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Negative reactivity and attachment: Down syndrome's contribution to the attachment–temperament debate

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Abstract
This longitudinal study investigated the relation between negative reactivity and attachment in children with Down syndrome (DS). Specifically, we examined whether extremely low negative reactivity is associated with the enactment and organization of attachment behaviors. To address this issue 30 infants with DS (13 female, 17 male) were observed in Ainsworth's Strange Situation at 19 and 27 months. The intensity and duration of distress reactions were coded in 15-s intervals throughout each Strange Situation episode. Children's distress intensity during separations from caregivers was used to place children into Low versus Moderate/High Negative Reactivity groups. In addition, ratings of infants' social interactive behaviors (contact maintenance, proximity seeking, distance interaction, resistance, and avoidance) were made for each episode and used to assess the quality of infants' attachment relationships. The data indicated that there are high rates of Type A and D insecure attachments within the DS population at each age studied. However, low negative reactivity was not consistently related to the activation of the attachment behavioral system, or associated with insecure attachment relationships. Alternative explanations for the high rate of insecure attachments are discussed.

The influence of temperament upon children's long-term development has been debated since Thomas, Chess, and Birch (1968) provided the first descriptions of infant temperament. In recent years, the role of negative reactivity, or infants' proneness to distress, has been highlighted as an important contributor to children's personality and socioemotional development (e.g., Belsky, Fish, & Isabella, 1991; Calkins, 1994; Fox, 1994; Rothbart & Ahadi, 1994). Empirical explorations suggest that children who react quickly, negatively, and intensely to limitations, novelty, and separations from caregivers are more prone to be behaviorally inhibited and shy than other children (Daniels & Plomin, 1985; Kagan, Resnick, & Snidman, 1988). In addition, heightened negative reactivity has been related to anxiety disorders (Hirshfeld & Rosenblum, 1992; Warren, Huston, Egeland, & Sroufe, 1997) and to disruptive behavior during early childhood (Olson, Bates, & Bayles, 1990).

In contrast, relatively little attention has been paid to the correlates of the opposite extreme of temperament—diminished negative reactivity. Such children are expected to be less fussy and, thus, less irritable than other children. In this regard, decreased negative reactivity may actually serve a *protective* func-

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tion in early emotional development by decreasing the frequency of stressful, negative interactions between parents and children. However, when taken to an extreme, diminished reactivity also may pose a unique challenge to caregivers (Bridges & Cicchetti, 1982). Brief or muted affect may not be detected or easily understood by others (Cicchetti & Sroufe, 1976a; Emde, Katz, & Thorpe, 1978; Kasari & Sigman, 1996; Walden, Blackford, & Carpenter, 1997; Walden & Knieps, 1996). Thus, parents or peers may have difficulty responding consistently and sensitively to such cues, or may find interactions with such children unrewarding and unappealing.

Children with Down syndrome (DS) may provide a unique opportunity to address this important but neglected issue. DS is a genetic disorder that involves full or partial triplication of the 21st chromosome. This genotype is most commonly associated with mental retardation (e.g., Dunst, 1990; Gibson, 1978; Wagner, Ganiban, & Cicchetti, 1990). However, as a group infants and young children with DS are often described as less emotionally reactive than non-DS children by their parents (Ganiban, Wagner, & Cicchetti, 1990) and by objective observers (Cicchetti & Serafica, 1981; Cicchetti & Sroufe, 1976a,b, 1978; Sorce & Emde, 1982; Serafica & Cicchetti, 1976; Thompson, Cicchetti, Lamb, & Malkin, 1985; Vaughn, Goldberg, Atkinson, Marcovitch, MacGregor, & Seifer, 1994). Thus, research with children with DS may yield important insights into the contributions of diminished negative reactivity to socioemotional development.

Emotional Reactivity and Attachment

The extent to which a child has been able to form a secure attachment relationship with a primary caregiver is considered to be an index of adaptive socioemotional development (Cicchetti, 1990; Rutter, 1995; Sroufe & Rutter, 1984). Attachment security is typically assessed through Ainsworth's "Strange Situation" (Ainsworth, Blehar, Waters, & Wall, 1978). In her original study with 12-month-old infants, Ainsworth detected three patterns of attachment in the Strange Situation: Secure (Type B, Subtypes B_1, B_2, B_3, B_4), Insecure–Avoidant (Type A, Subtypes A_1, A_2), and Insecure–Resistant (Type C, Subtypes C_1, C_2; Ainsworth et al., 1978). Infants with Type B attachments use their caregivers as a secure base for exploration, and actively seek comfort from caregivers through proximity, contact, or distance interaction. Moreover, such infants readily accept comfort when parents offer it. In contrast, infants with Type A attachments display few attempts to maintain proximity, initiate interactions, or seek contact with their caregivers. Instead, Type A infants actively avoid and ignore their caregivers. Infants with Type C attachments actively seek comfort and proximity with their caregivers, but often resist their caregivers' attempts to offer comfort. In recent years, a fourth classification has been identified during infancy: Type D or Disorganized attachments. Type D relationships are insecure in quality and are characterized by disorganization or disorientation on the part of the infant (Main & Solomon, 1990). Infants with this classification may display elements of Type A and C attachment types. In addition, infants within each Type D subtype may display "D signs" in the presence of their caregivers that reflect child disorganization, apprehension, fear, or anxiety (e.g., rocking, dazing, stilling, behavioral stereotypies, and asymmetric movements; Main & Solomon, 1990).

The Strange Situation paradigm has been used to assess attachment patterns cross-culturally (van Ijzendoorn & Kroonenberg, 1988) and within clinical populations, including infants who were born prematurely, infants with physical problems (e.g., cystic fibrosis and congenital heart disease), and toddlers with Down syndrome (van Ijzendoorn, Goldberg, Kroonenberg, & Frenkel, 1992). However, as van Ijzendoorn et al. (1992) note, little information about the external validity of the attachment classifications based upon behavior during the Strange Situation has been obtained for clinical samples. Within the DS population, Atkinson, Chisholm, Scott, Blackwell, Dickens, and Tam (in press) report that mothers of securely attached toddlers exhibit greater sensitivity to their

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children's cues than mothers of insecurely attached toddlers, or toddlers who were rated as "unclassifiable." Similarly, a second study by Moran, Pederson, Petit, and Krupka (1992) detected significant associations between maternal sensitivity and attachment security as assessed by Waters and Deane's (1985) Attachment Behavior Q-sort within a group of toddlers with DS. These studies suggest that the general construct of attachment security is valid for DS populations. However, additional research is required to firmly establish the external validity of the Strange Situation for clinical populations such as toddlers with DS.

The extent to which negative reactivity influences attachment classifications has been a point of debate. Attachment theorists propose that attachment patterns are primarily determined by parent sensitivity and contingency (e.g., Ainsworth et al., 1978; Isabella, 1993; Sroufe, 1983). Attachment patterns have also been cast as modes of emotion regulation that are acquired via parent–child interactions (e.g., Cassidy, 1994; Cicchetti, Ganiban, & Barnett, 1991; Kobak & Sceery, 1988). Consistent with the attachment perspective, van Izjendoorn et al.'s (1992) meta-analysis of attachment patterns within clinical populations suggests that maternal difficulties (e.g., maltreatment) are associated with greater deviations from secure attachment patterns than child characteristics (e.g., premature birth, sensory or motor deficits). However, van Ijzendoorn et al. (1992) also noted that DS may be an exception to this pattern. In particular, the frequency of insecure attachments within the DS population exceeded those of other children at biological risk, suggesting that child characteristics can be associated with attachment insecurity, in the absence of significant parental psychopathology.

