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BRIEF REPORT

Brief Report: Attachment Security in Infants At-Risk for Autism Spectrum Disorders

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Abstract Little is known about attachment security and disorganization in children who are at genetic risk for an Autism Spectrum Disorder (ASD) prior to a possible diagnosis. The present study examined distributions of attachment security and disorganization at 15-months of age in a sample of infant siblings of older children with (ASD-sibs; $n = 51$) or without (COMP-sibs; $n = 34$) an ASD. ASD-sibs were not more or less likely to evince attachment insecurity or disorganization than COMP-sibs. However, relative to COMP-sibs, the rate of B1–B2 secure subclassifications was disproportionately larger in the ASD-sib group. Results suggest that ASD-sibs are not less likely to form secure affectional bonds with their caregivers than COMP-sibs, but may differ from COMP-sibs in their expression of attachment security.

Keywords Attachment · Autism · Infant-sibling · Risk · Strange-situation procedure

Introduction

Autism Spectrum Disorders (ASDs) are neurodevelopmental disorders involving core impairments in social functioning and communication (Landa et al. 2007; Mundy and Hogan 1994; Sigman and Ruskin 1999). ASDs are highly heritable and there is evidence that a common set of genetic susceptibility factors are responsible for the broad severity continuum observed in these disorders (Constantino et al. 2006; Pickles et al. 2000). Early descriptions (Kanner 1943, 1949) suggested autism was a developmental disorder characterized by a failure to form affectional bonds with others. Since these early descriptions however, research has provided evidence that children with ASDs do, in fact, show a preference for directing attachment behaviors (e.g., proximity seeking, contact maintenance) towards their parents (Dissanayake and Crossley 1989, 1996) although they may do so to a lesser degree and intensity compared to comparison children without ASDs (Dissanayake and Crossley 1989; Rutgers et al. 2004; Sigman and Mundy 1989). Additionally, children with ASDs are able to develop secure attachments to caregivers (Rutgers et al. 2004). They do, however, show higher rates of attachment insecurity and disorganization than do children without ASDs (Naber et al. 2007; Rutgers et al. 2004; van IJzendoorn et al. 2007), in part as a function of their level of cognitive development and degree of ASD impairment (Capps et al. 1994; Naber et al. 2007; Rutgers et al. 2004; Yirmiya and Sigman 2001).

Several studies have examined attachment security and ASDs in children 2 years of age or older (Naber et al. 2007; Rutgers et al. 2004; van IJzendoorn et al. 2007). No studies to date, however, have examined attachment security and disorganization in the *infant siblings* of children with ASDs (ASD-sibs). Exploring the development of attachment security in ASD-sibs is important because it presents an opportunity to inform our understanding of the development and characterization of early socio-affective and relational deficits in the context of potential emergent

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ASDs (Baker et al. 2010b). Further, it offers the advantage of implementing the original Strange Situation Procedure (SSP: Ainsworth et al. 1978) with no modifications for older children or those already diagnosed with an ASD (e.g., Rogers et al. 1991; Shapiro et al. 1987).

Ainsworth and colleagues originally identified three organized attachment patterns based largely on the behaviors of infants during separations and reunions with their caregivers in the SSP. Secure (B) infants readily greet and seek contact with the caregiver upon reunion, openly display emotional communication, and demonstrate engaged exploration and play in the presence of the caregiver. Resistant (C) infants are characterized by displays of ambivalence with the caregiver, particularly during reunion, often seeking contact and comfort from the caregiver while simultaneously demonstrating signs of resistance including squirming to get down (if held), angry crying, and general petulance. Avoidant (A) infants are characterized by conspicuous avoidance of proximity to or interaction with the caregiver upon reunion and show little or no distress during their absence. A fourth attachment pattern, the disorganized-disoriented (D) pattern was subsequently identified by Main and Solomon (1986, 1990) to account for the lack of—or momentary breakdowns—in one of the organized behavioral strategies (i.e., A, B, or C).

When infants are assigned to an organized (i.e., A, B, C) attachment pattern they are also assigned to one of several subclassifications within each group that reflect the emotional/affective nature of how attachment security is behaviorally expressed. Of particular importance to the current report, secure infants can be assigned to one of four subcategories. B1 and B2 infants are rarely distressed during separation and tend to demonstrate their attachment security upon reunion in a more reserved manner, with less proximity seeking and contact-maintaining behavior than B3 and B4 infants. They may also show modest levels of avoidance (e.g., failing to actively greet the caregiver upon reunion). B3 and B4 infants, in contrast, tend to be more distressed during separation and readily seek proximity to and contact with their caregiver upon return from the separations with minimal or no avoidant behavior. Some evidence suggests that these different emotional expressions of attachment security (Frodi and Thompson 1985; Thompson and Lamb 1984) may reflect temperamental or neuropsychological aspects of the individual (Belsky and Rovine 1987).

