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ABSTRACT

Attempts to assess maternal and neonatal behavior and subsequent mother-infant interactions as potential determinants of the quality of attachment between mothers and their infants provide the focus of this paper. Several instruments and procedures that focused on (1) maternal and infant characteristics, (2) mother-infant interaction, and (3) life stress, were used to collect data from 212 high risk pairs of mothers and infants. The collection of data began during the prenatal period and continued through the infant's first year of life. Attachment was assessed when the babies were 12 months of age. Using the Strange Situation Procedure researchers classified infants as anxious/avoidant (Group A), securely attached (Group B), or anxious/resistant (Group C). Overall group differences among the three attachment groups were tested by a one-way ANOVA and the Student-Newman-Keuls was used for post hoc comparisons. Results indicate that maternal, neonatal, and interactive factors contribute to the development of qualitatively different attachment relationships. Anxious/resistant infants appear to develop more slowly than others. Mothers of anxious/avoidant infants tend to be tense, irritable, disinterested in their babies, and react negatively to motherhood. Securely attached infants tend to have mothers who are sensitive to their needs and who encourage reciprocity. While male infants tend to be more vulnerable to caretaking differences, female infants may be more vulnerable to stressful life events than males are. (Author/RH)

MATERNAL, NEONATAL AND MOTHER-INFANT ANTECEDENTS OF ATTACHMENT IN URBAN POOR

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Running head: Antecedents of Attachment

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Abstract

The Ainsworth and Wittig (1969) Strange Situation was administered to 212 high-risk mother-infant pairs. With data collected prenatally and during the infant's first year of life, this study attempted to discriminate between the three major attachment classifications. The data included maternal and infant characteristics, mother-infant interactions, and life stress events. Several patterns seemed to emerge. Mothers of securely attached infants were consistently more cooperative and sensitive with their infants as observed in a feeding and play situation than mothers of anxiously attached infants. Anxious/resistant infants tended to lag behind their counterparts developmentally and were less likely to solicit responsive caretaking. Anxious/avoidant infants, although robust, tended to have mothers who had negative feelings about motherhood, were tense and irritable and treated their infants in a perfunctory manner. Male babies were somewhat more vulnerable to qualitative differences in caretaking while, for girls, life circumstances showed a stronger relationship to security of attachment.

A critical developmental issue in the first year of life is the formation of an affective bond, an attachment, between the infant and its mother. The quality of that attachment has been related to various aspects of the child's functioning at the same and later ages. These include exploration at one year (Ainsworth, Bell, & Stayton, 1971), problem-solving and toddler sociability at age two (Matas, ARend, & Sroufe, 1978; Pastor, T980; in press) and curiosity, ego resiliency, and ego control in the preschool years (Arend, Gove, & Sroufe, 1979). As evidence accrues indicating the significance of different patterns of attachment for later development, understanding how these differences arise is of increasing theoretical and practical importance. Ethological-attachment theory (Bowlby, 1969) assumes that infant-adult attachments are a product of interaction over time, a function of the initial behaviors each brings to the relationship and the effects those behaviors have on each member. Consequently, studies of the antecedents of attachment usually explore one of three variables: infant characteristics, maternal attitudes, or interactive behavior.

Qualitative differences in attachment are usually assessed with the Ainsworth and Wittig (1969) Strange Situation. Securely attached infants are able to use the mother as a secure base for exploration and as a source of comfort following separation. When the caregiver's presence does not support exploration or reduce distress following separation, the infant is said to be anxiously attached. There are two patterns of anxious attachment. Anxious/avoidant infants explore without interaction in preseparation episodes, treat the mother and the stranger similarly, and avoid the mother upon reunion. Anxious/resistant babies demonstrate impoverished exploration and difficulty being comforted. They mix active contact-seeking with struggling, stiffness, and continued crying.

Using Ainsworth's classificatory system, Connell (1974, 1976) found that anxious/resistant infants had lower birth weights and lower Apgar ratings than either of the other groups. With a subsample of the infants in this study, Waters, Vaughn, and Egeland (1980) found anxious/resistant infants had lower scores on the Brazelton (1973) Neonatal Behavioral Assessment Scale than securely attached babies which suggests some physiological difficulty in coping with stress. Studies have failed to show that prematurity, infant anomalies or length of postpartum separation influence the formation of the attachment (Egeland & Vaughn, 1980; Hock, Coady, & Codero, 1973).