Temperament is a child characteristic that may directly influence the assessment of attachment classifications. In contrast to the attachment perspective, Kagan (1982) proposed that the Strange Situation assesses differences in negative reactivity, rather than qualitative differences in attachment relationships. Consistent with this position, Clarke–Stewart (1988) has hypothesized that children who are not sufficiently stressed by the Strange Situation may seem avoidantly attached to their caregivers because they do not seek contact or proximity to their caregivers. Some studies have detected significant correlations between distress intensity and specific attachment behaviors (e.g., contact maintenance, proximity, resistance; Braungart & Stifter, 1991; Connell & Thompson, 1986; Goldsmith & Alansky, 1987; Thompson & Lamb, 1984; Vaughn, Lefever, Seifer, & Barglow, 1989). However, it is notable that significant relationships between negative reactivity and attachment *security* have not been found consistently (e.g., Calkins & Fox, 1992; Vaughn et al., 1989).

Temperament, however, can also influence attachment classifications indirectly. A third perspective contends that negative reactivity places loose constraints upon the attachment classifications that a child will display, but parents determine the child's specific classification (Belsky & Rovine, 1987; Frodi & Thompson, 1985). Thompson and Lamb (1984) initially delineated two molar attachment groups that expressed levels of negative reactivity during the Strange Situation but included both secure and insecure attachment classifications: (a) children with Type A and Subtypes B_1 or B_2 attachments who demonstrated low levels of distress, and (b) children with Subtypes B_3, B_4, or C who demonstrated moderate to high levels of distress during the Strange Situation (see also Braungart & Stifter, 1991; Frodi & Thompson, 1985; Susman–Stillman, Kalkoske, Egeland, & Waldman, 1996). In additional studies, molar group differences in negative reactivity were related to temperament ratings made outside of the Strange Situation (Belsky & Rovine, 1987; Calkins & Fox, 1992). Thus, in this view, negative reactivity restricts the range of attachment classifications that a child will display (e.g., A–B_2 vs. B_3–C), but will not determine the child's specific attachment classification.

Because many children with DS often display diminished negative reactivity, this population affords the opportunity to explore the relationship between negative reactivity and attachment more extensively. Thus, investigations of children with DS may enable re-

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searchers to affirm, expand, and challenge normative developmental theories (cf. Cicchetti, 1993). Specific studies with children with DS have consistently found that these children display separation distress that is less intense and of shorter duration than non-DS children of similar mental age (MA) and chronological age (CA) during the Strange Situation (Cicchetti & Serafica, 1981; Serafica & Cicchetti, 1976; Thompson et al., 1985; Vaughn et al., 1994). Therefore, if diminished negative reactivity is related to attachment classifications, then this relationship should be accentuated within the DS population.

To date, few studies have examined attachment relationships within the DS population. The most extensive study, however, was conducted by Vaughn and colleagues (1994). This investigation included three samples of toddlers with DS, for a total of 133 toddlers with DS (age range 14 to 54 months). Vaughn et al. (1994) reported that children with DS displayed significantly less proximity seeking, contact maintenance, and resistance than non-DS children. Furthermore, Vaughn et al. (1994) found that most children with DS were classified as Type B Secure (46%) or Insecure Unclassifiable (i.e., Type D or unratable, 42%). A second analysis that excluded all extremely low functioning individuals did not alter this distribution significantly. In a longitudinal study of 26- and 42-month-old toddlers with DS, Atkinson and colleagues (in press) also detected similar distributions of Type B Secure and Insecure/Unclassifiable attachment classifications.

Vaughn and colleagues attributed the elevated rate of Type D and unratable attachments to diminished negative reactivity. They argued that toddlers with DS were not sufficiently stressed by the Strange Situation to exhibit attachment behaviors. As a result, the Strange Situation could not be used to assess their attachment security. Consistent with this interpretation, the toddlers with DS received low social interactive behavior ratings, and exhibited low levels of crying during the Strange Situation relative to typically developing children. Therefore, one implication is that the Strange Situation is not an appropriate assessment tool for children with DS, or other children, who exhibit low negative reactivity.

This temperament-based interpretation is both appealing and parsimonious. However, it requires further exploration and validation. For example, inconsistent with the Vaughn et al. (1994) findings, two other studies have reported that children with DS and CA-matched (Cicchetti & Serafica, 1981; Serafica & Cicchetti, 1976) and MA-matched non-DS children (Thompson et al., 1985) display similar amounts of attachment related behaviors during the Strange Situation. Moreover, Thompson et al. (1985) reported that distress intensity was positively correlated with contact maintenance and resistance and negatively correlated with distance interaction within DS and non-DS populations. Therefore, affect and behavior seem to be organized similarly in DS and non-DS populations.

The discrepancies among these studies may be attributable to the absence of MA- or CA-matched control groups in Vaughn et al. (1994). Extreme developmental delay may account for the high rate of disorganized or unclassifiable attachments within the DS sample. In fact, although Vaughn and colleagues strongly argue for a temperament explanation, they also speculate that ". . . the processes required to consolidate attachment for DS children take more time, in both an absolute and developmental sense, than is required for ND children." (Vaughn et al., 1994, p. 106). If this interpretation is correct, then disorganized attachments should be associated with severe mental retardation, while decreases in the frequency of Type D attachments should appear over time as the toddlers with DS make some developmental gains.

The high rate of disorganized and insecure attachments within the DS population may also reflect the high frequency of neuromotor impairments such as hypotonia, ataxia, and abnormal movements (e.g., arching, tremors, tics) among children with DS. In particular, these behaviors may interfere with the enactment of some attachment-related behaviors (e.g., active contact seeking) or be perceived as D signs (i.e., signs of attachment disorganization; c.f. Pipp–Siegel, Siegel, & Dean, 1995). Therefore, neuromotor impairment should be taken into account when classifying

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attachment organization in children with DS.

A final point to consider is that comparisons of children with and without DS do not assess whether the attachment behavioral system has been activated within each population. Rather, *within*-group analyses that examine changes in the enactment of behaviors throughout the course of the Strange Situation are better suited to address this issue. If the attachment system is activated by separations from caregivers, then children should demonstrate an increase in attachment related behaviors from preseparation to reunion episodes. Cicchetti and Serafica (1981) have found that toddlers with DS do evidence increases in attachment-related behaviors as stress increases within the Strange Situation. These latter data suggest that the attachment behavioral systems of children with DS are activated, despite low levels of expressed distress.

In summary, current research with children with DS has consistently detected a high rate of disorganized and unclassifiable attachment patterns within this population. The current study asked whether these findings are related to diminished negative reactivity. As such, this study addressed four questions: (a) Do Low and Moderate/High Negative Reactivity groups differ in the amount of attachment-related behaviors they display? (b) Is the attachment behavior system activated within children who display little distress during the Strange Situation? (c) Do Low and Moderate/High Reactivity groups differ in the type or range of attachment patterns they display? and (d) Does the incidence of Type D Disorganized attachments decrease over time? The answers to these questions will provide important information about the relationship between temperament and attachment classifications in children with DS, and may also contribute to our understanding of attachment–temperament relations in typically developing children.

