Bi-directional effects of depressed mood in the postnatal period on mother–infant non-verbal engagement with picture books

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ABSTRACT

The purpose of the present study is to examine the bi-directional nature of maternal depressed mood in the postnatal period on maternal and infant non-verbal behaviors while looking at a picture book. Although, it is acknowledged that non-verbal engagement with picture books in infancy plays an important role, the effect of maternal depressed mood on stimulating the interest of infants in books is not known. Sixty-one mothers and their infants, 38 boys and 23 girls, were observed twice approximately 3 months apart (first observation: mean age 6.8 months, range 3–11 months, 32 mothers with depressed mood; second observation: mean age 10.2 months, range 6–16 months, 17 mothers with depressed mood). There was a significant effect for depressed mood on negative behaviors: infants of mothers with depressed mood tended to push away and close books more often. The frequency of negative behaviors (pushing the book away/closing it on the part of the infant and withholding the book and restraining the infant on the part of the mother) were behaviors which if expressed during the first visit were more likely to be expressed during the second visit. Levels of negative behaviors by mother and infant were strongly related during each visit. Additionally, the pattern between visits suggests that maternal negative behavior may be the cause of her infant negative behavior. These results are discussed in terms of the effects of maternal depressed mood on the bi-directional relation of non-verbal engagement of mother and child.

1. Introduction

The development of children whose mothers show depressed mood is of serious concern (e.g. Jung, Short, Letourneau, & Andrews, 2007). Compared to children of non-depressed mothers, children of depressed mothers are less co-operative at 36 months, tend to have more difficulties in expressive language, and perform more poorly on measures of cognitive-linguistic functioning (Cox, Holden, & Sagovsky, 1987; Field, 2010; NICH Early Child Care Research Network, 1999; Stanley, Murray, & Stein, 2004). Furthermore, Richman, Stevenson, and Graham (1982) found poorer expressive language at 3 years and reading delay at 8 years in mothers who had been depressed in the pre-school period. Vandewater and Bickham (2004) examined the effect of family stressors, including maternal depressed mood on pre-reading and reading skills in young children. They found that maternal depression was related to a decrease in the quality of the home environment for school related learning, which had a significant negative effect on children’s reading skills.
The quality of the home environment is expressed in various ways. Tamis-LeMonda, Spier, Spellmann, Pan, and Rowe (1999) showed that the lack of attuned responsiveness of mothers with depressed mood to their infants' affective expressions was reflected in measures of the child's language ability. Research on the effects of maternal depression on mother–infant interactions points strongly to communication difficulties experienced when interacting with their infants and young children. Specifically, studies have shown that maternal postnatal depression can affect both the frequency and flow of social interactions (e.g., Field, 2010). For example, depressed mothers take longer to respond to their infants' communications, as measured by the duration of switching-pauses during speech (Zlochower & Cohn, 1996). In a meta-analytic review of 46 studies on maternal depressed mood and parenting behavior, Lovejoy, Graczyk, O'Hare, and Neuman (2000) found a significant association between maternal depression and negative parenting behavior, such as using coercive techniques for dealing with their child.

One indicator of the quality mother–infant interaction is gaze direction (e.g., Endriga & Speltz, 1997). When examining gaze behavior of depressed mothers interacting with their babies, research indicates that infants of depressed mothers avoid gazing at their mothers (e.g., Cohn, Campbell, Matias, & Hopkins, 1990). Other findings suggest that mothers, depressed in the postnatal period, are less able to sensitively engage with their infants (e.g., Field, 2010), where sensitivity is measured, for example, by maternal responsiveness to infants' gaze direction (e.g., Weinberg & Tronick, 1994) and type of touch (Ferber, 2004; Herrera, Reissland, & Shepherd, 2004). This association was especially strong for younger infants rather than older children.

Since, interpersonal relationships are important factors in the maintenance and amplifications of depressive mood (e.g., Coyne, 1976; Hops et al., 1987), it is important to address reciprocal influences of mother and infant behaviors. For example, Bornstein, Tamis-LeMonda, Hahn, and Haynes (2008) in a longitudinal study of 40 mother–child dyads at 10, 14 and 21 months found that maternal responsiveness varied widely. They suggest that these findings point to the fact that young children play an active role in eliciting maternal behaviors. This was also the conclusion reached in a study of newborns (Sutter-Dalay, Murray, Glatigny-Dalay, & Verdoux, 2003) which found that behavioral responses of 3-day-old infants predicted postnatal depression at 6 weeks postpartum. Furthermore, maternal shared reading interactions at 6 months can be predicted from their responses at the time of the birth of their baby (e.g., Berkule et al., 2008). Therefore the bi-directional interaction between mother and child as well as the length and current levels of depression need to be addressed when considering the effects of maternal depressed mood.