Individual differences in how children classified as secure express emotion may be of particular importance in the study of ASD-sibs. In addition to their increased risk for the development of ASDs, they are also at risk for qualitatively similar, but milder, or subclinical, deficits in the same core areas affected in ASDs—social responsiveness, communication, and limited interests/stereotyped behavior. Collectively, milder deficits such as these in family members of individuals with ASD are generally considered manifestations of the broad ASD phenotype (BAP; Bailey et al. 1998; Fombonne et al. 1997), and in infants and younger siblings of children with an ASD, the 'very early autism phenotype' or 'infant BAP' (Rogers 2009; Yirmiya and Ozonoff 2007). Research within our own laboratory (Baker et al. 2010a; Cassel et al. 2007; Chow et al. 2010) in addition to others (Yirmiya et al. 2006) has found some evidence that ASD-sibs do show subtle social and emotional communication deficits, such as less emotional reactivity, reduced or less positive affective expression, and joint attention delays. To the extent that these affective deficits are milder than those observed in children with ASDs, they may not impact the formation of a secure versus insecure attachment per se, but rather the intensity and frequency with which attachment signaling behaviors, such as visual regard (i.e., actively greeting the caregiver upon reunion), contact maintenance, and proximity seeking, are overtly expressed within the SSP. Said differently, ASD-sibs may not be less likely to develop secure attachments relative to siblings with no ASD-risk, but, given their risk for the 'infant BAP' (Yirmiya and Ozonoff 2007), they might be expected to manifest their attachment security in ways dissimilar to those of infants who do not possess familial risk for an ASD.

The current study presented a valuable opportunity to assess the emergence of attachment security and the nature of affective display (Shapiro et al. 1987) of attachment patterns in ASD-sibs. Given that ASD-sibs are at greater risk than comparison siblings (COMP-sibs) to evince affective deficits characteristic of the infant BAP (Yirmiya and Ozonoff 2007) but that majority of ASD-sibs will *not* go on to clinical diagnoses of an ASD (the recurrence risk for ASD-sibs has been estimated at 6–9%; Piven et al. 1997; Zwaigenbaum et al. 2005), we explored the possibility that meaningful differences may emerge in how secure attachment patterns are expressed during the SSP rather than in increased rates of insecure or disorganized attachment classifications, as has been found in samples of children diagnosed with an ASD (e.g., Capps et al. 1994; Rutgers et al. 2004; Naber et al. 2007).

Method

Participants

Data were drawn from the 15-month assessment of a longitudinal study examining the development of infants with or without an older sibling diagnosed with an ASD. COMP-sibs ($n = 34$) were classified as such if their older sibling(s) were not diagnosed with an ASD and there was

no research evidence of heightened ASD symptomatology. ASD-sibs ($n = 51$) were so classified if at least one of their sibling(s) was diagnosed with Autism, Asperger's Disorder, or Pervasive Developmental Disorder—Not Otherwise Specified (PDD-NOS). Independent community diagnoses for the older siblings with ASD were confirmed using DSM-IV-TR criteria (American Psychiatric Association 2000) via record review of previous evaluations in conjunction with clinical assessment using the Autism Diagnostic Observation Schedule (ADOS; Lord et al. 2000). The COMP-sibs were White/Caucasian (41.2%), Hispanic (47.1%), and African American/Other (11.7%). There were 15 males and 19 females. The ASD-sibs were White/Caucasian (39.2%), Hispanic (47.1%), and African American/Other (1%). Thirty-four were males and 17 were females.

Strange Situation Procedure (SSP)

Security of attachment was assessed using the traditional SSP and classification guidelines (Ainsworth et al. 1978) as well as Main and Solomon's (1990) scoring system for attachment disorganization. In addition, identification of behavioral markers of disorganization potentially indicative of neurological impairment were made according to the coding system developed by Pipp-Siegel et al. (1999). Eighty-one infants and their mothers and four infants and their fathers were seen in the SSP at the 15-month assessment.

Strange situations were coded blind to ASD-risk status by an experienced coder who was trained by L. Alan Sroufe and successfully passed the attachment reliability test (Minnesota tapes). Twenty-five percent of the sample was double-coded by an expert attachment coder. Satisfactory interrater agreement was reached on four-way attachment classifications (A, B, C, and D; 80% agreement, $\kappa = .63$) and secure subclassifications (B1 and B2 versus B3 and B4 classifications: 93% agreement, $\kappa = .86$).

Results

Attachment classifications did not differ between ASD-sibs and COMP-sibs whether considered at the 2-way (secure-insecure), 3-way (secure, resistant, avoidant), or 4-way (secure, resistant, avoidant, disorganized) levels (see Table 1). In addition, the distribution of disorganized versus non disorganized infants was not different between the two groups. The proportion of neurological indices of disorganization identified using the Pipp-Siegel et al. (1999) taxonomy did not differ between the two groups. We next compared the frequencies of B1 and B2 versus B3 and B4 secure subclassifications between the two groups.