Methods

Participants

Children's with DS were identified through the cooperation of state associations for retarded citizens, pediatricians, and DS parent groups. Parents who had a child with DS were recruited by letter and telephone. All of the families who were asked to participate agreed to do so. Thirty children participated in this study (17 males, 13 females). For each participant the presence of DS was confirmed by chromosomal testing. All children in this investigation were raised in middle-class, two-parent, Caucasian families. Nineteen children (12 males, 7 females) included in this study were included in Thompson et al.'s (1985) study of 19-month-old infants with DS.

Children were observed in the Strange Situation when they reached 19 and 27 months chronological age. At the time of each assessment all children were able to locomote independently. The average Bayley Mental Developmental Index (MDI; Bayley, 1969) at 19 months was 62 (SD = 13; range = 28–85). MDI scores also were available for 25 children at 24 months. The average MDI at this age was 62 (SD = 12; range = 29–76). MDIs below 50 on the Bayley were extrapolated from the child's raw scores according to the criteria delineated by Naglieri (1981). At both ages tested, the same four children had MDIs less than 50, and thus exhibited mental retardation in the moderate to severe range (American Psychiatric Association, 1994).

Procedures

All children were observed in Ainsworth's Strange Situation at 19 and 27 months (Ainsworth et al., 1978). The Strange Situation was constructed to activate the attachment behavioral system by decreasing the child's internal level of security. The Strange Situation begins with a brief 30-s introduction (Episode 1), followed by seven 3-min episodes. In Episode 2 (Preseparation), the infants and mothers are alone in a room. At the beginning of Episode 3 a female stranger enters the room and initiates interaction with the infant during the last minute of the episode. Episode 4 (Separation I) begins when the mother departs from the room and the infant is left with the stranger. At the beginning of Episode 5 (Reunion I) the mother returns to the room, and the stranger leaves. However, the mother departs again

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after 3 min and now leaves the infant alone (Episode 6: Separation II). At the beginning of Episode 7, the stranger returns to the room. In Episode 8, the mother returns and the stranger departs (Reunion II). Throughout each episode of the Strange Situation, the extent to which children display proximity seeking, contact maintenance, distance interaction, avoidance, and resistance are rated. Judgments about attachment security are primarily determined by the organization of these behaviors during the reunion episodes (Episodes 5 and 8). Due to equipment failure, the Reunion I episode was lost for one 19-month-old child.

Coding schemes

The vocalization subscale of Thompson and Lamb's (1984) affect coding system was used to rate infants' distress vocalizations in each episode of the Strange Situation. This scale includes 14 categories of distress vocalizations. Following procedures outlined by Thompson and Lamb (1984), we collapsed these categories into a 5-point scale that reflected affect valence and intensity. In this scale scores ranged from 2 to 6: 2 = *neutral vocalization;* 3 = *mild distress* (e.g., very brief frustration sounds; distress gasps); 4 = *moderate distress* (whining, continuous fussing); 5 = *high distress* (continuous and rhythmic crying; protest cries, screams); and 6 = *extreme distress* (panic cries, hyperventilate cries). If the child did not vocalize during a time interval, the interval was scored as 0. Children's vocalizations were rated in 15-s intervals throughout the Strange Situation by two independent coders. Interrater reliability was established for 15% of the sample and based upon agreements or disagreements for each 15-s interval. The raters displayed exact agreements 90% of the time (range = 84–95%).

Two affect summary scores were generated for each episode: (a) distress duration and (b) peak distress intensity. Distress duration was computed by dividing the number of time intervals children displayed distress by the number of time intervals in the episode. Previous researchers have viewed peak distress intensity as an index of negative reactivity and distress duration as an index of emotion regulation (e.g., Fox, 1989; Rothbart & Derryberry, 1981).

In addition, we used children's peak distress intensity ratings during separations to classify children as Low Reactivity versus Moderate/High Reactivity. We focused upon separations because previous research has indicated that children's distress intensity within these episodes is related to preexisting temperament characteristics (e.g., Vaughn et al., 1989). The Low Reactivity group included children who were neutral or displayed very low intensity distress during Separations I and II (i.e., ratings of 2 or 3 during both separations). In contrast, the Moderate/High Reactivity group included children who displayed moderate to extremely high intensity negative affect during Separation I or Separation II (i.e., intensity ratings of 4 or higher). Thus, every child in the Moderate/High Reactivity group cried, whereas the children in the Low Reactivity group expressed no distress or extremely brief negative vocalizations. At 19 months 16 children were classified as Low Reactivity, and the remaining 14 children were classified as Moderate/High Reactivity. Similarly, at 27 months 16 children were placed in the Low Reactivity group, while 14 children were included in the Moderate/High Reactivity group. Placement in each group was not associated with gender or MDI at 19 or 27 months. Consequently, the effects of these variables were not assessed in subsequent analyses.

In addition, multivariate analysis of variance (MANOVA) was used to assess whether the two Reactivity groups differed significantly in their distress reactions throughout the Strange Situations. The Moderate/High Reactivity group displayed more intense distress than the Low Reactivity group during the 19-month, Wilks' lambda, $F(7, 22) = 17.28$, $p < .0001$, and 27-month, $F(7, 22) = 16.23$, $p < .0001$, assessments. Univariate analyses of variance (ANOVAs) indicated that the Moderate/High Reactivity group also displayed longer bouts of distress at 19 and 27 months, $F(7, 22) = 6.06$, $p < .001$, and $F(7, 22) = 27.27$, $p < .0001$, respectively.

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Social-interactive behaviors

Children's social interactive behaviors were rated during each episode of the Strange Situation for each child. In one case, however, ratings for one child during Reunion I was not possible due to equipment failure. Following Ainsworth et al.'s (1978) guidelines, ratings were made for five social interactive behaviors, including (a) proximity seeking, (b) contact maintenance, (c) avoidance, (d) resistance, and (e) distance interactions. In each case, behaviors were rated on a 7-point Likert scale.

Attachment classifications

The organization of children's social interactive behaviors was used to assign children to attachment categories. Ainsworth et al.'s (1978) coding scheme was used to classify children as A, B, or C. Main and Solomon's (1990) classification system for Type D attachments and D indices also was employed in this study. As discussed earlier, it was conceivable that neurological impairments may be interpreted as D indices. To reduce this potential confound, the following guideline was implemented: For a behavior to be considered a D sign, the behavior had to be exhibited solely upon Reunions with *caregivers*, or with *increased frequency or intensity* upon *Reunions*. Many children exhibited such D signs as dazing, rocking, or turning in a circle; however, these youngsters did so only when the stranger was present, or did not exhibit these behaviors in greater frequency with their mothers. Therefore, these behaviors were viewed as likely neurological abnormalities associated with DS and were not considered in making final judgments about children's attachment classifications. Finally, infants who were classified as D also received a second, "forced-classification" of A, B, or C to indicate which pattern of organization they most resembled.