Ainsworth, Blehar, Waters, and Wall (1978) suggest that in the first quarter of life anxious/resistant and anxious/avoidant

infants are not discriminate from each other in their home behavior but as one group they do differ from securely attached infants. Anxiously attached infants tended to cry longer and more frequently, smiled less, responded less positively to being held and more negatively to being put down. However, they attribute these differences not to constitutional infant differences but to maternal handling and provide additional evidence to support such a hypothesis. Mothers of securely attached infants were more sensitive, cooperative, as opposed to interfering with ongoing infant behavior, accepting, and psychologically accessible than mothers of anxiously attached infants in a feeding situation. Mothers of anxious/avoidant infants were especially rejecting and had a strong aversion to physical contact. Rosenberg (1975) rated mothers on the Reciprocity Scale from the Maternal Attitude Scale (Cohler, Weiss, & Grunebaum, 1970) while they were playing with their infants. Those with securely attached infants encouraged more reciprocity with their children than mothers of anxious/avoidant infants.

Thus, evidence suggests that anxious/resistant infants may be less easy to care for than other infants and require more sensitive caretaking. Independently, other researchers have found that mothers of anxiously attached infants are less sensitive and less responsive to their infants cues and signals. Given these findings, what is needed is a study which follows a transactional model (e.g., Sameroff & Chandler, 1975) and assesses as independently as possible, maternal and neonatal behavior and subsequent mother-infant interactions as potential determinants of the quality of the attachment relationship. Only by viewing attachment as a relationship between two individuals who are continually influencing each other can one understand its formation.

As part of a large longitudinal study, starting prenatally and continuing through the first year of the infant's life, data were collected on maternal characteristics, infant temperament, mother-infant interaction, and life stress*. All of this was examined in an attempt to account for secure and insecure attachments in a high-risk sample. Attachment was assessed at 12 months. The sample size made it possible for us to analyze the attachment process for the group as a whole and separately for each sex. To date, no studies have examined antecedents to or consequences of attachment separately by sex. The distribution of sexes across the three attachment classifications has not been found to differ (Ainsworth et al., 1978). It is known that male infants are more irritable and difficult to

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*We continue to collect data on the mother, environmental circumstances and the development of the child.

soothe during the neonatal period (Horowitz et al., 1971) and that female infants are more responsive and elicit more positive attention from their mothers (Moss, 1967). Different skills may be important in coping with male and female infants or female infants may be less vulnerable to differences in caretaking. Thus, while an equal number of boys and girls may emerge in each attachment classification, the factors which were important in the development of that relationship may differ.

Method

Subjects

The original sample consisted of 267 primiparous women receiving prenatal care through public assistance at the Maternal and Infant Care Clinics, Minneapolis Health Department. At the time of the baby's birth, the mothers ranged in age from 12 to 37 years (M = 20.52, SD = 3.65). Sixty-two percent of the mothers were single and 86% of the pregnancies were not planned. Educational level ranged from junior high school to post-college graduate level. Sixty percent of the mothers had graduated from high school by the time their infants were born. Eighty percent of the mothers were white, 14% were black, and 5% were native American. Although the original sample consisted of 267 mothers enrolled in the study during their last trimester of pregnancy; at the time of the assessment of attachment (12 months), 212 subjects were tested.

Procedure

Assessment of maternal characteristics: At approximately 36 weeks of pregnancy and three months post-delivery, a battery of tests were given to assess personality characteristics: intellectual level (Shipley & Hartford); aggression, defendence, impulsivity, succorance and social desirability (Personality Research Form, Jackson, 1967); anxiety (IPAT Anxiety Scale; Cattell & Scheier, 1963); locus of control (Egeland, Hunt & Hardt, 1970; Rotter, 1966); and parents' feelings and perceptions of pregnancy, delivery and their expected child (Maternal Attitude Scale, Cohler, Weiss, & Grunebaum, 1970; Pregnancy Research Questionnaire, Schaefer & Manheimer, Note 1). The Maternal Attitude Scale measures maternal attitude toward controlling the child's aggression (Q 1 scale), maternal understanding of the need to encourage reciprocity (Q 2 scale), and maternal feelings of competence in meeting the baby's needs.

