE within a developmentally diverse group of toddlers with ASDs. Increasing the frequency and length of CIJE is critical for children with ASDs who are spending at least two-thirds of valuable learning time unengaged or in lower states of engagement. CIJE was also concurrently related to a constellation of important social behaviours including affect, attention, joint attention and imitation skills, reflecting the high social quality of child-initiated shared engagement. The association between responsivity and CIJE warrants further examination as a moderator of children's social development and intervention effects.

Acknowledgements

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Appendix 1

Table 4

Descriptions of parent and child outcomes: MBRS responsivity and directiveness items (Mahoney et al., 1998), engagement states (Adamson et al., 2009) and CBRS items (Mahoney & Perales, 2003).

	Description
MBRS item	
Responsivity ($\kappa = 0.87$)	A parent's active and appropriate response to the child's actions on objects as well as both verbal (e.g. vocalizations, language) and non-verbal communication and behaviour (e.g. gestures, body language, facial expression). Coding anchors: 1 = 'highly unresponsive' parent chronically fails to respond to the child's behaviours. 3 = 'consistently responsive' parent who may at times be slow or inappropriate but is otherwise responsive. 5 = 'highly responsive' parent that responds immediately and appropriately to both overt and subtle child behaviours.
Directiveness ($\kappa = 0.80$)	A parent's non-verbal and verbal prompting including requests, question asking and commands that directs or controls the child's behaviour. Coding anchors: 1 = 'very low directive' parent who allows the child to initiate and play without interfering, withholds suggestions until requested. 3 = 'moderately directive' parent who about half the time allows child to initiate, may direct how the child should play or what to play.

	Description
	5 = 'extremely directive' parent who continually redirects the child, extreme frequency of commands, training, requests and instruction where the parent completely control the interaction.
Engagement	
Unengaged (α = 0.99)	Child is not engaged with any object or person. For example, the child may be scanning the environment, wandering or engaging in self-stimulatory motor behaviours.
Object (α = 0.99)	Child is exclusively engaged with an object to the exclusion of the parent (e.g. the child is actively operating a pop-up toy alone or building with blocks without any participation by the adult).
Supported joint (α = 0.97)	Child and parent are actively engaged in a shared referent. The child is aware of the parent's participation (e.g. notices parent's actions on object and child joins in the play; child and parent are actively taking turns on an object) but does not repeatedly and overtly acknowledge the parents' participation via eye contact.
Supported joint with symbols (α = 0.82)	Child and parent are actively engaged in a shared referent and the child demonstrates an awareness of the parent's participation. Additionally, the child acknowledges the parent's use of symbols (e.g. child follows parent suggestion about how to act on an object) or the child uses symbols in reference to the shared activity (e.g. child and parent are rolling a ball back and forth and the child talks about the activity (e.g. 'roll ball') without making eye contact with the parent).
Coordinated joint (α = 0.99)	Child actively and repeatedly acknowledges both the shared activity and the interaction partner through eye contact and gestures (e.g. pointing, showing or giving objects).
Coordinated joint with symbols (α = 0.98)	Child actively and repeatedly acknowledges both the shared activity and the interaction partner through eye contact and gestures (e.g. pointing, showing or giving objects). Additionally, the child responds to or uses language in reference to the shared activity.
Social behaviour	
Affect (κ = 0.93)	Describes the child's emotional state (distress vs enjoyment) during the interaction indicated by frequency of smiling, laughing or vocalizing directed towards the parent. Coding anchors: 1 = 'Very low' – child demonstrates distress evidence through crying, whining or aggressive behaviours. 3 = 'Moderate' – child is neutral displaying little overt enjoyment. 5 = 'Very high' – child shows enjoyment through laughing, smiling and vocalizations when interacting with the parents and the activities. No demonstration of negative affect.
Attention (κ = 0.73)	Degree to which child is active, attentive and engaged in activities. Children who frequently change activities (flitting) or have sustained period of inattention will score lower on this item. Coding anchors: 1 = 'Very low' – inactive, avoidance and rarely ever attend to activity. 3 = 'Moderate' – attends about 50% of time. 5 = 'Very high' – child sticks with activity throughout session without periods of inattention.
Cooperation (κ = 0.87)	Degree to which a child complies with adult demands, requests and suggestions rather than rejecting or refusing. Coding anchors: 1 = 'Very low' – child may throw or otherwise reject objects or ignore the parent's activity suggestions. 3 = 'Moderate' – 50% of the time the child cooperates with adult requests or suggestions 5 = 'Very high' – child cooperates consistently throughout the sessions, responding quickly to both overt and subtle suggestions.
Interest (κ = 0.93)	Represents child's motivation and satisfaction in the activities that he/she engages in throughout the interaction. Coding anchors: 1 = 'Very low' – child obviously does not obtain satisfaction from the activity; may be highly distracted with neural affect. 3 = 'Moderate' – some satisfaction in activities, sustained periods using non-verbal or verbal