Both the second and third authors have established reliability for the Ainsworth et al. (1978) and Main and Solomon (1990) attachment classifications systems (cf. Carlson, Cicchetti, Barnett, & Braunwald, 1989). The second and third authors coded a subset of 15 tapes for reliability purposes. Interrater agreement for major attachment classification group was 100%. The second author coded all remaining tapes. However, when assignment of the classification was unclear, the third author was consulted and the tape was reviewed and discussed until consensus was reached. To help prevent classification biases, Strange Situations of the 27-month-olds were coded 8–12 months after the 19-month assessments were classified. This time lag eliminated the coder's awareness of individual children's original attachment classifications. The second author also made ratings on Ainsworth et al.'s 7-point social interactive behavior scales. Reliability on these scales on a separate sample of 12 infants was examined. Ratings between the two coders were within 1 point in 90% of all cases.

Molar attachment groups

To examine the relationship between reactivity group and attachment, we regrouped children at each age into the two molar attachment groups described by Thompson and Lamb (1984): $A–B_2$ molar group and $B_3–C$ molar group. Because little is known about the emotional characteristics of Type D infants, we placed them in a third group. Preliminary analyses indicated that neither gender nor MDI scores were significantly associated with molar attachment group placement during the 19- or 27-month assessments.

Results

Question 1: Do Low and Moderate/High Negative Reactivity groups differ in social interactive behavior ratings? Question 2: Is the attachment behavior system activated within the Low and Moderate/High Negative Reactivity groups?

To address Questions 1 and 2 we conducted a MANOVA that (a) assessed the main effect of reactivity group (e.g., Low vs. Moderate/High Reactivity) upon the social interactive behavior ratings, (b) made comparisons across

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Table 1. *Social interactive ratings for the Low and Moderate/High Reactivity groups at 19 months*

Social Interactive Behaviors	Reactivity Group: Low ($N = 16$) χ	Low SD	Moderate/High ($N = 14$) χ	Moderate/High SD	Reactivity Group Effect $F(1, 28)$
Preseparation					
Proximity Seeking	1.8	0.9	2.0	1.5	0.2
Contact Maintenance	1.1	0.2	1.5	1.6	1.2
Distance Interaction	3.5	2.1	2.4	1.5	2.9
Avoidance	1.8	1.0	1.9	0.6	0.3
Resistance	1.2	0.7	1.4	1.2	0.3
Reunion I[a]					
Proximity Seeking	3.3	2.3	3.4	1.3	0.02
Contact Maintenance	1.7	0.9	3.4	2.1	8.6**
Distance Interaction	3.3	1.6	2.4	1.5	2.4
Avoidance	3.9	1.8	3.7	1.4	0.1
Resistance	1.5	0.8	3.1	1.8	10.7**
Reunion II					
Proximity Seeking	4.2	1.9	4.4	1.6	0.1
Contact Maintenance	3.9	2.1	5.2	2.2	3.0†
Distance Interaction	3.6	1.9	2.3	1.8	3.4†
Avoidance	3.0	1.5	3.2	1.4	0.2
Resistance	1.8	1.1	3.5	1.6	11.5**

[a]$N = 15$ for the Low Reactivity group during Reunion I.
†$p < .10$. **$p < .001$.

the five social interactive behavior ratings (proximity seeking, contact maintenance, distance interaction, avoidance, and resistance), and (c) assessed the effect of episode type (i.e., Preseparation Episode 2, Reunion I, Reunion II) upon social interactive behavior ratings. Therefore, in this analysis reactivity group (2 levels) was the between-subjects factor, and the interactive behavior ratings (5 levels) and episode type (3 levels) functioned as within-subjects, repeated factors. Due to the small sample size, age could not be included in this analysis as a third within-subject factor. Therefore, separate analyses were conducted for the 19- and 27-month assessments.

Nineteen months. The mean social interactive behavior ratings by reactivity group and episode type are presented in Table 1. Overall, the MANOVA did not detect a significant main effect of reactivity group upon the social interactive behavior ratings across the Preseparation and Reunion episodes, Wilks' lambda, $F(15, 13) = 0.9$, *ns*. However, a significant interaction between reactivity group and the use of specific social interactive behaviors was detected, Wilks' lambda, $F(4, 24) = 3.28$, $p < .05$. Therefore, in regard to Question 1, this pattern of findings suggests that the groups did not differ in their *overall* social interactive behavior ratings. However, the *specific* behavior ratings varied with reactivity group. To explore this interaction further, we conducted a series of univariate ANOVAs for the specific behavior ratings. The F ratios for the separate ANOVAs are presented in Table 1. These analyses indicated that during Reunion I the Low Reactivity group received lower contact maintenance ratings, $F(2, 27) = 8.6$, $p < .01$, and resistance ratings, $F(2, 27) = 10.7$, $p < .01$, than the Moderate/High Reactivity group. During Reunion II, the Low Reactivity group received lower resistance ratings than the Moderate/High Reactivity group, $F(2, 28) = 11.5$, $p < .01$. As indicated in Table 1, marginal reactivity-group differ-

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ences were also noted for contact maintenance, $F(1, 28) = 3.0$, $p < .10$, and distance interaction, $F(1, 28) = 3.4$, $p < .10$.

To address the second question, we examined the main effect of episode type within the previously described MANOVA model. Within the 19-month-olds, a significant main effect of episode, Wilks' lambda $F(2, 26) = 79.66$, $p < .0001$, and a significant interaction between episode and social interactive behavior ratings, Wilks' lambda $F(8, 20) = 3.70$, $p < .01$, were obtained. However, the three-way interaction of Reactivity Group × Episode × Social Interactive Behaviors was not statistically significant, Wilks' lambda $F(8, 20) = 1.4$, *ns*. Therefore, in regard to Question 2, these data suggest that the two reactivity groups demonstrated similar changes in their use of specific behaviors across the different episodes. For both groups, the specific social interactive behavior ratings varied with episode type.

A series of post hoc repeated measures ANOVAs examined variation in social interactive behavior ratings across the Preseparation, Reunion I, and Reunion II episodes. Because the groups did not significantly differ in their pattern of change, we combined both groups in these analyses. The results indicated that ratings of proximity seeking, Wilks' lambda, $F(2, 27) = 21.74$, $p < .0001$, contact maintenance, Wilks' lambda, $F(2, 27) = 28.34$, $p < .0001$, resistance, Wilks' lambda, $F(2, 27) = 8.60$, $p < .001$, and avoidance Wilks' lambda, $F(2, 27) = 21.60$, $p < .0001$, varied with episode type. We next conducted a series of within-subjects Duncan Multiple Range tests ($\alpha = .05$) to assess how the specific behavior ratings varied across the episodes. These analyses indicated that proximity seeking and contact maintenance ratings were greatest during Reunion II, and lowest during the Preseparation episode (e.g., Reunion II > Reunion I > Preseparation). Resistance ratings were significantly higher during the Reunion episodes than during the Preseparation episode (Reunion I = Reunion II > Preseparation), while avoidance ratings were highest during Reunion I (Reunion I > Reunion II > Preseparation). Together, these data suggest that the attachment behavioral system was mobilized within both reactivity groups.

Twenty-seven months. The mean social interactive behavior ratings by reactivity group and episode type are presented in Table 2. We again conducted a $2 \times 5 \times 3$ MANOVA with reactivity group as the between-subjects factor (2), and social interactive behavior ratings (5) and episode type (3) as within-subjects factors. In regard to Question 1, the MANOVA detected a marginal effect of reactivity group upon the social interactive behavior ratings across the Preseparation and Reunion episodes, Wilks' lambda, $F(15, 14) = 2.19$, $p < .10$. Similar to the 19-month assessment, a significant interaction between reactivity group and the use of specific social interactive behaviors was also detected, Wilkes' lambda, $F(4, 25) = 2.98$, $p < .05$. Therefore, the marginal effect of reactivity group upon the behavior ratings suggests that the groups varied in their exhibition of social interactive behaviors.

