

## Parental Sensitivity and Attachment in Children With Autism Spectrum Disorder: Comparison With Children With Mental Retardation, With Language Delays, and With Typical Development

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This study on sensitivity and attachment included 55 toddlers and their parents. Samples included children with autism spectrum disorder (ASD), mental retardation, language delay, and typical development. Children were diagnosed at 4 years of age. Two years before diagnosis, attachment was assessed with the Strange Situation procedure, and parental sensitivity and child involvement during free play were assessed with the Emotional Availability Scale. Parents of children with ASD were equally sensitive as parents of children without ASD, but their children showed more attachment disorganization and less child involvement. More sensitive parents had more secure children, but only in the group without ASD. Less severe autistic symptoms in the social domain predicted more attachment security. Autism challenges the validity of attachment theory.

Several studies have documented the presence of attachment behaviors in children with autism spectrum disorder (ASD) when they feel stressed and seek comfort with their parents (Capps, Sigman, & Mundy, 1994; Sigman & Capps, 1997; see also Buitelaar, 1995), although one of the defining features of ASD is impaired social functioning (*Diagnostic and Statistical Manual of Mental Disorders*, 4th ed., Text Revision [DSM-IV-TR; American Psychiatric Association [APA], 2000). Children with ASD tend to display less contact seeking and contact maintaining with their mothers than children in comparison samples, but at the same time they demonstrate a clear preference for their mothers over a stranger and many of them show an increase in proximity seeking

with their mothers after a separation (Rogers, Ozonoff, & Maslin-Cole, 1993). A recent meta-analysis even found that the majority of children with ASD develop secure attachments (53%; see Rutgers, Bakermans-Kranenburg, van IJzendoorn, & Van Berckelaer-Onnes, 2004). Children with ASD appeared to be somewhat less securely attached to their parents than nonclinical children and comparison children with developmental disorders such as mental retardation or language delays (Rutgers et al., 2004).

One of the most frequently documented determinants of attachment is parental sensitivity. Observational and experimental studies of attachment have demonstrated the (causal) relation between parental sensitivity and attachment security, although the combined effect size is relatively modest (in De Wolff & van IJzendoorn's, 1997, meta-analysis, the combined effect size was  $r = .24$ ; for a meta-analysis of experimental studies, see Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003). A crucial issue therefore is whether parental sensitivity plays the same role in the development of attachment in children with ASD as it plays in nonclinical

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children or children who do not have pervasive impairments in social interaction. In the De Wolff and van IJzendoorn meta-analysis, clinical status of the samples (e.g., cerebral palsy, cleft palate, deafness) did not significantly moderate the association between sensitivity and attachment. In the current study, we address the issue by assessing parental sensitivity and attachment security in children with ASD, mental retardation, language delays, and typical development.

In their pioneering investigation of fifteen 3- to 5-year-old children with mental retardation and autism, Capps et al. (1994) found that mothers of securely attached children with autism showed more sensitivity than did mothers of insecurely attached children with autism during a 12-min play session. The authors considered this strong association between sensitivity and attachment (the effect size was large:  $r = .61$ ) to be evidence for the validity of their attachment assessment in children with autism. But they questioned the causal direction of this relation in preschool-age children, and they suggested a reciprocal association. Capps et al. stimulated further research into attachment in children with autism (e.g., Willemsen-Swinkels, Bakermans-Kranenburg, Buitelaar, van IJzendoorn, & Van Engeland, 2000) and into parenting of these children (e.g., Kasari, Sigman, Mundy, & Yirmiya, 1988), but to our knowledge no other study has investigated the association between parental sensitivity and attachment security. In the current replication and extension of the Capps et al. study, we included not only children with mental retardation and ASD but also relatively high-functioning children to investigate whether the finding of Capps et al. would be applicable to this latter group. We observed the children at a much earlier age, just after their second birthday, to be able to use the conventional assessment procedure of attachment, the Strange Situation procedure, without major adaptations. Including a group of children with mental retardation but without ASD, a group of children with language delays, and a comparison group of non-clinical children, we tested whether the parents of children with ASD are equally capable of sensitive parenting as parents of children with or without clinical disorders. We also tested whether the association between parental sensitivity and attachment holds in groups of children with and without ASD.

In the *DSM-IV-TR* (APA, 2000), children with pervasive developmental disorder (PDD) are characterized by impairments in three areas of development: reciprocal social interaction skills; communication skills; and stereotyped behavior, interest, and activities. Within PDD, the most

prototypic form is autistic disorder (AD). In children with AD, impairments in all three developmental areas are present. In approximately three fourths of these children, the disorder coexists with mental retardation. Children with AD may show a failure to cuddle; an indifference to affection or physical contact; a lack of eye contact, facial responsiveness, or socially directed smiles; and a failure to respond to their parents' voices. Older children with AD may show difficulties in reciprocity, turn taking, and recognition of affective expression and attribution of mental states of others (*DSM-IV*; APA, 1994). Children with PDD not otherwise specified (PDD-NOS) show impairments in the development of reciprocal social interaction in combination with either impairments in communication skills or the presence of stereotyped behavior (*DSM-IV-TR*; APA, 2000). In many studies on autism, participants with PDD-NOS and with AD have been combined into the overall category of ASD.