At the infant stage, non-verbal aspects of the picture book situation, such as gaze direction (e.g., Bloom, 1974; Messer & Vietze, 1984) looking at the pictures of the book (e.g., Holland, 2008) and turning the pages of the book (Bus, van Ijzendoorn, & Pellegrini, 1995), are essential in engaging the infant. It is through such non-verbal behaviors (e.g., Justice & Ezell, 2004; Tamis-LeMonda & Bornstein, 1989) that babies and young children acquire the skills of joint attention, turn-taking and later an understanding of the sequential nature of stories. Young children will only understand a storyline of a picture book (e.g., Lamme & Packer, 1986; Pellegrini, Brody, & Sigel, 1985) and increase their vocabulary (e.g., Senechal, Thomas, & Monker, 1995) if their parents use non-verbal gestures.

Although other studies have looked at the effect of maternal depression on frequency of reading picture books (e.g., McLennan & Kotelchuck, 2000; Kavanaugh et al., 2006) the current study examines the effects of maternal depressed mood on the bi-directional nature of non-verbal interactions while looking at a picture book. Specifically, this study examines the incidence of two types of non-verbal behaviors considered vital to the smooth flow interactions: touch and gaze direction hypothesized that infant behavior will be affected by maternal depressed mood. Specifically, infant behavior is expected to be more negative (trying to push the book away or closing the book prematurely) when reading with mothers expressing depressed mood, compared with infant behavior of mothers who are not depressed. Furthermore, we expect that mothers with depressed mood will show more negative touch behaviors, such as trying to prevent the infant from touching the book, when reading the picture book, compared with non-depressed mothers. Additionally, we expect that frequency of gaze direction will differ for mothers with depressed mood compared to non-depressed mothers with the former group expected to gazing less frequently at their babies compared to non-depressed mothers and babies of mothers with depressed mood avoiding gazing at their mothers.

2. Method

2.1. Procedure

Mothers and their infants were observed, as part of a study on play interactions in their homes, while showing a picture book to their infants (Dear Zoo, Campbell, 1998), which contains text interspersed with pictures. Infants sat on their mothers' lap or beside her on a couch. Mothers were asked to engage with their child while looking at the picture book as they normally would. Two cameras, one focussing mainly on the mother and placed approximately 1 m from the mother, the other placed approximately 1 m from the child and focussing mainly on the child were used to record the sessions.

2.2. Participants

2.2.1. Recruitment

Staff maintaining the hospital database contacted mothers by post by depending on the date of birth of their baby. Mothers interested in taking part in a study on maternal postnatal depression were asked to send a letter of consent to the
researchers. The researchers contacted mothers who opted in to the study and consented to take part in the study and made appointments for the two visits. All mothers who opted into the study were happy to receive the visits.

Mothers were middle class, monolingual English speakers and primary caregivers. Ninety-four mothers agreed initially to participate in the study. Of these 61, mothers and their babies who had been seen twice approximately 3 months apart and had been videotaped while reading the book were included in the present study: 38 boys and 23 girls, mean age 6.8 months (range 3–11 months) at the first visit, and mean age 10.2 months (range 6–16 months) at the second visit. These mothers and their children did not differ from the parent population in terms of maternal education (experimental group mean = 15.65 years, parent population mean = 15.8 years, t(60) = 0.38, p = .71), age of child at first visit (experimental group mean = 6.9 months, parent population mean = 7.4 months, t(60) = 1.10, p = .28) gender of child (the experimental group with 37% female children did not differ significantly from the parent population mean of 43% female, binomial comparison, p = .241). Mothers indicating depressed mood at the first visit had a mean of 15.11 years of education (range 11–21 years). Non-depressed mothers had a mean of 15.82 years of education (range 7–21 years). Depressed and non-depressed mothers had an equal number of children. Mothers who were depressed at the first visit had a mean of 1.6 children (range 1–4 children) and non-depressed mothers had a mean of 1.5 children (range 1–3 children).

2.2.2. Postnatal depression measures

The 10-item Edinburgh Postnatal Depression Scale (EPDS) (Cox et al., 1987) was used to assess the current state of maternal depression mood at both visits. Items on the EPDS include statements such as “In the past week I have been able to laugh and see the funny side of things” or “In the past week I have been anxious or worried for no good reason” which have to be rated on a 4 point scale from “very often” to “not at all”. A cut-off point of 9 on the EPDS was used to identify depressed mood (Benvenuti, Ferrara, Niccolai, Valoriani, & Cox, 1999; Cox & Holden, 1994; Dennis, 2004; Leverton & Elliott, 2000; Peindl, Wisner, & Hanusa, 2004). This is similar to the ideal cut-off used by Benvenuti et al. (1999) who established that a cut-off value of 9 was the most accurate, in terms of high sensitivity and good positive predictive values, for the detection of postnatal depressive symptomatology in community screenings. For this reason, mothers who scored 9 and above were classified as suffering from depression mood, and mothers who scored 0–8 were classified as non-depressed mothers.

