Maternal Sensitivity and Behaviour Problems in Young Children With Developmental Delay

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Children with developmental delay are at increased risk for behaviour problems, but little is known about risk and resilience factors. Previous research has established links between maternal sensitivity and behaviour problems in typically developing children, but no studies have examined maternal sensitivity in the development of behaviour problems in children with developmental delay. In this study, we coded videotaped interactions of 30 2-year-olds with developmental delay and their mothers using the maternal behaviour \textit{Q}-sort and a child behaviour coding system. Mothers completed the child behaviour checklist when their children were 2 and 3 years old. Results revealed significant inverse relations between maternal sensitivity and concurrent and later externalizing problems, and significant positive relations between maternal sensitivity and concurrent observed appropriate behaviour (compliance and social engagement). This study informs developmental theory and identifies an important maternal variable that may reduce the risk of behaviour problems in children with developmental delay. Copyright © 2006 John Wiley & Sons, Ltd.

Key words: maternal sensitivity; behaviour problems; developmental delay

Children with developmental delay are at increased risk of behaviour problems (Baker \textit{et al}., 2003; Borthwick-Duffy & Eyman, 1990; Feldman, Hancock, Rielly, Minnes, & Cairns, 2000; Merrell & Holland, 1997; Steffenburg, Gillberg, & Steffenburg, 1996; Stromme & Diseth, 2000), which begin to manifest in the preschool years (Baker \textit{et al}., 2003; Feldman \textit{et al}., 2000; Merrell & Holland, 1997). Although behaviour problems may result in injury to persons and property, failure to adjust in the community, and high costs for services (Bruininks, Hill, & Morreau, 1988; Grizenko, Vejic, vida, & Sayegh, 1991; Rudolph, Lakin, Oslund &...
Larson, 1998), little is known about the developmental pathways to behaviour problems in individuals with developmental delay (Crnic, Hoffman, Gaze, & Edelbrock, 2004). Existing studies have focused on early biological or constitutional factors, child self-regulatory capacities, and family stress (cf. Crnic et al., 2004). In a comprehensive study of risk and resilience in young children with developmental delay, we found a combination of child, parent, and family variables (multiple birth, dependency and management of the child, father’s education, father’s illness, financial stress, and marital status) accounted for 31% of the variance in behaviour problem scores in 2-year-olds with developmental delay (Feldman et al., 2000). In this first phase of the study, we relied on parent report. In the second phase, we examined observed differences among mothers to study the relation between maternal sensitivity and behaviour problems in children with developmental delay.

Attachment theory provides a potentially powerful framework for understanding risk of developmental psychopathology, and researchers have demonstrated the impact of attachment (the affectional bond between infant and primary caregiver) on child development in a variety of domains (Ainsworth, Blehar, Waters, & Wall, 1978; Atkinson & Zucker, 1997; Bretherton, 1985; Cicchetti, Toth, & Lyunch, 1995). The cornerstone of attachment theory is that infant attachment security arises from a caregiving history that involves sensitive responding to infant cues and signals. Bowlby (1969) emphasized the impact of the primary caregiver’s sensitivity in perceiving, interpreting, and responding to the child’s cues, and results of meta-analyses have confirmed that caregivers rated as sensitive are significantly more likely to have secure infants than caregivers rated as less sensitive (Atkinson et al., 2000; De Wolff & van IJzendoorn, 1997; Goldsmith & Alansky, 1987; van IJzendoorn, 1995). Van IJzendoorn and colleagues (Bakermans-Kranenburg, van IJzendoorn, & Juffer, 2003; van IJzendoorn, Juffer, & Duyvesteyn, 1995) established a causal link between maternal sensitivity and infant attachment security in their meta-analyses of the effects of maternal sensitivity intervention on infant attachment.

