THE EFFECTS OF SENSORIMOTOR STIMULATION ON THE IRRITABILITY OF PRETERM INFANTS AND ON MATERNAL BEHAVIOURS

Janet Elder

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ABSTRACT

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The study looked for effects of sensorimotor stimulation of preterm infants, carried out by their mothers during the first month at home, on infant irritability and weight gain, and on maternal confidence and competence. Thirty normal preterm infants ranging in gestational age (GA) from 25 to 36 weeks were assigned to one of three groups: the Rice Infant Sensorimotor Stimulation group (RISS) (Rice, 1977), which involved a programme of systematic cephalocaudal massage, and rocking; the Handling, Rocking and Social Stimulation group (HRS) which involved nonsystematic stroking and patting, and identical rocking; or the Weekly Weigh In (WWI) control group, which involved periods of relaxation with the infant. Mothers in the two stimulation groups were encouraged to look at and talk to their infants during treatment. Pre- and posttreatment measures included a maternal self-confidence rating scale, a 24-hour checklist of infant activities, and ratings of a taperecording of preterm and fullterm infant cries on 8 7-point rating scales. Mother-infant dyads were visited weekly for the month, when the babies were weighed and behavioural observations recorded.

Infants in the RISS group were significantly more drowsy than the WWI controls during observations of the last home visit. There were no other significant group differences in infant or maternal behaviours. Significant changes in infant behaviour over time included less sleeping and less drowsiness, and more visually alert behaviour during observations; less sleeping and more crying reported in the 24-hour checklists. Weight gain correlated positively with time spent sleeping, as recorded in the final 24-hour checklists, and negatively with the length of hospital stay, and with the Brazelton Neonatal Behavioral Assessment Scale (NBAS) Alertness score. Changes over time in maternal behaviour included more looking at their infants during the first 2 minutes of observation, and more holding them up to their shoulders during the last 3 minutes. Mothers rated themselves as significantly more confident at the final visit. On both the initial and final ratings of the taperecording of infant cries, mothers rated fullterm cries more negatively than preterm cries.

The hypothesis that the treated infants would be less irritable than the controls was supported only in that the RISS infants were more drowsy, an effect not seen in the HRS group, a result which is difficult to interpret.

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THE EFFECTS OF SENSORIMOTOR STIMULATION ON THE IRRITABILITY OF PRETERM INFANTS AND ON MATERNAL BEHAVIOURS

Until the early seventies the term "premature" was applied to all infants weighing less than 2500 grams at birth. Since 1971 the term has been changed to "preterm", to describe children born at least three weeks before their expected date of birth at 40 weeks gestation. Within this group are found infants whose weight is appropriate for gestational age (AGA), and others who are small for gestational age (SGA). Preterm children are known to be at risk for neurological damage, developmental delay, language delay, learning difficulties, hearing impairment and, while less common than in the early days of oxygen therapy, the visual impairment of retrolental fibroplasia remains a danger (Caputo & Mandell, 1970; Davis & Tizard, 1975; Fitzhardinge & Ramsay, 1973; Siegel, Saigal, Rosenbaum, Young, Berenbaum, & Stoskopf, Note 1). Preterm infants are also at greater risk for child abuse than the general population of children (Klein & Stern, 1971). Many factors have been suggested to account for this risk: the difficulty of caring for preterm infants, their irritability and the aversive quality of their cries, their unappealing appearance, their delayed maturation, and a possibly poorly formed attachment resulting from the long and early separation of mother and child (Parke & Collmer, 1975). Recent studies have shown that extra stimulation of preterm infants is likely to result in faster weight gain (Solkoff, Yaffe, Weintraub, & Blase, 1969; White & Labarda, 1976) and more rapid neurological

development (Rice, 1977) than found in non-stimulated controls. The infant stimulation studies have not investigated the effects on maternal behaviour of participation in a stimulation programme. It seemed not unreasonable to suppose that such a programme carried out by the mothers, which involved them in more physical contact with their infants, might result in increased maternal competence and confidence, and a more positive maternal-infant interaction, possibly reducing the risk of child abuse. The interest of the current study was in the immediate effects of participation in intervention programmes carried out by the mothers, on infant irritability and on maternal behaviour. The subjects were normal preterm infants whose weight was appropriate to their gestational age.

Historically, investigators have been interested in the sequellae of premature birth since the latter half of the 19th century. As early as 1862 Little implicated premature birth as a cause of cerebral palsy, particularly spastic diplegia, a finding which was later confirmed by Freud (1968, cited in Davis & Tizard, 1975). In one of the earliest systematic studies, Rosanoff and Inman-Kane (1934) found that premature infants had a higher incidence of mental retardation than their fullterm counterparts.

By the 1950s some of the specialized techniques that have by now become standard practice in intensive care nurseries, were becoming available. In a 10-year follow-up study of premature infants born between 1947 and 1953, a period coincident with the discovery that high ambient oxygen levels (>60%) were the cause of retrolental fibroplasia (Gordon, 1954) and the consequent reduction in oxygen levels, Lubchenco, Delivoria-Papadopoulos, Butterfield, French,

Metcalf, Hix, Danick, Dodds, Downs, and Freeland (1972) compared the outcomes of children born before and after September, 1950. The study showed an increased survival rate as well as a reduced incidence of retrolental fibroplasia after that date. The overall rate of handicaps remained the same, however, while the rate of neurosensory hearing loss increased, possibly because of the use of streptomycyn which became widespread at this time.