	Description
	communication to show satisfaction. 5 = 'Very high' – highly involved throughout the session with the activity, showing satisfaction in the activity where the activity can be either child- or parent initiated.
Joint attention (κ = 0.94)	Frequency with which a child uses eye contact with the parent, directs vocalizations coordinated with eye contact to the parent or uses a joint attention gesture (point, show or give object). Coding anchors: 1 = 'Very low' – no eye contact, non-verbal gestures or verbal attempts to share with the parent. 3 = 'Moderate' – child show periods of eye contact, periods may be in response to adult's bids rather than initiated by the child. 5 = 'Very high' – child initiates sharing through eye contact, gestures and/or language frequently and for sustained periods of time. The child frequently tries to involve the adult.
Persistence (κ = 0.87)	Frequency with which a child independently repeats or practises a behaviour when they encounter difficulty. Coding anchors: 1 = 'Very low' – never demonstrates repetition or second attempt at activity when having difficulty. 3 = 'Moderate' – extended periods where child appears to be practising behaviour, just as often as when he/she does not practise. 5 = 'Very high' – frequently practises vocalizations or activities as well as repeated attempts at tasks when having difficulty.

Table 1

Participant characteristics (*n* = 85).

	n	**Mean**	*SD*
Child characteristics			
Chronological age (months)		31	3
Mullen standard score		68.16	20.41
Mullen receptive language T score		31.12	14.53
Mullen expressive language T score		29.79	12.37
Gender (male/female)	70/15		
Autism/ASDs	65/20		
Ethnicity			
African American	2		
Asian	10		
Caucasian	52		
Hispanic	7		
Mixed	14		
Caregiver characteristics			
Primary caregiver			
Mother	76		
Father	8		
Grandparent	1		
Caregiver education			
High school	3		
Some college	14		
Specialized training	2		
College degree	38		
Graduate degree	27		

ASD: autism spectrum disorder; *SD*: standard deviation.

Table 2

Descriptives for primary outcome variables.

	Mean	*SD*
Child outcomes		
Engagement (s)		
Unengaged	75.85	81.54
Object engagement	281.34	95.96
Joint engagement		
Child-initiated joint engagement	100.64	89.81
Parent-initiated joint engagement	78.09	80.92
Social behaviours (CBRS scores)		
Affect	3.07	0.88
Attention	3.57	1.04
Cooperation	2.70	1.15
Interest	3.00	1.08
Joint Attention	2.08	1.16
Persistence	2.43	1.09
Caregiver outcomes		
Interaction style (MBRS scores)		
Responsiveness	2.70	1.12
Directiveness	3.33	1.09

SD: standard deviation; MBRS: Maternal Behaviour Rating Scale; CBRS: Child Behaviour Rating Scale.

Table 3

Final regression models for CIJE and PIJE.

	Standardized β	t	Significance
Model 2: CIJE			
MSEL receptive language T score	0.171	1.072	0.287
MSEL expressive language T score	0.031	0.192	0.848
Responsivity	0.364	3.569	0.001
Model 2: PIJE			
MSEL receptive language T score	0.188	1.152	0.253
MSEL expressive language T score	−0.239	−1.480	0.143
Directiveness	0.361	3.426	0.001

CIJE: child-initiated joint engagement; PIJE: parent-initiated joint engagement; *MSEL: Mullen Scales of Early Learning*.