Thirty-two of the mothers showed depressed mood (EPDS mean = 12.6; range 9–19) either shortly before and/or during the first visit and 29 were non-depressed (EPDS mean = 8.7; range 0–8). An independent group t-test on age showed that at the first visit the mean age of children of depressed mothers (mean = 6.96 months; N = 27) and the mean age of non-depressed mothers (mean = 6.74 months; N = 34; t60 = .73; 2-tailed) did not differ. The mean time difference from first to second visit was 3 months and was similar for boys (mean 3.39) and girls (mean 3.34).

During the second visit 17 mothers showed depressed mood (EPDS mean = 13.06; range 9–17) and 44 were non-depressed (EPDS mean = 4.07; range 0–8). Of these 17 mothers, one mother showed depressed mood only at the second visit and was therefore excluded from the statistical analyses.

2.3. Measures of infant and maternal behaviors

Given the importance of the bi-directional aspects of non-verbal interactions, specifically, gaze and touch (e.g. Bergin, 2001; Holland, 2008; Justice & Ezell, 2004; Moszkowski et al., 2009) these two types of behavior were coded for both mother and infant. Infant and maternal behaviors were coded from the time the mother started to look at the book until the mother finished reading the book. The behaviors were coded frame by frame from videotaped records using the OBSERVER. The rates of each of the behavior coded for each mother–child pair was calculated by dividing the total frequency of the behavior, by the total time taken to read the book.

2.3.1. Gaze direction

The frequency was counted by coding how many times the infant and mother performed one of three exhaustive and exclusive gaze behaviors, namely: infant gazing at mother (frequency was counted by coding how many times the infant started to move the gaze towards the mother to the time the infant started to move the gaze away), at the book (frequency was counted each time that the infant started to move the gaze towards the book to the time the infant started to move the gaze away) or at other (frequency was counted each time that the infant started to move the gaze towards camera or experimenter to the time the infant started to move the gaze away) and mother gazing at infant (frequency was counted each time that the mother started to move the gaze towards the infant to the time the mother started to move the gaze away), at the book (frequency was counted each time that the mother started to move the gaze towards the book to the time the mother started to move the gaze away) or at other (e.g. from the time the mother started to move the gaze towards camera or experimenter to the time the mother started to move the gaze away). From these measures we derived the measure of rate in gaze direction.

2.3.2. Type of touch

Three touch behaviors were coded for the baby, namely baby touching the book passively, baby “closing” the book by pushing the front and back-flap of the book together while mother tried to read the book, and baby pushing the book away by forcing the book out of their sight or pushing it down towards the floor while mother tried to read the book. Two touch behaviors were coded for the mother, namely, mother restrains baby’s hands by holding them and thereby preventing the
2.3.3. Reliability

Ten percent of the observational data were re-coded by an independent observer, blind to the hypothesis. Reliability of the data was calculated for infant touch (mean Cohen’s Kappa = .78 (range: K = .71–.93)) maternal touch (mean Cohen’s Kappa = .78 (range: K = .71–.86)) infant gaze (mean Cohen’s Kappa = .89 (range: K = .77–.97)) and maternal gaze (mean Cohen’s Kappa was K = 0.89 (range: K = .72–.98)).

3. Results

In order to assess the effect of depression on the behavior of mothers and their infants Kolmogorov–Smirnov two-sample tests were used. As can be seen from Table 1 (see Table 1) there were significant effects of maternal depression at visit 1 on the infant’s behavior, with infants of depressed mothers pushing the book away and closing the book significantly more frequently than infants of non-depressed mothers. At visit 2 there were no significant effects. This might be taken as evidence that the effects of maternal depression on infant behavior are short-lived; however, the medium effect sizes (Cohen’s d) greater than .4, given in the notes to Table 1) suggest that the effect is still strong during the second visit.

In order to assess the possible bi-directional effects of infant and maternal behaviors, a series of correlations were performed between infant and mother touching behavior at visit 1 and visit 2. To reduce the number of correlations computed frequencies of occurrences of the two maternal behaviors previously examined (the mother restraining her infant and keeping/pulling the book away) were added to form the measure of mother negative touch behavior and the frequencies of the two negative infant behaviors (infant pushing the book away and closing the book) were added to form the measure of infant negative touch.