Attachment theorists consider maternal sensitivity critical to the development of child compliance, self-regulation skills, and other internalized controls. Theoretically, insecure children of insensitive mothers have less to lose by disobeying parental requests, are less trusting of adults, and are more likely to behave in a disruptive or aggressive manner in order to engage an unresponsive caregiver. Evidence from several studies has supported theoretical predictions about the role of infant attachment security in the development of behaviour problems in non-delayed toddlers and preschoolers (e.g. Bohlin, Hagekull, & Rydell, 2000; DeMulder, Denham, Schmidt, & Mitchell, 2000; Erickson, Denhan, Schmidt, & Mitchell, 1985; Greenberg, Deklyen, Speltz, & Endriga, 1997; Greenberg, Speltz, DeKlyen, Endriga, 1991; Lyons-Ruth, Alpern, & Repacholi, 1993; Pierrehumbert, Miljkovitch, Plancherel, Halfon, & Ansermet, 2000; Shaw & Vondra, 1995). Maternal sensitivity also is inversely related to behaviour problems in typically developing children (e.g., Bohlin et al., 2000; Deater-Deckard & Petrill, 2004; Lieberman, Padan-Belkin, & Harel, 1995; Rose-Krasnor, Rubin, Booth, & Coplan, 1996; Rothbaum & Weisz, 1994; Shaw, Keenan, & Vondra, 1994), possibly directly and/or via infant attachment security.

In comparison to typically developing children, samples of dyads involving children with developmental delay typically show lower levels of maternal sensitivity and infant attachment (Atkinson et al., 1999; Moran, Pederson, Pettit, & Krupka, 1992). Observational studies of parents of school-age children with developmental delay have revealed that these parents are more persistent,
directive, negative, critical, hostile, and over-involved with their children with developmental delay than with typically developing siblings, and that negative parent–child interactions were associated with child behaviour problems, regardless of disability status (e.g., Beck, Daley, Hastings, & Stevenson, 2004; Floyd, Harter, & Costigan, 2004). These findings support the notion that children with developmental delay can present challenges to parent–child interaction that may have a negative impact on maternal sensitivity. Indeed, as infants, these children may be less responsive to parental interactions; the parents, in turn, have difficulties interpreting the children’s cues and responding quickly and contingently (Kelly & Barnard, 2000). These difficulties may have a negative impact on the formation of infant attachment security. However, researchers have questioned the validity of the traditional measure of infant attachment security, the strange situation, for use with children with developmental delay (Atkinson et al., 1999; van IJzendoorn, Goldberg, Kroonenberg, & Frenkel, 1992; Vaughn et al., 1994). The attachment Q-set (AQS; Waters, 1986; Waters & Dean, 1985) — the other instrument considered a valid measure of infant attachment security (van IJzendoorn, Vereijken, Bakermans-Kranenburg, & Riksen-Walraven, 2004) — has proved difficult to code reliably (cf. Vaughn & Waters, 1990) and is confounded by intellectual level in children with developmental delay (Atkinson et al., 1999).

Surprisingly, there has been no published research on the impact of early maternal sensitivity on behaviour problems in children with developmental delay, despite the increased risk for both lowered maternal sensitivity and child behaviour problems in this population and the potentially powerful explanatory framework provided by attachment theory for the risk of development of psychopathology. In this study, we examined maternal sensitivity in mothers of 2-year-old children with developmental delay, and its possible relation with concurrent and later behaviour problems. We tested the hypothesis that maternal sensitivity will be inversely related to both concurrent (age 2) and later (age 3) behaviour problems.