Considering the severe impairments in reciprocal social interaction and communication, one wonders whether the parents of children with ASD are able to respond sensitively to their children's signals and needs in an equally prompt and adequate manner as parents of less socially impaired children. Ainsworth defined sensitivity as the parents' ability to perceive and interpret their children's attachment signals accurately and to be able and willing to respond promptly and adequately to those signals (Ainsworth, Blehar, Waters, & Wall, 1978). Children with ASD, however, render their parents' task of deciphering their signals more difficult because they may not express their emotions in explicit ways. Parents may also have to use less direct verbal responses to avoid interfering abruptly with established routines. To respond adequately to children with ASD may require more careful attunement, more clear-cut nonverbal responses that take the developmental level into account, and more promptness than in the case of typically functioning children. Because ASD has been found to be genetically transmitted (Rutter, 2000), parents of children with ASD may run the risk of displaying less social interactive abilities than parents of typically developing children or other clinical groups (possible parental communication deficit; Cantwell & Baker, 1984).

Doussard-Roosevelt, Joe, Bazhenova, and Porges (2003) observed mothers and their preschool children with autism in play sessions and found that the quantity of parental initiatives did not differ from what was observed in mothers of typically developing preschoolers. Mothers of children with autism, however, used more physical contact, more high-intensity behaviors, and fewer social verbal

approaches with their child with autism. Kasari et al. (1988) also found similarities between parenting of children with autism and parenting of children with either mental retardation or typical development. Parents responded in similar ways to their children's nonverbal initiatives and did not differ in their engagement in mutually sustained play. However, parents of children with autism more often used control strategies than did parents of typically developing children, and they more often held their children physically on task than did parents of children with mental retardation. In these studies, detailed descriptions of similarities and differences in specific parental behaviors were presented, without an overall evaluation of parental sensitivity. The core of the sensitivity concept is that the same behavioral responses may be nevertheless different in terms of sensitivity, depending on the specific characteristics and needs of the child, whereas different responses may serve the same function of sensitively reacting to the child's attachment signals.

In the current study, we focus on the rating of parental sensitivity. We speculate that the more demanding task of responding sensitively to a socially impaired child, combined with a certain genetic risk for being socially less competent, may lead to lower levels of sensitivity in parents of children with ASD. Children with mental retardation may also challenge their parents' ability to respond sensitively to their attachment needs and signals. Developmentally delayed children tend to have muted responsiveness to external stimuli, and their emotional signaling has been shown to contain more uncertainty and noise compared with typically developing children (Emde, Katz, & Thorpe, 1978). Goldberg (1977 in Moran, Pederson, Pettit, & Krupka, 1992) suggested that initially responsive parents might become ineffective in their interaction because of their unpredictable and unresponsive children.

Despite this potentially lower sensitivity of parents of children with mental retardation, children with Down syndrome have been shown to be attached to their parents (Serafica & Cicchetti, 1976), although unclassifiable cases and insecure attachments were overrepresented in the chronologically and developmentally youngest children with Down syndrome when they were observed in the conventional Strange Situation procedure (Vaughn, Goldberg, Atkinson, & Marcovitch, 1994). Nevertheless, Atkinson et al. (1999) found that securely attached children with Down syndrome had more sensitive parents than did insecurely attached or unclassifiable children with Down syndrome, indicating that even the Strange Situation behavior of the unclassifiable children reflects interac-

tive experiences with their parents at home. Atkinson et al. also found that developmental level interacted with sensitivity in predicting security of attachment. Relatively high levels of parental sensitivity and children's cognitive competence predicted secure attachments, whereas low levels of both enhanced the probability of insecure and unclassifiable assessments (Atkinson et al., 1999). Observing attachment behavior at home, Moran et al. (1992) found that developmentally delayed children appeared to use their parents as a secure base and that parental sensitivity did indeed predict attachment security. However, parents of developmentally delayed children felt more parenting stresses compared with parents of typically developing children, and their children showed on average less attachment security. The concept of parental sensitivity implies flexibility to the demands of a specific child, and the crucial role of the parents in shaping the development of their children's attachments has been documented in a range of studies, including clinical samples (van IJzendoorn, Goldberg, Kroonenberg, & Frenkel, 1992; see also Bokhorst et al., 2004).