To explore this issue further, we conducted a series of univariate ANOVAs for specific behavior ratings. The *F* ratios for the ANOVAs are presented in Table 2. These analyses indicated that during Reunion I the Low Reactivity group received *higher* avoidance ratings, $F(1, 28) = 11.35$, $p < .01$, and lower distance interaction ratings, $F(1, 28) = 4.79$, $p < .05$, than the Moderate/High Reactivity group. The Moderate/High Reactivity group also displayed slightly more resistance than the Low Reactivity group during the Preseparation episode, $F(1, 28) = 3.8$, $p < .10$. Therefore, this pattern of findings does not suggest that the Low Reactivity group displayed fewer attachment-related behaviors than the Moderate/High Reactivity group.

To address Question 2 within the 27-month assessment, we examined the main effect of episode upon social interactive behavior ratings. Similar to the 19-month-assessment, episode was significantly associated with the behavior ratings, $F(2, 27) = 75.09$, $p < .0001$. A significant interaction between episode and interactive behavior type, $F(8, 21) = 9.15$, $p < .0001$, was also detected. In addition, the three-way interaction of Reactivity Group × Episode × Social Interactive Behaviors ap-

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Table 2. *Social interactive behaviors ratings for Low and Moderate/High Reactivity groups at 27 months*

Social Interactive Behaviors	Reactivity Group				Reactivity Group Effect
	Low ($N = 16$)		Moderate/High ($N = 14$)		
	χ	*SD*	χ	*SD*	*F* (1, 28)
Preseparation					
Proximity Seeking	1.7	1.1	2.4	1.5	2.0
Contact Maintenance	1.0	0.0	1.1	0.3	1.2
Distance Interaction	3.0	1.9	3.1	2.2	0.0
Avoidance	1.8	.08	1.7	0.9	0.1
Resistance	1.1	0.2	1.6	1.0	3.8†
Reunion I					
Proximity Seeking	3.1	1.8	4.0	1.8	1.7
Contact Maintenance	1.9	0.9	2.2	1.7	0.3
Distance Interaction	2.5	1.7	4.1	2.4	4.8*
Avoidance	4.9	0.9	3.6	1.3	11.4**
Resistance	2.1	1.4	2.2	1.7	0.03
Reunion II					
Proximity Seeking	3.6	2.1	4.1	1.4	0.6
Contact Maintenance	2.9	1.6	3.7	2.2	1.3†
Distance Interaction	2.4	1.8	3.3	2.1	1.4
Avoidance	4.7	1.3	3.9	1.4	2.3
Resistance	2.4	1.4	3.3	1.8	2.5

†$p < .10$. *$p < .01$. **$p < .001$.

proached significance, $F(8, 21) = 2.23$, $p < .10$. This set of findings suggests that the two reactivity groups demonstrated slightly different changes in their use of specific behaviors across the different episodes.

This three-way interaction was primarily due to reactivity group differences in avoidance. A series of post hoc repeated measures ANOVAs that examined changes in the use of specific social interactive behaviors across the Preseparation, Reunion I, and Reunion II episodes indicated that only avoidance ratings demonstrated a significant Reactivity Group × Episode interaction, $F(2, 27) = 5.63$, $p < .01$. Avoidance ratings of increased across the three episodes for both reactivity groups. However, this change was more dramatic for the Low Reactivity group, Wilks' lambda $F(2, 14) = 83.97$, $p < .0001$ than for the Moderate/High Reactivity group, Wilks' lambda $F(2, 12) = 16.88$ $p < .001$. In the remaining repeated measure ANOVAs, we combined both reactivity groups to explore the relationship between behavior ratings and episode type. These analyses detected significant changes in contact maintenance, Wilks' lambda, $F(2, 28) = 22.8$, $p < .0001$, resistance, Wilks' lambda, $F(2, 28) = 13.90$, $p < .001$, and proximity seeking, Wilks' lambda $F(2, 28) = 15.28$, $p < .001$, across episodes.

We next conducted a series of within-subjects Duncan Multiple Range tests ($\alpha = .05$) to assess how the behavior ratings varied across episodes. These analyses indicated that within both reactivity groups, avoidance was displayed more during Reunions I and II than during the Preseparation episode (i.e., Reunion I = Reunion II > Preseparation). In addition, analyses that combined both reactivity groups indicated that ratings for resistance and contact maintenance were greatest during Reunion II and lowest during the Preseparation episode (i.e., Reunion II > Reunion I > Preseparation). Proximity seeking was lowest during the Preseparation episode (i.e., Reunion I = Reunion II > Preseparation).

In summary, these analyses explored whether the use of social interactive behaviors varied by reactivity group and by episode type during the 19- and 27-month assessment.

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Table 3. *Reactivity group by attachment classifications at 19 months*

Reactivity Group	Attachment Classification			
	Type A ($N = 3$)	Type B ($N = 6$)	Type C ($N = 4$)	Type D ($N = 7$)
Low	2	12	0	2
Moderate/High	1	4	4	5

Overall, these data indicated that at both ages studied, the two reactivity groups were fairly similar in their use of social interactive behaviors and evidenced similar changes in their use of specific social interactive behaviors across Strange Situation episodes. The exception to this pattern was avoidance during the 27-month assessment. However, overall the attachment behavioral system appeared to be mobilized within the Low and Moderate/High Reactivity groups.

Question 3: Do the Low and Moderate/High Reactivity groups display similar patterns of attachment?

Attachment classifications and negative reactivity. As illustrated in Table 3, at 19 months 53% ($N = 16$) of the sample was classified as Type B, 10% ($N = 3$) were rated as Type A, 13% ($N = 4$) were rated as Type C, and 23% ($N = 7$) were rated as Type D. Within the D group, four of the nine infants were given Type B forced classifications, indicating the presence of underlying attachment security. Two of the remaining infants with D classifications were force-classified as Type A, and one infant was force-classified as Type C.

At 27 months 43% ($N = 13$) were rated as Type B, 23% ($N = 7$) were rated as Type A, 3% ($N = 1$) were rated as Type C, and 30% ($N = 9$) were rated as Type D (Table 4). Within the D Group, only one toddler received a forced classification of Type B. Of the remaining eight toddlers, five were force-classified as Type A, and three were force-classified as Type C.

Finally, to rule out the effects of cognitive functioning and gender upon attachment classifications, we examined the extent to which these variables were related to specific attachment categories. At 19 months, three children who exhibited moderate to several mental retardation (i.e., MDIs less than 50) were rated as Type C Resistant. At 27 months, these three children received Type D Disorganized attachment classifications. The remaining child with an MDI less than 50 was rated as Securely attached at both ages. Gender was not significantly associated with the overall distribution of attachment classifications at either age. However, at 27 months, eight of nine children classified as Disorganized were male. This relationship between gender and Type D classification was significant, $\chi^2(1, N = 30) = 5.4$, $p < .05$.

