



Introduction

The idea that a mother's interaction with her infant can have a profound impact on that child's socio-emotional development is intuitive, and most previous research on mother-infant interactions has focused on this type of outcome measure. Because the mother-infant relationship involves much talking and teaching, it is likely that mother plays a major role in a child's cognitive development as well. Given the importance of language and memory skills to later school performance, it is important to identify variables that can impact a child's development of these skills. The current study examines how maternal interactions with her 5-month-old infant relate to development of receptive language and short-term memory at 3 years of age. It was hypothesized that the quality of early mother-infant interactions would be positively correlated with language and memory performance.

Participants



Participants in the current study are thirty-two 3-year-old children who also participated in a study at 5 months of age. These children are part of a larger longitudinal study of individual differences in cognitive development. EEG and ECG measures were also taken, but those data will not be discussed here. Data collection at the 3-year assessment is ongoing. (NIH grant HD43057)

Language

The PPVT-III (Peabody Picture Vocabulary Test-III; Dunn & Dunn, 1997) was administered at age 3 to assess each child's verbal comprehension and receptive vocabulary. Raw scores ranged from 31 to 65; $M = 49.04$; $SD = 9.50$.



Short-Term Memory



Short-term memory was assessed at age 3 using a variation of the Corsi-Milner test of recognition memory (Corsi, 1972; Diamond et al, 1997). During this task, the children were shown a series of cards (40 trials), each depicting a simple black and white line drawing of an everyday object. All images were presented for approximately 5 seconds. This task required the child to distinguish an image that had been shown from an image that had not been shown. After trials 4, 8, 12, 16, and 20, a question card depicting two images (one of which was previously presented) was shown. The child was asked, "Which of these two pictures have you already seen?" During each of the practice trials, the child was shown a picture card immediately followed by a question card depicting two images. For results to be considered valid, the child was required to demonstrate that he or she understood the meaning of the words *already seen* by correctly identifying which card was "already seen" in at least two of three practice trials. One point was given for each correct answer. Scores ranged from 0 to 5; $M = 4.3$; $SD = 1.26$.

Mother-Infant Interaction

Quality of mother-infant interaction (maternal responsivity and intrusiveness) was assessed during a 2-minute game of peek-a-boo when the infant was 5 months old. These interactions were coded in 30-second epochs to give an index of maternal responsivity and intrusiveness. Maternal responsivity was defined as how well she facilitated the infant's attention to the task and included factors such as appropriateness of pace and responsiveness to her infant's cues. Intrusiveness ratings were based on behaviors such as interacting with the infant so exuberantly that the baby flinches or turns away (Calkins et al, 2004).



Results

Several children were excluded either because they were unable to perform the Corsi-Milner task, because they did not cooperate during the memory or language measure at the 3-year visit, or because the peek-a-boo task was not performed at the 5-month visit. Correlations were computed for the 20 children with complete data.

As predicted, maternal responsivity at 5 months was positively correlated with both the language measure and the memory task; and a high level of intrusiveness was negatively correlated with performance on both the language measure and the memory task.

Table 1. Intercorrelations Among Variables

	1	2	3
1. PPVT-III	--		
2. Corsi-Milner	0.62**	--	
3. Maternal Responsivity	0.44*	0.48*	--
4. Intrusiveness	-0.52*	-0.46*	-0.70**

* $p < .05$, ** $p < .01$

Discussion

These results provide preliminary support for the idea that maternal behavior during infancy has the potential to influence language and memory development in early childhood. These data are correlational in nature, so care must be taken in interpreting the nature of the relationship, which is likely complex and may be mediated by other variables. One possible explanation is that mothers who demonstrate low intrusiveness and high responsiveness to their infants' cues also engage in joint attention with their infants more often than less responsive and more intrusive mothers. Joint attention is thought to be an important factor in cognitive development. For example, joint attention may enhance language development as mothers respond to infants' attention to various objects with verbal cues. In fact, failure to engage in joint attention in infancy is thought to contribute to the social and language deficits of autistic children (Trepagnier, 1996). These data warrant further investigation and suggest a need for early intervention programs for at-risk children.