In previous studies, a high percentage of children with autism were classified as "disorganized" in their attachment to the parent. In the Capps et al. (1994) study, an expert coder observed that all 15 low-functioning children with autism showed sufficient disorganized behaviors (separate from the typical autistic behavioral displays such as stereotypical behaviors) to categorize them as disorganized. In the Willemsen-Swinkels et al. (2000) study, 31% of the children with ASD were classified as disorganized, again taking into account the seemingly disorganized behaviors that are typical for children with autism. In nonclinical samples, about 15% of the children display disorganized attachments (van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999). Also, studies of children with mental retardation showed an overrepresentation of disorganized attachments (Vaughn et al., 1994), perhaps as a function of the lack of cognitive competence to perceive accurately what is going on in the complex Strange Situation procedure. In atypical groups of children, therefore, not only should the organized insecure-avoidant, secure, and insecure-ambivalent attachment patterns (Ainsworth et al., 1978) be observed, but disorganization of attachment (Main & Solomon, 1990; Vondra, Hommerding, & Shaw, 1999) should be observed as well. At the same time, it is unclear what factors determine the emergence of attachment disorganization in atypically developing children. In nonclinical children, frightening, highly intrusive, and neglectful parental behaviors have been shown to be associated with

attachment disorganization, and parental sensitivity did not seem to be relevant (Lyons-Ruth & Jacobvitz, 1999; Madigan et al., 2006; van IJzendoorn et al., 1999). However, the antecedents of attachment disorganization in atypical groups have not been investigated. Here, we assess attachment disorganization in both clinical and nonclinical groups, and we explore whether parental sensitivity plays any role in reducing the risk of disorganized attachment in clinical groups.

In sum, the current study is the first to test the association between parental sensitivity and children's attachment in children with ASD just after their second birthday. We examined the following hypotheses. The first question was whether parents of children with ASD are equally sensitive as parents of children without ASD. Parents of children with autism may be less sensitive to their children's needs because of the inborn social impairment with which these children and their social environment have to struggle or because of traces of social impairment in the parents themselves. The second question was whether children with ASD display less attachment security and more disorganization of attachment. Children with autism may also show less involvement with their parent during play. In view of previous studies, we expected children with autism to be less securely attached and to show more attachment disorganization. The third question was whether parental sensitivity predicts attachment security equally well for children with ASD as for children without ASD, and equally well for children with mental retardation as for children without mental retardation. Moreover, we examined how parental sensitivity is related to attachment disorganization. We predicted that higher parental sensitivity would be associated with more attachment security but not with (less) attachment disorganization.

## Method

### *Participants and Procedure*

About 31,000 children 14–15 months old in the province of Utrecht, the Netherlands, were prescreened with the 4-item Early Screening of Autistic Traits (ESAT; Swinkels et al., 2006). Children with a positive prescreening were further evaluated during a home visit using the 14-item screening instrument ESAT at well-baby offices. Next, screen-positive children on the 14-item ESAT were invited for further investigations at the Department of Child Psychiatry. In addition, clinically referred children

with a suspicion of ASD or related developmental problems were also seen for further investigation. Details about the screening are described by Swinkels (Willemsen-Swinkels et al., in press) and Dietz (Dietz, Willemsen-Swinkels, Van Daalen, Van Engeland, & Buitelaar, 2006). A series of five measurements (for details, see the following discussion) were scheduled, with observations of the child's social and communicative behavior in a small group of very young children and their parents. Children were also individually observed together with their primary caregiver ( $n = 49$  mothers,  $n = 6$  fathers). One session was especially designed to measure parental sensitivity and child involvement. Attachment security was measured 1 week after the sensitivity assessment.

The final diagnoses, made when the participating children were age 4, were the following: (a) AD ( $n = 13$ ), (b) PDD–NOS ( $n = 8$ ), (c) mental retardation without ASD ( $n = 10$ ), (d) language delay ( $n = 9$ ), and (e) nonclinical comparison children ( $n = 15$ ). The current analyses were based on the final diagnoses of the follow-up assessments at around 4 years of age, and not on the preliminary diagnoses during the screening phase. In fact, the children were already participating in the assessments at 28 months before their final diagnosis, established 2 years later, was known. The children with AD and PDD–NOS were combined into one ASD group, with a distinction between high- ( $n = 8$ ) and low- ( $n = 13$ ) functioning children (cutoff score on developmental level = 70). The nonclinical comparison children were recruited through child-care centers. The current sample involved 55 children. The sample included 35 boys and 20 girls, with a mean age of 28.4 months at Strange Situations assessment (standard deviation ( $SD$ ) = 4.9,  $range = 16.6$ – $41.6$  months).

### *Instruments*

*Autism.* At four years of age, the Vineland Social–Emotional Early Childhood Scales (Sparrow, Balla, & Cicchetti, 1997), as well as the Autism Diagnostic Observation Schedule (ADOS–G; DiLavore, Lord, & Rutter, 1995) and the Autistic Diagnostic Instrument–Revised (ADI–R; Lord, Rutter, & LeCouteur, 1994) were administered. To quantify the severity of autistic symptoms in the social domain (parallel to Dapretto et al., 2006), we used the ADOS subscale scored at 4 years of age (Lord, Leventhal, & Cook, 2001). This scale ( $M = 7.33$ ,  $SD = 5.13$ ,  $n = 18$  children with ASD) quantifies social deficits across the autism spectrum, separately from repetitive behaviors and interests, expressive language level, and nonverbal intelligence.