The Life Events Scale (Egeland,& Deinard, Note 2) was given to each mother when her infant was 12 months old. It rated the occurrence

of 44 events during the previous 12 months. Thirty-eight items were from Cochrane and Robertson's (1973) Life Events Inventory. Six additional items had to do with trouble with welfare, money problems, a boyfriend's move out, and an increase in the number of arguments with a friend.

Infant characteristics: Naturalistic observation ratings were provided by having the nurses in the newborn nursery rate each newborn in the study on 15 items. They included such behaviors as activity level, alertness, and soothability of the newborn as well as the mother's skill with and interest in the new baby. The infants were rated throughout their stay in the neonatal nursery.

The Neonatal Behavioral Assessment Scale (NBAS) (Brazelton, 1973) was administered to each infant at home on two separate occasions. The NBAS consists of 26 behavioral items and 21 reflex items. The behavioral items examine habituation to repeated stimuli, orientation, to inanimate and animate stimuli, motor maturity, state control and physiological regulation. The first administration of the NBAS was scheduled for the second day after release from the hospital, usually the infant's seventh day of life. The second administration was usually on the infant's tenth day of life.

The Bayley Scales of Infant Development (mental and motor)(1969) were administered at nine months.

Mother-infant interaction: At three and six months postnatal age observers visited the home to watch a feeding situation. At six months feeding was observed on two separate occasions. After watching a feeding the observer rated a variety of maternal behaviors, infant behaviors, and interactions between the mother and the baby. A total of 33 items were rated including expressiveness, facility in caretaking, synchrony, positive and negative regard, etc. Ainsworth's scales of Sensitivity and Cooperation (Ainsworth et al., 1978) were also used to rate the mothers at six months. In addition, the mothers and babies were observed in a standardized play situation at six months and rated on 12 items (see Vaughn, Taraldson, Crichton, & Egeland, 1980, for a complete description of the feeding and play items).

Assessing the quality of attachment: At 12 [redacted] months of age infant-mother attachment was assessed using the Strange Situation Procedure (Ainsworth & Wittig, 1969). The procedure involves seven, three-minute sequences in which the infant's exploration of a novel environment in the presence of mother, reaction to separation

from the mother, and reunion with the mother are observed. In addition, the baby's reaction to a stranger with and without the mother present is observed. Primarily based on the behaviors seen upon reunion with the mother after separation (i.e., whether or not the infant initiates contact and/or interaction, avoids contact, or resists comforting and contact) the infant is assigned to a group reflecting both quality and patterning of its attachment behaviors. As previously described, Group B infants are securely attached; Group A, anxious/avoidant; and Group C, anxious/resistant.

The Strange Situation procedures were video taped. Two coders watched the tapes and independently classified the entire sample of infants into the three major groups. Rater agreement was 89%. Disagreements were resolved by discussing the tapes in question.

Results

Of the 212 infants classified, 21% (N = 46) of the infants were classified as A babies, 55% (N = 118) were Bs, and 22% (N = 48) were C's. Breakdown of the classifications by sex followed a similar pattern with over 50% of both the boys and girls being Bs and the remainder of each sex evenly divided between groups A and C. Overall group differences among the three attachment groups were tested by a one-way ANOVA and the Student-Newman-Keuls was used for post hoc comparisons.

Maternal characteristics: For the total sample there were only six significant differences of the 20 variables analyzed (see Table 1). On the personality variables assessed prenatally, mothers of A babies were more tense and irritable ($F = 3.79$, $p < .02$) and described themselves in less positive terms ($F = 2.99$, $p < .05$) than mothers of B babies. Mothers of C infants had lower scores on the Shipley-Hartford Vocabulary Test ($F = 3.78$, $p < .02$) and on Cohler's Scale 3 assessing the acceptance versus denial of emotional complexity in child care ($F - 4.25$, $p < .01$) than mothers of Bs. When the tests were administered three months after delivery, mothers of Cs still had lower scores on the Cohler Scale; mothers with A babies had less positive feelings about maternity than those with Bs ($F = 3.97$, $p < .02$).