**METHOD**

**Participants**

An opportunity sample of 30 mother–child dyads participated in the present study. This investigation was conducted as part of a larger, longitudinal study of 76 children with developmental delay, which included videotaping interactions of 57 mother–child dyads when the children were 2 years old (Feldman et al., 2000). The 76 children participating in the longitudinal study were recruited from infant development programs in Southern Ontario. The children were representative of the socioeconomic and ethnic mix of Southern Ontario, with most being middle class and Caucasian (Feldman et al., 2000). In 30 of the 57 videotapes, we found sufficient information to code for maternal sensitivity. The remaining 27 of the 57 videotapes were excluded from the present study: three were of very poor quality (i.e. coders could not see or hear what was happening), 19 did not meet requirements for parent–child interaction (i.e. at least 5 min in at least three of the four conditions described below), and five showed so little behaviour or interaction (despite meeting interaction conditions requirements) that they were not suitable for coding maternal sensitivity (i.e. coders placed more than 30 Maternal Behaviour Q-sort items in the middle pile because they
could not judge if the items were ‘like’ or ‘unlike’ the mother). The 30 included dyads did not differ significantly from the other 46 children in the larger study in terms of child age, child functioning level, child behaviour problem scores, maternal age, or maternal education. Behaviour problem questionnaire data were available at age 2 for all 30 children in the present study and for 18 of the 30 children at age 3. Behaviour observation data were available at age 2 for 18 of the children in the present study (those with videotapes including all four interaction conditions; Passey & Feldman, 2004).

The 30 included dyads involved children with developmental delay of various etiologies: nine Down syndrome, four other genetic syndromes, one foetal alcohol syndrome, one cerebral palsy, one epilepsy, one brain damage, and 13 developmental delay of unknown origin. None of the children had autism spectrum disorder or another pervasive developmental disorder. At Time 1, the children had a mean age of 28 months (S.D. = 4) and, at Time 2, their mean age was 43 months (S.D. = 4). Most children (70%) had siblings, and 63% were male. The mean score on the Vineland Adaptive Behavior Scales (71; S.D. = 13; Sparrow, Balla, & Cicchetti, 1984) corresponded to an IQ score that fell in the borderline-to-mild range of mental retardation (DSM IV; American Psychiatric Association, 1994). The mean age of the mothers was 34 years (S.D. = 8), their mean number of years of education was 14 (S.D. = 2), 77% were married, and 34% were employed full time.

Measures

Family information questionnaire
The parents completed a locally-developed questionnaire providing demographic information on family members (e.g. child’s age, diagnosis, parents’ age, education, occupation, marital status, family income).

Vineland Adaptive Behavior Scales
The Vineland is a standardized measure assessing personal and social sufficiency of individuals from birth to 19 years (Sparrow et al., 1984). The Interview Edition, Survey Form of the Vineland (297 items) is a semi–structured interview that was administered by a trained examiner to the mothers in their homes. The adaptive behaviour composite score represents a composite of scores in the four domains: communication, daily living skills, socialization, and motor skills. The adaptive behaviour composite has a standard score M = 100, S.D. = 15. It was used as a proxy measure of functioning level in the present study because it is highly correlated with measures of intelligence in children with developmental delay (Niccols, Atkinson, & Pepler, 2003), has excellent psychometric properties, and has been used extensively in the investigation of developmental delay (e.g. Atkinson et al., 1999; Keith, Fehrmann, Harrison, & Pottebaum, 1987).

Maternal Behaviour Q-sort
We used the Maternal Behaviour Q-sort (MBQS; Pederson & Moran, 1995; Pederson et al., 1990) to assess maternal sensitivity from the videotapes (across contexts). The MBQS consists of 90 statements regarding a mother’s behaviour with her infant, specifically behaviours reflecting reading of infant cues and responding promptly and appropriately to those signals (e.g. ‘Balances tasks
and baby’s activities during feeding’, ‘Seems to resent baby’s bids for attention and signals of distress’, ‘Arranges her location so that she can perceive baby’s signals’). Each statement is typed on a card, and the cards are sorted into nine piles of 10 statements each according to the degree to which they describe the mother (i.e. Pile #1 = very much unlike, Pile #9 = very much like). The cards are sorted by an independent rater who has observed the mother and child interact (on videotape) but who was not previously familiar with the mother or child. The instrument yields a continuous score in the form of an item–by–item correlation between the sort for a particular mother and the sort of the prototypically sensitive mother. The scores provided by the MBQS vary on a continuum from insensitive to sensitive.