Further information was obtained from pediatric examinations and a standardized interview with the parents concerning the child's developmental history. More details on the psychiatric diagnoses are reported elsewhere (Van Daalen et al., 2007). The interrater reliability for the clinical diagnosis among three child psychiatrists (H.E., J.B., E.D.) was calculated for the diagnosis ASD or other than ASD. Agreement was reached in 92% of 38 cases ( $\kappa = .74$ ). The interrater reliability for all diagnostic categories was 79% ( $n = 38$ ,  $\kappa = .67$ ). Diagnostic discrepancies were resolved through consensus.

*Developmental level.* Mullen Scales of Early Learning (Mullen, 1995; Bradley-Johnson, 1997) were administered at three points: the home visit (24.2 months), the first assessment (28.3 months), and the follow-up assessment (44.1 months). On the basis of their developmental level, children were divided into high ( $n = 24$ ) and low ( $n = 31$ ) functioning groups (cutoff = 70), with the score of the last assessment being decisive.

*Attachment.* The quality of the attachment relationship was assessed with the Strange Situation procedure (Ainsworth et al., 1978). Attachment behavior was observed in a laboratory playroom where the children were confronted with a stranger and two short separations from the caregiver (once with and once without the stranger present). The distribution of attachment classifications was 13% insecure-avoidant attachments, 56% secure attachments, 7% insecure-ambivalent attachments, and 24% disorganized attachments. The distribution of attachment classifications for the group of children diagnosed with autism ( $n = 21$ ) was 14% insecure-avoidant, 48% secure, 0% insecure-ambivalent, and 38% disorganized attachment. The child's behavior in the two reunion episodes was rated with scales for proximity seeking, contact maintaining, avoidance, and resistance. Because the distribution of classifications was skewed and the number of children with autism was modest, we used continuous measures for security and disorganization. A continuous score for Richters attachment security ( $M = 0.72$ ,  $SD = 3.21$ ) was derived from the rating scales for proximity seeking, contact maintaining, avoidance, and resistance of both episodes 5 and 8 with the simplified Richters, Waters, and Vaughn (1988) algorithm (van IJzendoorn & Kroonenberg, 1990). The Richters Attachment Security Scale is strongly associated with secure versus insecure attachment classifications, correctly predicting about 90% of the cases (van IJzendoorn & Kroonenberg, 1990), and it has been used in more than 20 studies (e.g., Kochanska, 2001; Kochanska, Aksan, Knaack, & Rhines, 2004; Lyons-Ruth & Easterbrooks, 2006).

Moreover, a rating for disorganization of attachment ( $M = 3.27$ ,  $SD = 2.61$ ) was assigned following the Main and Solomon (1990) guidelines. Behavioral indexes of disorganized attachment were contradictory behavior, misdirected or stereotypical behavior, stilling and freezing for a substantial amount of time, and direct apprehension or fear of the parent. These behaviors are considered to be the result of a failure to construct a coherent strategy for organizing attachment behavior. Strange situations were coded by experienced coders (S.W.S., M.B.K.), who reached satisfactory intercoder reliability on both the three- and four-way attachment classifications ( $\kappa > .74$ ), on the Richters security scale ( $r = .77$ ,  $n = 26$ ), and on the scale for attachment disorganization ( $r = .66$ ;  $n = 26$ ).

*Parental sensitivity and child involvement.* All children were observed during 10 min of free play with the same parent who was observed with the child in the Strange Situation procedure (49 mothers, 6 fathers). The Emotional Availability Scales (EAS Infancy/Early Childhood Version; Biringen, Robinson, & Emde, 1998) were applied to assess the quality of the interactions between parent and child. We include the two most relevant scales in this article: sensitivity and child involvement. Parental sensitivity ( $M = 5.50$ ,  $SD = 1.11$ ) was rated on a scale ranging from 1 (*highly insensitive*) to 9 (*highly sensitive*). Child involvement ( $M = 4.86$ ,  $SD = 1.21$ ) indicated the child's ability to invite the parent into interactive loops, and it was rated by independent coders blind for the sensitivity scores, also on a scale ranging from 1 (*child highly uninvolved with the parent*) to 9 (*child highly involved with parent*). The coders were unaware of child diagnosis. Interrater reliability among three coders ranged from .68 to .83 ( $M = 0.76$ ) for sensitivity, and from .64 to .66 ( $M = 0.65$ ) for child involvement. The correlation between parental sensitivity and child involvement was  $r = .26$ ,  $p = .06$ .