Analyses by sex revealed that boys who were As had mothers who were more irritable ($F = 5.74$, $p < .004$) and chose less positive self-descriptions ($F = 4.79$, $p < .01$) than those of either Bs or Cs. At three months mothers of A boys had more negative feelings about maternity than those with boys who were Bs ($F = 4.19$, $p < .02$).

Mothers of girl infants classified as As had higher scores of prenatal aggression than mothers of B girls ($F = 2.93$, $p < .05$). On the three month variables, mothers of C girls had lower scores on the Maternal Attitude Scale 1 than mothers of A girls, indicating they were either too lenient or too controlling of their child's aggression ($F = 3.28$, $p < .04$). The mothers of A girls had less desire for pregnancy than those with Cs ($F = 3.57$, $p < .03$). Mothers of girls classified as Cs reported significantly more stressful life events than mothers of A or B girls ($F = 4.27$, $p < .02$).

Surprisingly, few of the personality variables discriminated among attachment groups. A brief explanation of the significance of the Cohler measure may be useful. The higher scores of the mothers of securely attached infants on this measure suggest these women are more mature. They demonstrate an adaptive attitude by admitting to having mixed feelings regarding their child rearing role. At the same time they also believe children should be encouraged to express their negative as well as their positive feelings.

Infant characteristics: Of the 12 variables analyzed, 5 significant differences were found for the total sample (see Table 2). The nurses' ratings were reduced to four factors. In the newborn nursery mothers of infants later classified as As were rated as showing less interest in their babies than mothers of B infants. C infants were rated as less alert and active than A or B infants. The mean factor scores for how easy the baby was to care for also differed ($F = 2.99$, $p < .05$). At 9 months C infants had significantly lower scores on the Bayley Mental and Motor Scales than B infants ($F = 2.94$, $p < .05$; $F = 3.04$, $p < .05$).

For boys the alertness activity factor scores were significantly different for attachment groups and male Cs were rated as less easy to care for in the nursery than male Bs. Female Cs had lower scores on the Bayley Mental and Motor Scales ($F = 4.68$, $p < .01$; $F = 4.71$; $p < .01$) than either A or B girls. The analyses involving the Brazelton Scale using factor scores and a summary score (optimal vs. non-optimal) revealed no significant physiological differences between attachment groups for the total sample or for either sex.

Mother-infant interaction: Observations of the three month feeding (see Table 3) revealed mothers of As were less able than mothers of Bs to synchronize the rate of feeding to the baby's pace ($F = 3.03$, $p = .05$). Mothers of C infants verbalized to them less frequently than those of As or Bs ($F = 6.25$, $p = .002$). Mothers of As also engaged in less non-functional handling and were less effective in their response to the infants' crying than mothers of B or C infants ($F = 3.18$, $p < .05$; $F = 3.99$, $p = .02$).

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There were also significant mean group differences on an item rating the mother's appropriateness in determining the time to start feeding. For the boys only: C infants initiated and responded less to social interaction and had a tenser muscle tone than A boys. The mothers of C boys and girls in comparison to mothers of Bs made few efforts to verbally stimulate their babies ($F = 3.59$, $p = .03$; $F = 3.11$, $p = .05$). For females, there were also significant overall Fs for the amount of time spent looking at girls and the amount of non-functional handling.

For the two observations of feeding at six months, the mean scores of the observations were used. For the total sample, mothers of Bs were more sensitive to their infants' needs ($F = 4.85$, $p < .008$) and more adept at caretaking ($F = 6.43$, $p < .002$) than mothers of either As or Cs. Mothers of As, as compared to Bs, were more likely to delay feeding until the baby started to fuss. Determining the amount and end of feeding was also significant for the three groups ($F = 2.99$, $p < .05$). Again, analyzing the results by sex revealed slightly different patterns. Male Cs cuddled less than either of the other groups ($F = 4.96$, $p < .01$). Mothers of Bs verbalized more to their male infants than mothers of As and were more expressive emotionally than mothers of A or C boys. The group means for the facility in caretaking and sensitivity items differed for boys ($F = 3.86$, $p < .02$; $F = 3.76$, $p < .02$). With girl infants, mothers of As were less adept at determining the amount and time to end the feeding than those with B or C girls ($F = 6.10$, $p < .003$). Women with B babies showed greater facility in caretaking than women with A girls ($F = 3.07$, $p < .05$).