Published estimates of reliability between two independent raters vary between 0.75 and 0.97 (Atkinson et al., 1999; Moran et al., 1992; Pederson & Moran, 1995; Pederson et al., 1990). In the present study, mean inter-rater reliability (r) for two independent raters on five randomly selected videotapes (17% of the sample) was 0.75. Concurrent validity has been demonstrated by positive relations between home–based MBQS ratings and the Ainsworth rating scale in studies of non-delayed children (e.g. Atkinson et al., 1999; Pederson et al., 1990) and children with developmental delay (Moran et al., 1992). External validity has been established by studies relating MBQS and AQS ratings in developmentally delayed (Atkinson et al., 1999; Moran et al., 1992) and non-delayed samples (Pederson & Moran, 1995; Pederson et al., 1990). Using meta-analytic procedures, Atkinson et al. (2000) found that the MBQS was a better predictor of infant attachment than traditional measures of maternal sensitivity (i.e. Ainsworth ratings).

**Child Behavior Checklist**

To assess children’s behaviour problems, we used the Child Behavior Checklist for Ages 2–3 (CBCL; Achenbach, 1991). Parents are asked to rate each of the 100 specific problem items as 0 ('Not True'), 1 ('Somewhat or Sometimes True'), or 2 ('Very True or Often True') currently or within the past 2 months. The CBCL has high test-retest reliability over a 1-week interval for problem item scores (ICC=0.95) and high inter-rater reliability (ICC=0.96; Achenbach, 1991). Content and criterion validity have been demonstrated in that the CBCL discriminates children referred to mental health clinics from those not referred (Achenbach, 1991). The CBCL is widely used and accepted as a reliable and valid measure of behaviour problems in typically developing children and children with developmental delay (e.g. Cohen, Kolers & Bradley, 1990; Feldman et al., 2000; Kindlon, Sollee, & Yando, 1988; Shulman, Margalit, & Gadish, 1990). Mean CBCL scores differentiate between groups of children with and without developmental delay and between clinical and non-clinical groups of children with developmental delay (e.g. Kindlon et al., 1988; Shulman et al., 1990), including preschool-age children (e.g. Baker, Blacher, Crnic, & Edelbrock, 2002; Baker et al., 2003).

**Child behaviour observation**

Appropriate child behaviours (compliance, social engagement) and inappropriate behaviours (disruptive, dangerous) were coded from the videotapes using the definitions and format developed by Passey and Feldman (2004). The mean inter-rater reliability (Cohen’s kappa) for two independent raters on randomly selected videoclips (20% of the sample) ranged from 0.89 to 0.95. A 10 s partial interval coding was used. For every interval in which a defined child
behaviour was observed, the designated behaviour category was coded. Frequency of each behaviour was calculated to compute a total score for appropriate behaviours and inappropriate behaviours.

**Procedures**

We videotaped mother–child dyads interacting in their homes when the children were approximately 2 years old. All videotapes used in the present study included at least 5 min in at least three of four conditions - free play, feeding, compliance, and parental distraction (where the mother had to engage in another task while maintaining sole supervision of the child), and they were a mean of 69 min in total length (S.D. = 20 min).

An experienced research assistant trained the MBQS coders and they completed approximately 20 Q-surveys based on live observation and practice videotapes (not from this study) until they reached inter-rater reliability \( r \) of 0.80 (which took 1–2 months). One of two MBQS coders viewed each study videotape in order to complete the MBQS. The MBQS coders were blind to other study information (e.g. child behaviour scores).

Child behaviour observation coders received training in the coding system until they achieved at least 85% inter-rater agreement. Behaviour coders were blind to other study information (e.g. maternal sensitivity scores).