*Statistical analyses.* We assigned the diagnostic groups to broader categories to enlarge group size for statistical analyses. Using dichotomous contrasts, the power for finding moderately strong effects was .70; using more subgroups would decrease power. Three dichotomous categories were created: (a) children with autism versus children without autism, (b) children with mental retardation versus children with typical developmental level, and (c) children with clinical diagnosis versus children without clinical diagnosis (see Table 1). Of course, the three groupings were overlapping, in that some children were categorized in the clinical, autistic, and mental retardation group. Nevertheless, for descriptive purposes we tested whether the major

Table 1  
Means (M) and Standard Deviations (SD) of Sensitivity, Attachment Security, Disorganization, and Child Involvement in Various Diagnostic Groups

Diagnostic group	N	Sensitivity		Security		Disorganization		Child involvement	
		M	SD	M	SD	M	SD	M	SD
ASD+MR	13	5.27	1.38	-0.48	3.37	4.85	3.21	3.70	1.33
ASD	8	5.50	0.93	0.12	3.73	3.12	2.17	5.41	0.80
MR	10	5.25	1.06	-0.12	3.83	4.20	2.62	4.18	1.01
Language	9	5.44	1.31	1.53	3.04	2.78	2.59	5.43	0.48
Comparisons	15	5.90	0.87	2.16	1.93	1.67	1.05	5.67	0.65
ASD ± MR	21	5.36	1.21	-0.25	3.43	4.19 <sup>a</sup>	2.93	4.35 <sup>b</sup>	1.41
Non-ASD	34	5.59	1.06	1.32	2.96	2.71	2.26	5.16	0.97
MR	23	5.26	1.22	-0.32 <sup>c</sup>	3.50	4.57 <sup>d</sup>	2.92	4.02 <sup>e</sup>	1.22
Non-MR	32	5.67	1.01	1.47	2.81	2.34	1.93	5.46	0.78
Clinical	40	5.35	1.17	0.19 <sup>f</sup>	3.44	3.88 <sup>g</sup>	2.78	4.55 <sup>h</sup>	1.24
Nonclinical	15	5.90	0.87	2.16	1.93	1.67	1.05	5.67	0.65
Total	55	5.50	1.11	0.72	3.21	3.27	2.61	4.85	1.21

Note. ASD = autism spectrum disorder; MR = mentally retarded.

<sup>a</sup> $F(1, 53) = 4.46, p = .04, \eta = .28$ .

<sup>b</sup> $F(1, 53) = 6.43, p = .01, \eta = .33$ .

<sup>c</sup> $F(1, 53) = 4.44, p = .04, \eta = .28$ .

<sup>d</sup> $F(1, 53) = 11.56, p < .01, \eta = .42$ .

<sup>e</sup> $F(1, 53) = 28.38, p < .01, \eta = .59$ .

<sup>f</sup> $F(1, 53) = 4.36, p = .04, \eta = .28$ .

<sup>g</sup> $F(1, 53) = 8.93, p < .01, \eta = .38$ .

<sup>h</sup> $F(1, 53) = 10.94, p < .01, \eta = .41$ .

groupings differed even though subgroups were too small to allow for statistical analyses. One-way analyses of variance were used to test differences among the various aggregated diagnostic groups in parental sensitivity, child involvement, Richters attachment security, and attachment disorganization. Within the ASD group, we also conducted exploratory analyses with partial correlations between deficits in the social domain and, respectively, attachment security and disorganization, controlling for developmental level. Multivariate analyses of covariance (MANCOVA) with diagnostic status (children with ASD vs. children without ASD) and parental sensitivity (high vs. low, median split) as factors were used to explain the variance of attachment security and disorganization. No outlying values were detected.

## Results

### *Do Parents of Children With Autism Show Less Sensitivity?*

In Table 1, the means and SD of parental sensitivity for all diagnostic groups as well as for the various diagnostic categories are presented. Parents of children with ASD did not differ significantly

from parents of children without ASD,  $F(1, 53) = 0.55, p = .46, \eta = .10$ . We did not find significant differences in sensitivity between parents of children with mental retardation and parents of other children, or between parents of clinical children versus parents of comparison children (see Table 1).

### *Do Children With ASD Display Less Involvement With Their Parents?*

Child involvement was significantly lower in the group with autism than in the group without autism,  $F(1, 53) = 6.43, p = .01$ , with a substantial effect size of  $\eta = .33$ . We also found significant differences between children with mental retardation and other children,  $F(1, 53) = 28.38, p < .01, \eta = .59$ , as well as between children with clinical diagnosis and children without diagnosis,  $F(1, 53) = 10.94, p < .01, \eta = .41$  (see Table 1). Children with mental retardation and children with clinical diagnosis were significantly less involved in the interaction with their parents.

### *Do Children With ASD Display Less Attachment Security and More Disorganization of Attachment?*

Children with autism tended to score lower on the Richters security scale than did children without

autism,  $F(1,53) = 3.23$ ,  $p = .08$ ,  $\eta = .24$ . Larger differences, however, were found for the other comparisons (see Table 1). Children with mental retardation scored significantly lower on security than did children without mental retardation,  $F(1,53) = 4.44$ ,  $p = .04$ ,  $\eta = .28$ , and children with clinical diagnosis scored significantly lower than did children without such a diagnosis,  $F(1,53) = 4.36$ ,  $p = .04$ ,  $\eta = .28$ . For disorganization of attachment, we found significant differences in all three comparisons. Children with autism showed more attachment disorganization than did children without autism,  $F(1,53) = 4.46$ ,  $p = .04$ ,  $\eta = .28$ . Children with mental retardation displayed more attachment disorganization than did children without mental retardation,  $F(1,53) = 11.56$ ,  $p < .01$ ,  $\eta = .42$ , and children with clinical diagnosis were more disorganized than children with typical development,  $F(1,53) = 8.93$ ,  $p < .01$ ,  $\eta = .38$ .