To examine the relationship between reactivity and attachment classification, we compared the distribution of attachment patterns within the Low and Moderate/High Reactivity groups. At 19 months, most children with Type A or Type B attachment relationships were in the Low Reactivity group (Table 3). In contrast, Type C and D attachment relationships were more frequent within the Moderate/High Reactivity group. Overall, low reactivity was associated with secure attachment patterns, while moderate/high reactivity was associated with insecure attachment patterns, $\chi^2(1, N = 30) = 6.47$, $p < .05$. At 27 months reactivity and attachment security were not significantly related, $\chi^2(1, N = 30) = 2.04$, $p < .15$; see Table 4). Only children with Type A attachments were clearly associated with low reactivity. In contrast, children with Type B or D attachment relationships were more equally distributed across the Moderate/High and Low Reactivity groups.

Molar attachment groups and negative reactivity. At 19 months reactivity and attachment molar groups were significantly related, $\chi^2(1,$

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Table 4. *Reactivity group by attachment classifications at 27 months*

Reactivity Group	Attachment Classification			
	Type A ($N = 7$)	Type B ($N = 13$)	Type C ($N = 1$)	Type D ($N = 9$)
Low	7	5	0	4
Moderate/High	0	8	1	5

Table 5. *Distress intensity and duration by molar attachment groups at 19 months*

	Molar Attachment Group						
	$A–B_2$ ($N = 14$)		$B_3–C$ ($N = 9$)		D ($N = 7$)		Molar Group
Episode	χ	*SD*	χ	*SD*	χ	*SD*	*F* (2, 27)
Preseparation							
Intensity	2.1^a	0.3	2.4^a	1.0	2.1^a	0.4	1.1
Duration	0.0^a	0.0	0.1^a	0.2	0.0^a	0.0	1.4
Separation I							
Intensity	2.0^a	0.0	3.4^b	1.5	3.6^b	1.6	6.7**
Duration	0.0^a	0.0	0.4^b	0.5	0.4^b	0.4	5.4*
Separation II							
Intensity	2.7^a	0.7	4.4^b	1.5	$4.3^{a,b}$	1.6	6.9**
Duration	0.2^a	0.2	0.7^b	0.4	0.6^b	0.4	6.4**

Note: Values with different superscript letters are significantly different from each other.
*$p < .05$. **$p < .01$.

$N = 30) = 11.12$, $p < .01$. Low Reactivity children were more likely to be in the $A–B_2$ molar group ($N = 12$) than in the $B_3–C$ ($N = 2$) or D ($N = 2$) molar groups. In contrast, Moderate/High Reactivity children were more likely to be in the $B_3–C$ ($N = 7$) and D ($N = 5$) molar groups than in the $A–B_2$ molar group ($N = 2$). At 27 months, reactivity and molar group were not significantly related, $\chi^2(1, N = 30) = 3.85$, *ns*. Although Low Reactivity children were more likely to be in the $A–B_2$ molar group ($N = 10$) than in the $B_3–C$ ($N = 2$) or D ($N = 4$) groups, the Moderate/High Reactivity children were equally distributed across all three molar groups: $A–B_2$ ($N = 4$), $B_3–C$ ($N = 5$), and D ($N = 5$).

In a second analysis we used ANOVAs to assess the main effect of molar group on distress intensity and duration (Tables 5 and 6). The effect of molar group was marginally significant, $F(2, 27) = 3.1$, $p < .10$. A series of post hoc Duncan Multiple Range Tests ($\alpha = .05$) were used to rank the three groups. These analyses indicated that the $A–B_2$ and $B_3–C$ molar attachment groups differed in distress intensity and duration during both separations at 19 months. However, at 27 months the $A–B_2$ and $B_3–C$ molar groups display different levels of distress during Separation II, but not during Separation I. The D molar group was most similar to the $B_3–C$ infants at 19 months. However, the D group did not differ from either the $A–B_2$ or $B_3–C$ groups at 27 months.

Question 4: Are attachment classification and negative reactivity group stable?

Attachment classifications. As indicated in Table 7, attachment classifications were rela-

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Table 6. *Distress intensity and duration by molar attachment group at 27 months*

	Molar Attachment Group						
	$A–B_2$ ($N = 14$)		$B_3–C$ ($N = 7$)		D ($N = 9$)		Molar Group
Episode	χ	*SD*	χ	*SD*	χ	*SD*	*F* (2, 27)
Preseparation							
Intensity	2.1^{a}	0.5	2.1^{a}	0.4	2.3^{a}	0.7	0.7
Duration	0.3^{a}	0.0	0.0^{a}	0.0	0.4^{a}	0.1	0.6
Separation I							
Intensity	2.4^{a}	0.8	2.6^{a}	1.1	3.1^{a}	1.5	1.0
Duration	0.1^{a}	0.1	0.2^{a}	0.4	0.3^{a}	0.5	1.7
Separation II							
Intensity	2.9^{a}	1.0	4.1^{b}	1.3	$3.8^{a,b}$	1.4	3.1†
Duration	0.2^{a}	0.3	0.7^{b}	0.4	$0.6^{a,b}$	0.5	4.9*

Note: Values with different superscript letters are significantly different from each other.
†$p < .10$. *$p < .05$.

Table 7. *Stability of attachment classifications from 19 to 27 months*

	27 Months				
19 Months	Type A	Type B	Type C	Type D	Total Row
Type A	3	0	0	0	3
Type B	2	10	0	4	16
Type C	0	1	0	3	4
Type D	2	2	1	2	7
Total column	7	13	1	9	30

tively unstable over time, with 50% of the children displaying the same attachment classification from 19 to 27 months ($\kappa = .26$). The concordance rate for Type A from 19 to 27 months was relatively high, and greater than chance ($\kappa = .53$). The concordance rates for Types B, C, and D were lower and approached chance levels, κs = .40, .39, and 0, respectively.

Molar group. Molar attachment group classifications were not stable over time, $\chi^2(1, N = 30) = 5.33$, *ns*. The $A–B_2$ group demonstrated the most stability with 64% of the toddlers retaining this classification from 19 to 27 months. Proportionally fewer children retained the $B_2–C$ (14.3%) or D (21.4%) group classifications from 19 to 27 months.

Reactivity group. Eighteen children retained the same reactivity classification from 19 to 27 months, $\chi^2(1, N = 30) = 1.16$, *ns*. Six children changed from Low to Moderate/High Reactivity, while six children also shifted from Moderate/High to Low Reactivity. Since reactivity classifications were based upon the children's peak intensity ratings, we examined the correlations between distress intensity during separations at 19 and 27 months. Distress intensity during Separation I at 19 and 27 months were significantly correlated, $r(30) = .65$, $p < .0001$. However, dis-

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tress intensity ratings during Separation II at 19 and 27 months were only moderately correlated, $r(30) = .35$, $p < .10$.

Discussion

Previous research has discovered an alarmingly high frequency of Type D Disorganized or unclassifiable attachments within the DS population (e.g., Atkinson et al., in press; Vaughn et al., 1994). Similar to previous research, we also detected a number of Type D Disorganized attachments within 19- and 27-month-old toddlers with DS. Specifically, 23 and 30% of the children displayed Type D attachments at 19 and 27 months, respectively. Although this rate is lower than that reported by Vaughn and colleagues (1994), it is slightly higher than that observed in nonclinical samples but similar to other clinical groups. For example, in a meta-analysis of attachment patterns within clinical samples, van Ijzendoorn, Goldberg, Kroonenberg, and Frenkel (1992) reported that an average of 15% (range = 7–22%) of nonclinical control groups displayed Type D attachments, while 25% of the clinical sample (preterm infants and infants with physical handicaps) displayed Type D attachments. Furthermore, the overall distribution of attachment patterns we detected closely resembled that of van Ijzendoorn's clinical sample: Type A: 19%; Type B: 52%; Type C: 4%; Type D: 25%. Thus, our data suggest that youngsters with DS tend to display insecure, Type D attachments more frequently than typically developing children, but not more frequently than other child clinical populations. Therefore, the cause of higher rates of attachment insecurity within these children (as well as other clinical populations) requires further examination.