Mothers completed the CBCL for ages 2–3 when their children were 2 years old, and again when their children were 3 years old. We calculated total behaviour problems, internalizing problems, and externalizing problems \( T \) scores for each child at ages 2 and 3 years.

**RESULTS**

**Mean Scores for Maternal Sensitivity and Child Behaviour**

MBQS scores \( (M = 0.44, \text{S.D.} = 0.39) \) were similar to those observed in other studies of children with developmental delay (Atkinson et al., 1999; Moran et al., 1992). Despite the variation in video length, observation time was not related to maternal sensitivity score.

CBCL total behaviour problems, internalizing problems, and externalizing problems scores for the children with developmental delay in the study sample at age 2 \( (\text{Ms} = 49, 49, \text{and} 51, \text{respectively}; \text{S.D.} \text{.'s} = 13, 12, \text{and} 14, \text{respectively}) \) and at age 3 \( (\text{Ms} = 52, 51, \text{and} 53 \text{respectively}; \text{S.D.} \text{.'s} = 12, 13, \text{and} 12, \text{respectively}) \) were similar to the mean for the standardized sample (Achenbach, 1991). MBQS and CBCL scores were not related to gender or child functioning level (Vineland adaptive behaviour composite score).

Appropriate behaviours (compliance and social engagement) occurred during a mean of 65.8% of the intervals. Inappropriate behaviours (disruptive and dangerous behaviour) occurred in a mean of 34.2% of the intervals.

**Relations between Maternal Sensitivity and Child Behaviour**

As seen in Table I, correlations between maternal sensitivity and behaviour problems in children with developmental delay were all in the predicted direction, with maternal sensitivity inversely related to child behaviour.
problems, and of medium effect size (cf. Cohen, 1988). (This remains true when Time 1 scores are used as a covariate, i.e., the partial correlations between MBQS and Time 2 CBCL scores with Time 1 CBCL scores partialled out are similar to the correlations between MBQS scores and Time 2 CBCL scores without Time 1 CBCL scores partialled out, \( r's = -0.20, -0.40, \) and \(-0.27\) for internalizing, externalizing, and total CBCL scores, respectively.) MBQS scores were significantly negatively correlated with concurrent (age 2) and later (age 3) externalizing problems scores.

The inverse correlation between maternal sensitivity and concurrent observed inappropriate behaviour \( (r = -0.11) \) was not significant. MBQS scores were significantly positively correlated with observed appropriate (compliance and social engagement) behaviours \( (r = 0.48, p < 0.05) \).

DISCUSSION

We examined maternal sensitivity in a sample of 2-year-old children with developmental delay, and its relations with concurrent and later behaviour problems. Maternal sensitivity was inversely correlated with concurrent and later externalizing problems, and positively correlated with concurrent observed appropriate behaviour (compliance and social engagement). In this longitudinal study, mothers who were less sensitive in their interactions when their children were 2 years old had children who engaged in less prosocial behaviour in interaction with them at age 2 and they reported more acting-out behaviours in their children at that age and again at age 3 (likely because maternal sensitivity was stable across time; cf. Atkinson et al., 1999). Mothers who were more sensitive had children with more prosocial behaviour and lower levels of externalizing behaviour. These findings are consistent with theoretical predictions and previous research involving typically developing children (e.g. Bohlin et al., 2000; Deater-Deckard & Petrill, 2004; Lieberman et al., 1995; Rose-Krasnor et al., 1996; Rothbaum & Weisz, 1994; Shaw et al., 1994), and extend them to the population of children with developmental delay. Although correlation does not imply causation, relatively sensitive mothering may be a protective factor (cf. Ainsworth, 1979), and infants whose mothers are insensitive, unresponsive, intrusive, and/or negative in interaction may be at increased risk of problem behaviour, to which children with developmental delay seem especially vulnerable. Child characteristics, maternal behaviour (especially intrusiveness, coercive behaviour, hostility, negativity, and rejection), and their interaction have been implicated as important factors in theoretical models and studies of the early processes involved in the development of childhood psychopathology, specifically conduct disorder and hyperactivity (e.g. Morell & Murray, 2003). Maternal insensitivity may be stressful to infants, leading to increased