With a more exploratory aim, we examined how autistic symptoms in the social domain were related to attachment security and disorganization. Within the group of children with ASD, the score on the social interaction scale of the ADOS was highly correlated with attachment security, partial  $r(15) = -.58$ ,  $p = .02$ , controlling for developmental level. ASD children with more autistic symptoms in the social domain were less securely attached. Within the group of children with ASD, the score on the ADOS social interaction scale was not significantly correlated with attachment disorganization, partial  $r(15) = .24$ ,  $p = .36$ , controlling for developmental level.

#### *Does Parental Sensitivity Predict Attachment Security and Disorganization of Children With and Without ASD?*

**Attachment security.** In a MANCOVA on the Richters security scores with parental sensitivity (median split) and autism (children with or without a diagnosis of autism) as factors, we found a significant interaction between diagnosis and parental sensitivity, which remained significant when we included child involvement, developmental level, and attachment disorganization as covariates,  $F(1,48) = 6.03$ ,  $p = .02$ ,  $\eta = .33$ . The interaction is graphically presented in Figure 1.

For children with ASD parental sensitivity was not associated with attachment security scores, whereas for children without ASD the predicted association was found: Parents who were more sensitive had children who scored higher on security, even when differences in child involvement, developmental level, and attachment disorganization were controlled

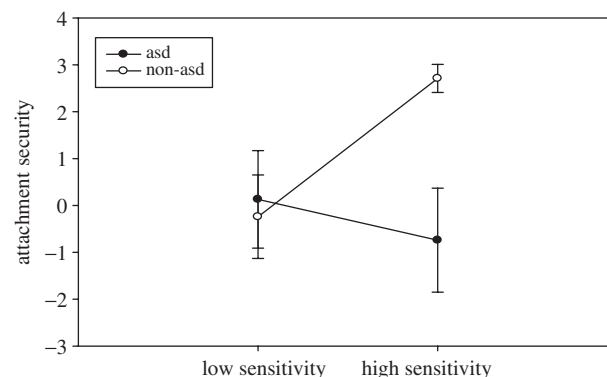


Figure 1. Association between parental sensitivity and autism spectrum disorder (ASD) on attachment security.

for. The MANCOVA showed a significant effect of the covariates attachment disorganization,  $F(1,48) = 6.21$ ,  $p = .02$ ,  $\eta = .34$ , and child involvement,  $F(1,48) = 4.28$ ,  $p = .04$ ,  $\eta = .29$ . Higher scores on attachment disorganization and lower scores on child involvement were associated with lower scores on security. The third covariate, developmental level, was not significant. The interaction between autism diagnosis and parental sensitivity also remained significant when we excluded the 6 fathers,  $F(1,42) = 6.48$ ,  $p = .02$ ,  $\eta = .37$ .

With a more exploratory aim, we examined whether this pattern held for high functioning as well as low-functioning children. We included developmental level (high vs. low) as a factor and tested for a three-way interaction of autism diagnosis, parental sensitivity, and developmental level. However, only the two-way interaction between autism and sensitivity was significant,  $F(1,45) = 7.10$ ,  $p = .01$ ,  $\eta = .37$ . Thus, the interaction between autism and sensitivity predicting attachment security was robust and remained significant with and without the covariates, with and without the six fathers, and irrespective of the developmental level of the children. More parental sensitivity was only associated with more security in the group of children without ASD.

We then examined the association between the continuous parental sensitivity and child attachment scores, controlling for potentially confounding child characteristics. Partialing out child involvement, we found a nonsignificant correlation between parental sensitivity and Richters security,  $r(18) = -.17$ ,  $p = .50$ , in the group of children with ASD, whereas we found a significant partial correlation between parental sensitivity and security,  $r(31) = .49$ ,  $p < .01$ , in the group without ASD. The difference between the two correlations was significant ( $z = 2.22$ ,  $p = .03$ ).

*Attachment disorganization.* Predicting attachment disorganization on the basis of parental sensitivity and autism, controlling for child involvement, developmental level, and Richters security, we found a significant overall  $F(6, 48) = 3.70, p < .01$ . Autism diagnosis was not a significant factor,  $F(1, 48) = 0.68, p = .41, \eta = .12$ . Parental sensitivity was not a significant factor either,  $F(1, 48) = 0.35, p = .56, \eta = .08$ , and the interaction between parental sensitivity and autism was also nonsignificant,  $F(1, 48) = 0.42, p = .52, \eta = .09$ . Two covariates were significantly associated with attachment disorganization: Richters security,  $F(1, 48) = 6.21, p = .02, \eta = .34$ , and developmental level,  $F(1, 48) = 6.11, p = .02, \eta = .34$ . Higher scores on security and a higher developmental level were associated with less attachment disorganization, but variance in attachment disorganization could not be explained on the basis of parental sensitivity.