There was evidence of consistency in behavior with significant correlations between visit 1 and 2 for frequency of negative infant touch behavior, r(60) = .27, p < .05, and of maternal negative touch behavior, r(60) = .35, p < .01. Furthermore, negative infant touch behavior was significantly correlated with frequency of maternal negative touch behavior at both the first, r(60) = .56, p < .0001 and second, r(60) = .51, p < .0001, visits. There was a non-significant relationship between infant negative touch behavior at the first visit and maternal negative touch behavior at the later visit, r(60) = .19, p = .20. In contrast, there was a significant effect of maternal negative touch behavior at the first visit on infant negative touch behavior at the second visit, r(60) = .26, p < .05. Such a pattern of correlations is in line with the mother’s behavior having long-term effects on her infant’s behavior.

4. Discussion

In the present study, maternal and infant bi-directional non-verbal interactions while engaged with a picture book were observed on two occasions. Results indicated that depressed mood had an effect on the non-verbal interactions of mothers and their infants while looking at the picture book. During the first visit, significantly more infants of mothers with depressed mood showed negative touch behaviors while their mothers were still trying to engage their infant’s interest in the book compared with infants of mothers who did not show any signs of depression. This result is supported by research which showed that 4 months old infants of depressed mothers used more negative forms of touch (i.e., pulling and grabbing) than infants of non-depressed mothers (Moszkowski et al., 2009). Negative touch behaviors were stable for both the infant and the mother in that they were highly correlated between visit 1 and 2. Specifically, the bi-directional nature of these non-verbal behaviors is evident when examining the impact of negative touch behavior between individuals and between visits where it appears that maternal negative touch at visit 1 influences infant negative touch behavior at visit 2. In contrast...
infant negative touch behavior does not seem to have a lasting effect on maternal behavior. Hence, the evidence based on correlations observed suggests that mothers influence their infants more than vice versa. Research, indicating that the longer children are exposed to maternal depression the more negative the impact on their development (e.g. Campbell, Cohn, & Meyers, 1995; Cooper & Murray, 1995; Cornish et al., 2005), as well as intervention studies which indicate that changing maternal non-verbal behavior changes infant non-verbal behavior (e.g. Jung et al., 2007) support this interpretation. One limitation of the present study is that at the second observation compared with the first fewer mothers showed depression. However, although at visit 2 there were no significant statistical effects of maternal depression on infant behavior, the medium effect sizes (Cohen’s $d$ greater than .4, given in the notes to Table 1) suggest that the effect is still strong during the second visit. This effect could possibly be shown to be significant in a future study consisting of a bigger cohort of depressed mothers.

The engagement of both mother and her infant in the process of reading results in increased interest in reading books by 2-year-olds (Ortiz, Stowe, & Arnold, 2001). Given that there is a significant negative correlation between maternal depression and her child’s reading ability (Vandewater & Bickham, 2004) and that non-verbal interactions, specifically gaze direction and touch (e.g. Bergin, 2001; Holland, 2008; Justice & Ezell, 2004) are important during picture book reading; it is likely that subtle non-verbal behaviors expressed in infancy are the reason for why children of depressed parents are less engaged in the shared book reading interaction. This view is supported by others (e.g. Gest, Freeman, Domitrovich, & Welsh, 2004) who argue that measures of the quality of shared book reading need to be targeted in order to improve children’s language skills.

Maternal depression leads to a reduction in enrichment interactions including reading, telling stories and singing songs (Paulsen, Dauber, & Lieferman, 2006). Moreover, parental warmth during book reading affects the child’s sense of affiliation and relatedness to the parent (Fletcher & Reese, 2005), and engenders a positive attitude toward books from an early age (Bus & vanIJzendoorn, 1988; Bus & vanIJzendoorn, 1997). A limitation of the present study concerns the age range studied. As infants mature, their ability to act within a situation matures as well, and hence we tried to control for maturation by observing infants twice with an interval of three months using behaviors, namely gaze and touch, which are within the ability range of all infants observed. In a future study, longitudinal observations of a cohort of depressed and non-depressed mothers and their children followed from 3 months of age to the age when they can read first words should be carried out; in order to replicate the findings of the present study and to demonstrate the behaviors observed with 3 months old babies and their depressed mothers predict how these children interact with books later on.

5. Conclusion

In sum, the present study examined the bi-directional effect of maternal depressed mood on mother–infant engagement with a picture book. The complexity of the effects of depressed mood on mother and infant is highlighted by the fact that no significant differences were found when simply comparing maternal behavior of depressed and non-depressed groups. In contrast, infants of these two groups of mothers showed significant differences in their non-verbal behaviors. Specifically, infants of depressed mothers showed during the first visit significantly more negative touch behaviors compared with infants of non-depressed mothers. One possible implication of the results of the present study is that infants react to maternal negative non-verbal engagement with the picture book by showing negative behaviors themselves and less interest in interacting with books. Separating out how parental and infant non-verbal behaviors in infancy relate later to children’s motivations, attitudes, and competence in the domain of book reading might ultimately help in designing successful interventions.

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References