Finally, on the Scales of Cooperation and Sensitivity for the total sample, mothers of Bs were more sensitive and cooperative than those of either As or Cs during feeding and play. However, separate analyses by sex revealed these results to be significant for the boys only.

In summary, there were a variety of items rated during feeding ranging from specific aspects of caretaking (e.g., timing, handling) to more general indications of caring (e.g., sensitivity, expressiveness). On both types of items mothers of As were often rated lower than mothers of B infants. On the infant behavioral items, the few mean differences found the Cs to be functioning less adequately.

Discussion

The results are complicated; yet, as predicted, by a transactional model (e.g., Sameroff & Chandler, 1975) maternal, neonatal, and interactive factors contribute to the development of qualitatively different

attachment relationships. Certain patterns, in particular, seem to be emerging. Data from several sources suggest that anxious/resistant (C) infants develop more slowly than other infants and at birth they do not seem to be functioning as well as the As and Bs in certain areas. Nurses observed them to be less alert and active in the nursery. At three and six months, while being fed, anxious/resistant boys had engaged in less cuddling behavior with the mother. At nine months, the Bayley Scales suggest the anxious/resistant infants lagged behind the securely attached and anxious/avoidant infants mentally and motorically. These data indicate that anxious/resistant infants may be more difficult to care for. Their unresponsiveness may in turn lead the caretaker to occasionally withdraw. One such indication of this possibility is the mother's tendency not to engage the child verbally while feeding.

On the other hand, a certain set of maternal (and not infant) characteristics seems to influence the development of anxious/avoidant attachments. Mothers of anxious/avoidant infants tend to be tense and irritable and react negatively to motherhood. They show little interest in their infants once they are born as observed in the nursery and during feedings. They handle their infants only as much as is necessary to feed them. They do not adapt their feeding to the baby's pace. Feeding, one opportunity for close mother-infant contact, is something the mothers of anxious/avoidant infants do to them in a mechanical fashion, severely reducing opportunities for reciprocity.

Finally, securely attached infants tend to have mothers who are sensitive to their needs and encourage reciprocity. These mothers tend to feel more positive about themselves and, consequently, have more to give to their infants.

While the attachment group differences discussed thus far are for the whole sample, the importance of analyzing data involving parent-child relationships separately by sex is emphasized. Male infants tended to be more vulnerable to caretaking differences as evidenced by the Scales of Cooperation and Sensitivity. Mothers of anxious/avoidant boys were consistently less sensitive and less cooperative than mothers of securely attached boys. Maternal cooperation and sensitivity did not, however, discriminate among attachment classifications for girl babies. Female infants, on the other hand, may be more vulnerable to stressful life events than males. The mothers of anxious/resistant girls experienced more turmoil in their lives than mothers of anxious/avoidant or securely attached girls; however, life stress did not discriminate among attachment groups for boys.

These results are preliminary. Strange situation classifications on these infants at 18 months of age present a slightly different picture while also supporting many of the 12-month findings. The results discussed corroborate evidence previously presented for middle class samples only (Ainsworth et al., 1978). In addition to highlighting the possibility of separate factors contributing to qualitative differences in attachment for males, and females, we have found significant differences between the two groups of anxiously attached infants so often treated as one group solely to be compared with securely attached infants. The ability to isolate patterns of interaction which result in different types of insecure attachment has implications for distinguishing, at an early age, those at higher risk for developmental deviations.

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TABLE 1

MEAN SCORES ON THE PRENATAL AND 3-MONTH MOTHER VARIABLES: TOTAL SAMPLE

Variable	Attachment Classification A	B	C	F-value	P	Contrast
Prenatal						
Shipley-Hartford	25.32	26.30	23.31	3.79	.02	C < B
Social Desirability	9.35	10.52	10.38	2.99	.05	A < B
Cohler Scale 3	38.20	39.31	36.16	4.25	.01	C < B
Tension/Irritability	31.09	28.78	29.32	3.79	.02	B < A
3-Month						
Cohler Scale 3	34.47	39.11	35.78	2.98	.05	C < B
Maternal Feelings	13.29	12.05	12.95	3.97	.02	B < A
BOYS						
Prenatal						
Social Desirability	8.78	10.55	10.78	4.79	.01	A < B,C
Cohler Scale 1	29.61	32.74	32.30	2.89	.05	
Tension/Irritability	32.19	28.57	28.93	5.74	.004	B,C < A
3-Month						
Maternal Feelings	13.96	12.09	13.29	4.13	.02	B < A
GIRLS						
Prenatal						
Aggression	8.44	6.44	7.11	2.93	.05	B < A
3-Month						
Cohler Scale 1	33.52	30.25	28.11	3.28	.04	C < A
Desire for Motherhood	15.76	13.94	11.78	3.57	.03	C < A
Life Stress	8.44	7.60	11.71	4.27	.02	A,B < C