### Discussion

Our study is the first to focus on parental sensitivity and infant–parent attachment in children with ASD at 2 years of age. The study tests the limits of attachment theory to explain the development of secure and insecure attachments in children with a major social impairment as implied by the autism diagnosis. We found that the sensitivity of parents of children with ASD did not differ significantly from that of parents of children without ASD. However, children with autism tended to be less secure and they were more disorganized. Moreover, their involvement with the parents during play was lower. Finally, for children with ASD more sensitive parenting was not associated with more attachment security, whereas for children without ASD more sensitive parenting was associated with more attachment security. Even though we screened a sample of 31,000 infants, our study involved a limited number of children with ASD because of the low incidence of this diagnosis. The power of the analyses is therefore restricted, but it was sufficient for finding several statistically and theoretically significant differences.

One of the basic tenets of attachment theory is the association between parental sensitivity and children's attachment security (Ainsworth et al., 1978; Main, 1990). The bias to display attachment behaviors toward a protective adult in times of stress and distress is thought to be rooted in evolution and to be genetically preadapted among most members of the human species (Bowlby, 1969/1982). Individual differences in attachment security, however, have been

traced back to differences in parenting (Ainsworth, 1967) and are considered to be transmitted across generations (Hesse, 1999; Main, 1999). In some circumstances the intergenerational transmission of attachment has been shown to be interrupted. For example, in a study on the cross-culturally unique childrearing environment of the communal kibbutz, Sagi et al. (1997) found that collective child care during the night prevented the parents from influencing their children's attachment development, which was restricted by their limited dyadic interactions during daytime.

Parallel to this ecological constraint, the current findings might lead to the hypothesis that for children with ASD there is a biological constraint on the intergenerational transmission of attachment. Because of their inborn limited social information processing, children with ASD may challenge the established role of sensitive parenting obtained in studies on typically developing children. In a recent functional magnetic resonance imaging (fMRI) study, Gervais et al. (2004) found an abnormal cortical voice processing in adults with autism compared with matched controls. In combination with other problems in the processing of social information, this may lead to a general decreased sensitivity to social stimuli in individuals with autism (Gervais et al., 2004). In this respect, deficits in joint attention may be relevant. Naber et al. (in preparation) found that already at the age of 2 years, children with autistic symptoms show less joint attention than children in comparison samples, even after controlling for developmental level.

Recently, the so-called mirror neuron system (Iacoboni, 2005) was demonstrated to show reduced activity in adults and children with autism (Dapretto et al., 2006), leading to impaired performance on simple imitation tasks but also on tasks requiring the recognition or imitation of facial emotions. In such tasks, typically developing children show an activated mirror neuron system and related limbic system activation, and appear to understand the meaning of an expressed emotion directly. In contrast, IQ-matched children with autism must rely on increased visual and motor attention through which the internally mirrored emotional value of the stimulus is not immediately captured. They therefore fail to understand another person's facial emotion expression at a glance. Dapretto et al. suggest that the lack of mirror neuron system activation during tasks involving social mirroring in children with ASD is at the root of the social deficits observed in autism. Neurologically based problems with emotion recognition may lead to less adequate processing of



parental sensitive responses and thus to blocking of the expected linkage between parental sensitivity and child security. Indeed, in our study lower child attachment security was strongly associated with more deficits in the social domain as assessed with the ADOS, parallel to the equally strong negative correlation between mirror neuron activity and ADOS social domain scores in the Dapretto et al. study. This may suggest a constitutional basis for the differences in attachment security in children with autism.

Autism seems to jeopardize not so much the development of secure or insecure attachments (Rutgers et al., 2004) but the common relation between parenting and attachment development. In our study, we found that mental retardation was not incompatible with the development of secure or insecure attachments, and that mental retardation did not interfere with the association between autistic symptoms in the social domain and attachment security, or with the (absence of an) association between parental sensitivity and child security in children with ASD. In Capps et al. (1994), the role of developmental level could not be tested, as all children in their study were low functioning. Although we were not able to confirm the association between sensitivity and attachment, Capps et al. found, this discrepancy might be explained by our use of a cognitively more diverse sample. Controlling for developmental level did not change our results, but a larger group of low- and high-functioning children with autism is needed to settle this issue more definitely.

In their two-tiered theory of attachment working models, Sigman and Capps (1997) posited that the emergence of a secure working model of attachment comes later in children with ASD or it may never be reached, as it requires the understanding and appreciation of the perspectives of others (i.e., the attachment figure). Here we suggest that the development of secure base behavior of children with autism as regulated and scaffolded by a sensitive attachment figure is also delayed compared with clinical groups without the specific social impairments of autism, such as children with mental retardation. In the case of ASD, the child and parent may both need more time and effort to develop a predictable and well-matched interaction pattern, which may only become established in preschool age or may fail to emerge at all.