Table I. Correlations between maternal sensitivity at Time 1 and child behaviour problems at Time 1 and 2

<table>
<thead>
<tr>
<th></th>
<th>Time 1 (age 2 years), ( N = 30 )</th>
<th>Time 2 (age 3 years), ( N = 18 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internalizing Problems</td>
<td>-0.21</td>
<td>-0.30</td>
</tr>
<tr>
<td>Externalizing Problems</td>
<td>-0.43*</td>
<td>-0.46*</td>
</tr>
<tr>
<td>Total Behavior Problems</td>
<td>-0.34</td>
<td>-0.39</td>
</tr>
</tbody>
</table>

*\( p < 0.05 \).
physiological arousal (cf. Gunnar, Brodersen, Nachmias, Buss, & Rigatuso, 1996) and increased demand on infant regulatory capacity, especially in at-risk infants (Morell & Murray, 2003).

Maternal sensitivity was not significantly correlated with maternal report of internalizing or total behaviour problems or observed inappropriate behaviours, although correlations were in the predicted direction and of small-to-medium effect sizes. It is possible that mothers had more difficulty observing internalizing problems than externalizing problems in their children, which may have attenuated the findings for internalizing and total behaviour problems. Observed inappropriate behaviours were infrequent (relative to appropriate behaviour) on the videotapes, which may have limited variance.

There are several aspects of the present study that warrant caution for interpretation of the findings. First, the study involved a small sample of young children with developmental delay of heterogeneous etiology. Longitudinal data were available only for a subsample of children, and maternal sensitivity may have been impacted by the different behavioural characteristics of children with developmental delay of differing etiologies (e.g. Down’s syndrome versus foetal alcohol syndrome; cf. Eisenhower, Baker, & Blacher, 2005). Second, because children’s behaviour problems were rated by their mothers, there is the possibility of biases in this behaviour problem data. Observational data on child behaviour were available for a subsample. Third, there were practical difficulties with videotaping naturalistic interaction, and with coding maternal sensitivity from videotape. Thus, as is true of infant attachment (Atkinson et al., 1999; van IJzendoorn et al., 1992; Vaughn et al., 1994; Vaughn & Waters, 1990), assessing maternal sensitivity in dyads involving children with developmental delay is difficult. However, despite the small sample due to difficulties with videotaping and coding, results for maternal sensitivity were consistent with previous research: mean maternal sensitivity scores were similar to those found in previous studies of children with developmental delay (e.g. Atkinson et al., 1999).

CONCLUSIONS

The present study appears the first to examine maternal sensitivity in relation to behaviour problems in young children with developmental delay. This population is at elevated risk for behaviour problems, but little is known about early predictors (Baker et al., 2003; Borthwick-Duffy & Eyman, 1990; Crnic et al., 2004; Feldman et al., 2000; Merrell & Holland, 1997; Steffenburg et al., 1996; Stromme & Diseth, 2000). The findings of this study identify an important maternal variable that may be amenable to intervention in reducing the risk of behaviour problems in young children with developmental delay. The results replicate findings from studies of typically developing children in suggesting that maternal sensitivity may be important in the development of externalizing behaviour problems, and they inform developmental theory by showing that attachment principles and parent–child interaction influences on behaviour may apply to children with atypical development. However, given the small sample size and other methodological issues, the study should be considered preliminary and, as such, any conclusions are tentative. Once replicated with a larger sample, future research involving etiologically distinct samples (cf. Dykens, 2000), live observation of parent–child interaction and child behaviour, and longer-term follow-up would be informative. Controlled studies of parent
training to increase sensitive interactions in initially insensitive mothers of children with developmental delay would shed light on the causal relationship between maternal sensitivity and development of child behaviour problems in children with developmental delay.

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