Vaughn and colleagues (1994) have suggested that diminished negative reactivity may account for the high rate of insecurity within the DS population. In particular, they argue that the Strange Situation may not be a valid assessment tool for toddlers with DS. This explanation touches upon a broader debate within the field of attachment that centers upon the influence of temperament upon infants' behaviors during the Strange Situation (e.g., Goldsmith & Harman, 1993).

To further explore the relationship between negative reactivity and attachment security within the DS population, we conducted several analyses that compared the attachment behaviors and organizations of children with DS who display little separation distress (i.e., Low Negative Reactive group) to those of children with DS who display moderate to high separation distress (i.e., Moderate/High Reactivity group). Overall, we detected few group differences during the 19- or 27-month assessments. At 19 months the Moderate/High Reactivity group displayed more resistance during both reunions, and more contact maintenance during Reunion I than the Low Reactivity group. At 27 months, the Moderate/High Reactivity group displayed significantly more distance interaction, while the Low Reactivity group displayed significantly more avoidance. Such few group differences, and the lack of consistent differences between the two reactivity groups, lessens the possibility that attachment classifications are primarily influenced by children's negative reactivity.

It is important to note, however, that similar relationships between social interactive behaviors and negative reactivity have been detected within normative populations. Goldsmith and Alansky's (1987) meta-analysis of attachment and temperament data detected a significant positive relationship between resistance and reactivity in non-DS populations. Braungart and Stifter (1991) also have found that children with Type C Resistant attachments display high levels of distress. However, they also noted that children classified as having subtypes B_3 and B_4 attachments display low resistance, but distress levels comparable to children with Type C attachments. In the same study, Braungart and Stifter also found that Type A Avoidant attachments and low separation distress were associated. However, again, their data indicated that children with B_1 and B_2 attachments exhibited levels of distress similar to Type A children, but lower levels of avoidance. Therefore, these data suggest that the relationship between avoidance, resistance, and negative reactivity reflect the

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effects of specific attachment types, rather than a consistent relationship between temperament and attachment behaviors.

Collectively, these data also help explain why we found different associations between negative reactivity and the social interactive behaviors at each age. The higher frequency of Type C relationships at 19 months may underlie the observed association between moderate/high negative reactivity and resistance. In contrast, the paucity of children with Type C attachments and the increased rate of Type A attachments during the 27-month assessment probably accounts for the lack of an association between resistance and reactivity, and the emergence of an association between avoidance and reactivity at this age. Thus, in summary, diminished negative reactivity within the current study sample and within typically developing populations does not determine the organization of infants' attachment behaviors.

A second issue addressed by this study was whether the Strange Situation was sufficiently stressful to mobilize the attachment behavior system within the Low Reactivity group. To address this issue, we examined changes in specific attachment-related behaviors across the preseparation to reunion episodes. We reasoned that if the attachment behavioral system is activated, then attachment-related behaviors should increase across these episodes. Our analyses illustrated that both reactivity groups displayed increases in proximity seeking, contact maintenance, resistance, and avoidance from preseparation to reunion episodes at both ages. Thus, the attachment behavioral system appeared to be activated within each group at each age. These findings are consistent with a previous study by Cicchetti and Serafica (1981) which also examined within group changes in attachment-related behaviors across the Strange Situation. Therefore, although children with DS may display fewer attachment-related behaviors than typically developing children (c.f. Vaughn et al., 1994), their attachment behavioral system still appears to be activated by separations and reunions during the Strange Situation. These findings weaken the argument that the attachment behavioral system is not activated within children who exhibit few overt signs of separation distress.

A third question addressed by the present investigation was whether negative reactivity is associated with attachment insecurity in general and with Type D attachment in particular. To address this question, we examined whether Low and Moderate/High Negative Reactivity groups displayed different attachment patterns. During the 19-month assessment, low negative reactivity was associated with Type B secure attachment relationships and not with insecure attachments. At 27 months, negative reactivity and attachment classifications were not associated. Therefore, the contention that Type D attachments can be attributed to low negative reactivity was not supported. Rather, the data suggest that low reactivity either serves as a "protective factor" that facilitates secure attachments, or that these children were not sufficiently stressed to display overt signs of attachment insecurity. The latter explanation, however, is improbable since systematic reactivity group differences in social interactive behaviors were not apparent at both ages. Again, these data suggest that the high rates of insecurity amongst DS children cannot be attributed to diminished negative reactivity solely or to the inappropriateness of the Strange Situation for activating the attachment behavioral system.

An alternative possibility is that temperament characteristics do not determine specific attachment classifications, but may constrain the types of attachment patterns that a child is likely to display. For example, Thompson and Lamb (1984) have argued that proneness to distress influences one's assignment to an attachment molar grouping that includes a range of attachment patterns (e.g., B_3–C vs. A–B_2). However, negative reactivity does not determine attachment security (Belsky & Rovine, 1987; Frodi & Thompson, 1985; Thompson & Lamb, 1984).

To explore this possibility, we divided infants into the molar attachment groups first delineated by Thompson and Lamb (1984): B_3–C and A–B_2. Because the relationship between disorganized attachments and negative reactivity is unclear, a third molar group was created for children with this classification.

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We next compared the extent to which children in each molar attachment group displayed separation distress. At 19 months these analyses yielded the predicted group differences in distress intensity and duration during both separations: the $A–B_2$ molar attachment group displayed less distress than the $B_3–C$ molar attachment group. In addition, the D molar attachment group was most similar to the $B_3–C$ group. At 27 months, the $A–B_2$ and $B_3–C$ groups differed during the second separation only, while the ratings for the D group did not differ significantly from the other groups. Therefore, consistent with previous research, these data suggest that negative reactivity is associated with children's placement into the $A–B_2$ versus $B_3–C$ molar attachment groups. However, within this population the relationship between negative reactivity and Type D attachments is ambiguous. Thus, once again, the heightened rate of Type D attachments within DS populations cannot be attributed to negative reactivity.

A second possibility that is briefly mentioned by Vaughn and colleagues (1994) is that Type D attachments may be attributable to developmental delays. If this is the case, then low MDI should be associated with Type D attachments at each age, while over time the incidence of Type D attachments should decrease. These hypotheses were not consistently supported by our data. When infants were 19 months old, three infants with low MDIs displayed Type C attachments; at 27 months low MDI (i.e., <50) was not associated with a particular attachment group. The findings from the longitudinal data also provided conflictual support for the developmental delay explanation. Consistent with the developmental delay hypothesis, only two of seven children classified as disorganized at 19 months were again classified as disorganized at 27 months. However, seven children who displayed organized attachments at 19 months were classified as having disorganized attachments at 27 months. Thus, again these data suggest that disorganized attachments cannot be attributed solely to developmental lags (see also Cicchetti & Barnett, 1991).