In previous studies, children with mental retardation were found to be less predictable and less responsive to external stimuli, which was supposed to overburden initially sensitive parents (Emde et al., 1978; Goldberg, 1977). In the current study, we con-

firmed the lower involvement in interactive loops of children with mental retardation, who also were less securely attached and more disorganized, in agreement with earlier findings by Vaughn et al. (1994). Although the strong association between mental retardation and attachment disorganization casts doubt on the validity of disorganized attachment assessments in this developmentally atypical group (Pipp-Siegel, Siegel, & Dean, 1999), we did find the predicted association between parental sensitivity and attachment security in children with mental retardation. Together with similar findings of Moran et al. (1992) and Atkinson et al. (1999), this is reason to believe that the regular organized attachments can be validly observed in 2-year-old children with mental retardation, despite their major cognitive impairments.

Of course, the absence of the common association between sensitivity and attachment might also point to problems in the assessments of sensitivity and attachment in children with autism and their parents. Our criteria for sensitive parenting may be inadequate for autism. Children with ASD may need much more explicit parental stimuli and a stronger emphasis on nonverbal input than children without ASD, and their parents may thus sometimes appear more physically intrusive (Doussard-Roosevelt et al., 2003; Kasari et al., 1988). Such parenting might be ideal from the perspective of a child with impaired social information processing, but it may at the same time be classified as insensitive according to conventional criteria for the patterning and timing of parental responses to children's signals. Seemingly sensitive behaviors may at times be too low-keyed to reach the child with autism.

Furthermore, attachment security in children with ASD may manifest itself differently from that in nonclinical children, and typical attachment behaviors such as proximity seeking and contact maintaining may have a different function. In their Attachment Q-Sort study with attachment and autism experts, however, Rutgers, van IJzendoorn, Bakermans-Kranenburg, & Swinkels (2007) found that experts agree on the similarity between children with ASD and typically developing children in terms of observable secure base behaviors in a natural setting. Because the Q-sort items describe concrete behaviors, however, phenotypic resemblances may index different underlying functions. Instead of secure base behavior, proximity seeking in children with autism may mean proximity to the familiar (whether a familiar but arbitrary person or a familiar object) and avoidance of a disturbing overload of unfamiliar stimuli. In this case, individual differences

in proximity seeking would not be dependent on differences in parenting but on the severity of (in-born) deficits in the social domain related to autism. Also, secure base behavior does not fully cover disorganized attachment behaviors, and the assessment of disorganized attachments may be compromised in atypically developing children with neurological impairments (Pipp-Siegel et al., 1999).

In the current study, we did not search for the specific social-interactive determinants of attachment disorganization such as extreme insensitivity or frightening parental behavior, and evidence-based conclusions about its validity therefore are not yet possible. It seems implausible to explain the overrepresentation of disorganized attachments in children with autism solely on the basis of parental influences (e.g., parental unresolved loss or other trauma that increases the risk of frightening or extremely insensitive behavior), although the perception of normal parental behaviors may be more threatening for children with autism, who are more easily disoriented by changing environments and who may have more problems reading their parents' facial expressions of emotions because of mirror neuron dysfunction.

In future studies, the concept of biological constraints on intergenerational transmission of attachment in children with ASD may be examined in three ways—if possible in samples with larger numbers of children with autism. First, the parents of children with ASD may be asked to participate in an Adult Attachment Interview to assess their mental representation of attachment (Hesse, 1999; Main, 1999). If secure parents have children who are classified as secure in the Strange Situation procedure, the regular transmission of attachment would have been documented even when the interactive mechanisms have not yet been uncovered (van IJzendoorn, 1995). To our knowledge, such a study has not yet been published, although it would shed new light on the validity of attachment theory in the extreme case of children with ASD. Second, the measurement of parental sensitivity may be adapted to the specific problems and pitfalls arising in interactions with children with ASD. Security-promoting sensitivity consists of three stages: accurate parental perception of attachment-related signals from their children, and—from the perspective of the child—prompt and adequate responses to these signals. Departing from the general definition of sensitivity, one may try to take into account the specific ways of social information signaling and processing in children with ASD in developing a tailor-made sensitivity coding system. Third, experimental evidence for intergen-

erational transmission of attachment may be derived from attachment-based intervention experiments that aim at enhancing the sensitivity of parents of children with ASD in a randomized-controlled intervention (see Bakermans-Kranenburg et al., 2003). To our knowledge, the small-scale investigation of Pechous (2001) has reported the only randomized attachment-based intervention on children with autism. The effectiveness of this approach appeared to be promising.

In sum, parental sensitivity is associated with security in children without autism, but the present study failed to confirm this relation in children with autism. If attachment behaviors in children with ASD have the same meaning as in other children, attachment may be affected by parental interactive behaviors other than sensitivity as traditionally defined in attachment theory. Alternatively, we speculate that the parents of children with ASD may be unable to overcome the biological constraints in communicative functioning of their children, and that individual differences in attachment relationships of children with autism are largely dependent on constitutional factors. Attachment-based interventions are needed to test these speculations.

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