TABLE 2

MEAN SCORES ON THE INFANT VARIABLES:
TOTAL SAMPLE

	A	B	C	F value	P	Contrast
Nurses' Factors						
N1 Alert/Activity	-.07	-.15	.41	3.65	.03	B,A < C
N2 Mother's Interest	.31	-.15	.13	3.08	.05	B < A
N4 Ease of Care of Baby	.13	-.21	.19	2.99	.05	NS
Bayley Scales						
Mental Development	121.80	122.30	115.40	2.94	.05	C < B
Motor Development	107.90	111.10	103.20	3.04	.05	C < B
		BOYS				
N1 Alert/Activity	-.12	-.08	.65	3.85	.03	NS
N4 Ease of Care of Baby	.16	-.21	.31	3.39	.04	B < C
Bayley Scales						
Mental Development	124.70	123.70	112.80	4.68	.01	C < B,A
Motor Development	112.80	113.70	100.40	4.71	.01	C < A,B

TABLE 3

MEAN SCORES ON THE FEEDING VARIABLES: TOTAL SAMPLE

ITEM	A	B	C	F value	P	Contrast
			Attachment Classification			
3 Month						
Baby's State	4.87	5.18	5.06	3.06	.05	A < B
Frequency of Verbalization	3.84	3.92	3.18	6.25	.002	C < A,B
Determination of beginning of feeding	2.77	2.56	2.86	2.88	.05	NS
Synchronization	5.37	5.99	5.71	3.03	.05	A < B
Amount of non-functional handling	1.88	2.25	2.37	3.18	.04	A < B,C
Mother's effectiveness to crying	4.38	5.23	5.42	3.99	.02	A < B,C
6 Month						
Determination of beginning of feeding	2.56	2.31	2.35	3.48	.03	B < A
Determination of amount & end	1.35	1.15	1.30	2.99	.05	
Facility in Caretaking	5.61	6.39	5.85	6.43	.002	A,C < B
General Sensitivity	5.66	6.25	5.77	4.85	.008	A,C < B
Overall Cooperation	5.35	6.03	5.58	4.66	.01	A < B
Overall Sensitivity	5.18	6.07	5.53	7.22	.0009	A,C < B
			BOYS			
3 Month						
Frequency of verbalization	3.90	4.03	3.37	3.59	.03	C < B
Baby's muscle tone	3.11	2.98	2.78	3.03	.05	C < A
Baby's social behav.	4.37	3.85	3.37	3.26	.04	C < A
Determination of beginning of feeding	2.81	2.53	3.00	3.73	.02	B < C
6 Month						
Frequency of verbalization	2.86	3.62	3.17	3.00	.05	A < B
Cuddling by baby	2.95	3.00	2.47	4.96	.009	C < A,B
Mother's expressiveness	4.89	5.67	4.98	3.84	.02	A,C < B
Facility in caretaking	5.62	6.33	5.58	3.86	.02	NS
General Sensitivity	5.69	6.32	5.64	3.76	.02	NS
Overall Cooperation	5.22	6.19	5.54	5.34	.006	A,C < B
Overall Sensitivity	5.04	6.12	5.53	5.59	.004	A < B

TABLE 3 CONTINUED

GIRLS

	A	B	C	F value	P	Contrast
3 Month						
Frequency of verbalization	3.73	3.83	-2.93	3.12	.05	C < B
Mother's looking at baby	6.00	5.42	6.00	3.58	.04	NS
Non-functional handling	1.65	2.23	2.39	3.09	.05	NS
6 Month						
Amount and end of feeding	1.53	1.12	1.11	6.10	.003	C,B < A
Facility in caretaking	5.58	6.44	6.27	3.07	.05	A < B