Table 1 Frequencies of 15-month attachment classifications by risk group

ABCD attachment group			
	ASD-sibs	COMP-sibs	Totals
A	1 (2%)	4 (12%)	5 (6%)
B	35 (69%)	22 (65%)	57 (67%)
C	7 (14%)	2 (6%)	9 (11%)
D	8 (16%)	6 (18%)	14 (16%)
Totals	51	34	85
ABC attachment group			
A	5 (10%)	4 (12%)	12 (14%)
B	38 (75%)	26 (77%)	60 (71%)
C	8 (16%)	4 (12%)	9 (11%)
Totals	51	34	85

A Avoidant, *B* Secure, *C* Resistant, *D* Disorganized. Of the 8 disorganized ASD-sibs, secondary organized classifications were as follows: 4 avoidant, 3 secure, and 1 resistant. Of the 6 disorganized COMP-sibs, secondary organized classifications were as follows: 4 secure and 2 resistant

Table 2 Crosstabulation of ASD-risk status and secure attachment subclassification

Secure attachment subclassification	ASD-risk status		Totals
	ASD-sibs	COMP-sibs	
B1 and B2	22 (17.2)	7 (11.8)	29
B3 and B4	16 (20.8)	19 (14.2)	35
Totals	38	26	64

Expected frequencies appear in parentheses

The frequencies were significantly different, χ^2 (1, $N = 64$) = 5.98, $p < .02$ (see Table 2). Relative to COMP-sibs, the rate of B1–B2 secure subclassifications was disproportionately larger in the ASD-sib group.

Given that the behavioral rating scales scored during the SSP (i.e., avoidance, proximity seeking, contact maintenance, resistance, and the overall disorganization rating) inform infant classification, we also examined attachment security from a dimensional perspective (Fraley and Spieker 2003) by scaling these behavioral rating scales on dimensions of avoidance and resistance/disorganization. The results were consonant with our categorical findings overall, as well as those above indicating differences in rates of secure subclassifications between the ASD-risk groups. Specifically, ASD-sibs ($M = 3.42$, $SD = 1.38$) showed modest, but significantly higher overall scores on the avoidance dimension than did COMP-sibs ($M = 2.83$, $SD = 1.22$); $t(83) = -2.00$, $p < .05$. No differences were observed on the dimension

tapping resistance and disorganization. Of note, mean scores on the avoidance dimension (maximum = 7) were relatively modest for both groups, consistent with few avoidant classifications overall.

Discussion

To our knowledge, this is the first study to examine attachment security and disorganization in ASD-sibs before they reached 2 years of age. We did not find any differences in secure, insecure, or disorganized classification rates between ASD and COMP-sibs. Additionally, there were no differences between the groups in the proportion of disorganized indices which have been identified as possibly indicative of neurological impairment (Pipp-Siegel et al. 1999). However, a group difference emerged in how secure attachment was expressed in the two groups. ASD-sibs accounted for the majority of B1 and B2 secure attachment subclassifications while COMP-sibs accounted for the majority of B3 and B4 secure subclassifications. These results highlight the possibility that ASD-sibs are no more or less likely to be judged securely attached (or disorganized) than COMP-sibs at 15 months of age, but rather show less salient affective displays of attachment-relevant social response behaviors during the SSP that characterize the secure B1–B2 subclassifications and may be related to the milder affective deficits thought to characterize the (infant) BAP (Bolton et al. 1994; Constantino et al. 2006; Rogers 2009; Yirmiya and Ozonoff 2007).

In addition to the possibility that these findings represent manifestations of the infant BAP in ASD-sibs, an equally tenable explanation is that such differences in the expression of secure attachments are due to meaningful variations in parental sensitivity (De Wolff and van IJzendoorn 1997). Parenting a child with an ASD is often a stressful experience (Benson 2006) and the behavioral adjustment of siblings of children with autism may be compromised as a result (Hastings 2003). To the extent that the emotional demands of rearing a child with a disability, as well as anxiety concerning the development of the infant sibling at-risk for an ASD, detract from the ability of a caregiver to optimally provide sensitive-responsive interactions with the ASD-sib, more affectively reserved expressions of secure attachments that are tinged with low-level manifestations of avoidance (i.e., B1–B2) might be expected. An equally plausible explanation for the low-level avoidance noted in ASD-sibs is that the ASD diagnosis of the older sibling may intensify the tendency of younger siblings to receive lower levels of maternal sensitivity than their older sibling (Teti et al. 1996; van IJzendoorn et al. 2000), These possibilities aside, the fact that these ASD-sibs were ultimately judged secure in their attachment speaks to the overall caregiving competency of these parents in the presence of significant familial adversity.

These findings are preliminary and we await eventual diagnostic outcome of our infant siblings to shed further light on the meaning of the reported difference in secure attachment subclassifications as well as the traditional 3 and 4-way attachment classifications. Limitations of the current report include the absence of complete data on prior or concurrent measures of developmental functioning and parental sensitivity. Consequently, we were not able to determine whether rates of security of disorganization between the two groups differed based on their level of intellectual functioning nor were we able to explore the contribution of measures of parental sensitivity to these findings. Nevertheless, the results of this study warrant follow-up in additional independent samples and call attention to the need to consider not only attachment security versus insecurity in ASD research, but also how security of attachment is expressed, particularly in ASD-sib designs. In addition, differences in patterns of attachment with both mothers *and fathers* remains a rich area of exploration and future research in this area may yield important clues regarding attachment formation in children at risk for ASDs.

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