In summary, our findings suggest that diminished negative reactivity was not the main determinant of attachment insecurity within the DS group studied. Therefore, a remaining question is why there is an elevated rate of attachment insecurity and disorganization within the DS population. One explanation is that the attachment patterns described by Ainsworth and colleagues (1978) are not valid constructs for the DS population. That is, secure versus insecure patterns may differ from DS to non-DS populations. As discussed previously, there is some evidence that attachment security within the DS population is associated with parent–child interactions (e.g., Atkinson et al., in press). However, further research is clearly needed to establish the antecedents of attachment patterns and to determine the meaning of secure versus insecure attachment patterns within the DS population.

In particular, it will be important for future research to determine whether similar parent and child factors predict attachment insecurity within DS and non-DS populations. In non-DS populations, attachment security is related to a host of proximal and distal factors that may influence parenting and attachment quality. Belsky and Rovine (1987) define proximal determinants as variables that directly influence parent–child interactions, including child characteristics (gender, temperament, cognitive abilities) and specific parenting styles (e.g., sensitive vs. insensitive). Within this study, infant gender may have played a role in attachment disorganization. Notably 89% (8 of 9) of the children who displayed disorganized attachments by 27 months were male. In a study with maltreated infants, Carlson, Cicchetti, Barnett, and Braunwald (1989) have also reported higher rates of disorganized attachments within males than females. The basis for this discrepancy is unclear, and intriguing. It may reflect greater vulnerability on the part of males for overall maladjustment as indexed by higher rates of child disorders among male children than female children (American Psychiatric Association, 1994). Or, perhaps, male infants may somehow evoke more negative parenting behaviors than female infants (cf. Carlson et al., 1989).

In addition, within this study, cognitive functioning was associated with Type C at-

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tachments at 19 months and Type D attachments at 27 months. In the current study, we attempted to control for the impact of motor and neurological deficits in our rating of attachment behaviors. However, motor deficits and neurological dysfunction, coupled with extreme developmental delays, may also influence early parent–child interactions and, over time, negatively affect attachment relationships of toddlers with DS. For example, Bridges and Cicchetti (1982) have proposed that muted affect or ambiguous affective cues due to poor muscle tone may make it difficult to accurately interpret the cues of children with DS. In addition, Berger (1990) notes that key social cues are delayed in their onset within DS populations, while Walden and Knieps (1996) report that toddlers with DS have difficulty decoding their mothers' facial expressions. Each of these factors may impede the establishment of synchronous, reciprocal interactions between toddlers with DS and their caregivers.

Consistent with this view, studies that have examined the quality of parent–infant interactions within the DS population have found that many caregivers are highly directive and intrusive with their children (e.g., Crawley, & Spiker, 1983; Jones, 1977). Recently, Marfo, Dedrick, and Barbour (1998) have also hypothesized that this style of interaction serves to foster short term cognitive development within toddlers with DS. However, this strategy may not be an adaptive response to the child's reactive characteristics when the child's long term socioemotional development is considered. In particular, a consistent history of such asynchronous–intrusive or insensitive interactions may predispose toddlers with DS to display insecure patterns of attachment behaviors or, perhaps, impede the toddlers' capacities to form organized attachment strategies.

Moreover, the effects of asynchronous interactions may be cumulative and lead to higher rates of attachment insecurity as these children grow older. This interpretation would explain why there was an overall increase in attachment insecurity from 19 to 27 months within the current study. Even within the disorganized group, the 27-month-olds tended to demonstrate insecure force-classifications, while the 19-month-olds tended to be force-classified as "secure," suggesting that they possessed an underlying secure organization. In a previous study with non-DS infants, Lyons–Ruth, Repacholi, McLeod, and Silva (1991) reported that infants with disorganized attachments who had insecure forced classifications tended to have caregivers who were highly active and hostile during interactions. However, toddlers with disorganized attachments and secure forced classifications had caregivers who exhibited lower levels of intrusive involvement.

Numerous distal factors also may increase the risk of children forming insecure attachment relationships with their caregivers. One unique source of stress for parents may be the shock of having a child with a developmental disability. Previous research has indicated that many parents undergo mourning or unresolved loss with the birth of a handicapped child (Atkinson et al., 1995; Blacher, 1984; Emde & Brown, 1978). Within non-DS samples, disorganized attachments have been associated with parents' experience of unresolved loss (Ainsworth & Eichberg, 1991; Lyons–Ruth et al., 1991; Main & Hesse, 1990). In particular, Lyons–Ruth and colleagues (1991) found that parents with histories of loss tended to have infants with disorganized attachments but who evidenced secure forced classifications. In a recent study, Marvin and Pianta (1996) examined the relation between maternal resolution of their infants' diagnosis of cerebral palsy and attachment security. They found that most of the mothers who had not resolved their children's diagnoses also had insecurely attached children. Consequently, within the DS population, parents' initial reactions or incomplete resolution of their children's diagnoses may foster disorganized or insecure attachment relationships.

In addition children with disabilities may often require more medical or psychological services and attention than other children. These increased demands may then lead to higher levels of emotional and financial stress for caregivers (e.g., Gowan, Johnson–Martin, Goldman, & Appelbaum, 1989; Harris &

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McHale, 1989). In turn, such stress may negatively impact upon the marital relationship of parents. A recent study by Owen and Cox (1997) reported that chronic marital conflict within normative populations is associated with disorganized attachment behaviors. Atkinson et al. (1995) also reported that coping strategies that minimize the stress of parents of infants with DS may negatively impact upon the quality of parent–child interactions. Specifically, these investigators reported that caregivers who displayed the least amount of stress used avoidant coping strategies to handle stress. Unfortunately, this particular strategy was negatively associated with maternal sensitivity. In contrast, parents who adopted an "approach" coping strategy sought more information about their children's abilities and behaviors but also experienced the most distress. Therefore, coping strategies that lead to short-term mental health benefits for caregivers may also lead to problematic parent–child interactions, which, in turn, may lead to insecure parent–child attachment relationships.

Thus, the high rate of insecure attachments with DS populations may be related to numerous proximal and distal reasons. However, the association between DS and insecure attachments should be viewed with caution for several reasons. First, it is important to note that in this study many children with DS exhibited secure, organized relationships with their caregivers at 19 and 27 months of age. Second, this study included a small number of toddlers with DS, drawn from two-parent, middle-class families. Thus, the generalizability of our findings may be limited. In addition, the small sample size made it difficult to detect subtle differences between toddlers with Low versus Moderate/High negative reactivity. Finally, it also is important to keep in mind that the concurrent and predictive validity of attachment patterns in the Strange Situation has not been studied extensively in children with DS. Therefore, future research should continue to explore how the various proximal and distal factors transact to foster optimal socioemotional development within this population.

Finally, further research with this population could help answer questions that arise from studies with normative populations. For example, the findings of this investigation significantly challenge the proposition that diminished negative reactivity is associated with insecure attachment classifications. Rather, consistent with research with normative populations, these data suggest that negative reactivity may place some loose constraints upon the types of attachment patterns a child may display (i.e., $A–B_2$ vs. $B_3–C$ molar attachment group; e.g., Belsky & Rovine, 1987; Thompson & Lamb, 1984). However, negative reactivity does not determine whether a child will be securely or insecurely attached to a caregiver.

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