Until the early fifties it was common practice to withhold feedings for up to 72 hours after birth in cases of prematurity; this practice has been implicated in the intellectual deficits frequently found among low birthweight children. In the sample of Lubchenco et al. (1972) 43% of the children had IQs below 90, compared to the 30% expected in the general population. If children with IQs over 90 who had learning problems are included among the intellectually handicapped, then only 30% of their sample can be considered normal.

Fitzhardinge and Ramsay (1973), in a follow-up study done in Montreal, found that their very low birthweight sample, (<1251 grams) born between 1960 and 1966, showed lower rates of handicap than did the sample of Lubchenco et al. (1972). They found retrolental fibroplasia in only 6% of their sample compared to Lubchenco's 16%, while they found major neurological defects in only 6% compared to the 32% found by Lubchenco and his colleagues. Sensorimotor hearing loss was similarly reduced. More recent studies put the incidence of hearing loss among preterm infants at 1 to 2% (Davis & Tizard, 1975; Stewart & Reynolds, 1974), about 10 times the incidence in the general population. It has been suggested that incubator noise is one etiological factor in hearing loss, since infants who spend longer in

incubators appear to be at greater risk for auditory impairment (Stennert, Schultz, Vollrath, Bruner, & Frauenrath, 1978). The samples of both Lubchenco et al. (1972) and Fitzhardinge and Ramsay (1973) showed that 43% of the children had IQs of less than 90. As the infants in Fitzhardinge and Ramsay's sample were born after the importance of adequate calories had become well established, it becomes evident that the cognitive delay so frequently found in preterm children cannot be only a function of low postnatal caloric intake. Of the children in Fitzhardinge and Ramsay's sample who were of school age at the time of the follow-up, 39% showed perceptual motor difficulties; most of these children were failing school or were in special classes.

As well as neurologic, cognitive and sensory impairments, preterm infants are at risk, after the original perinatal period, for a higher incidence of infections (respiratory, otitis media, and gastroenteritis) and for Sudden Infant Death Syndrome (Desmond, Wilson, Alt & Fisher, 1980). Littman and Parmelee (1978) reported that by the age of 9 months 80% of their sample of 126 preterm infants had experienced some type of serious medical or surgical problem, and the incidence of such problems correlated significantly with development at the age of two, as measured by the Gesell Developmental Schedules, and the Bayley Scales of Infant Development.

Of particular interest to the current study is the risk of child abuse and neglect, and of "failure to thrive", persistent growth retardation with no known organic cause, that threatens the preterm child. Studies of abused and neglected children have shown consistently that preterms are over-represented in this group. Shaheen and Barbero (1968), in their sample of 39 infants over 6 months of age, presenting

with "failure to thrive", found that 16, or 41%, had weighed less than 2500 grams at birth, whereas premature infants generally comprise about 7% of the population. Klein and Stern (1971), in a study carried out in Montreal, found that, in a sample of 51 battered children, 12, or 23.5% had been of low birthweight, whereas the overall rate of prematurity in the province of Quebec at the time of the study was 7%. Even adjusting for the higher rate of 9 to 10% found among women of low socioeconomic status, the figure of 23.5% remains significantly high.

In a recent study of the antecedants of abuse and neglect, Hunter, Kilstrom, Kraybill, and Loda (1978) assessed family psychosocial characteristics and infant factors which appeared to be predictive of abuse and neglect. The infant variables of importance included lower gestational age and birthweight, more congenital defects, hospital stays of more than 40 days, and less family contact during the hospital stay. In this study it was discovered that it was not enough to make possible unlimited visiting by the family to the baby during the hospitalization period. The families of the maltreated babies took the least advantage of the visiting privileges.

While the high incidence of prematurity found among abused and neglected infants and children is well established, the etiology of abuse in this population is still open to question. Inquiries into the causes of the greater susceptibility of preterms to abuse have been carried out in two main areas: characteristics of the low birthweight infant that make the task of caretaking more difficult and less rewarding than caring for a normal fullterm baby, and the parent-infant separation which has been an unavoidable result of preterm birth (Parke & Collmer, 1975).

Any or all of the possible sequellae of preterm birth that have already been discussed might well increase the difficulty of caring for the infant. Some of the immediate outcomes, such as feeding disturbances, irritability, visual and auditory handicaps, or immature and unattractive appearance may affect the parent-child relationship during the early months at home (Caputo & Mandell, 1970). A study by Frodi, Lamb, Leavitt, Donovan, Neff, and Sherry (1978) showed that the cry of the preterm infant is more autonomically arousing, and is perceived as more aversive by parents, than the cry of a fullterm infant. The subjects were parents of 5-month-old babies. The authors did not include information about the birth history of the subjects' babies. Zeskind and Lester (1978) were able to show that naive adults (non-parents) could differentiate the cries of low risk and high risk newborns. The cries of the infants at high risk were perceived as more aversive and less healthy than the cries of low risk infants. The arousing and aversive qualities of the cries of at risk infants, combined with their reported high level of irritability (Elmer, 1967) might contribute to uncontrollable aggression in the parents. A more recent study (Friedman, Waxler, & Yarrow, Note 2), however, did not find the cries of preterm infants to be uniformly perceived more negatively than the cries of fullterms. The cries of those preterms whose neonatal condition had been considered medium risk, were consistently rated more negatively than the cries of fullterms, and of low risk preterms. The cries of the low risk preterms were, however, frequently rated more positively than the cries of fullterms, suggesting that it is the medical risk level, rather than the fact of prematurity which contributes to the perceived aversiveness of the

preterm cry. This finding is consistent with the work of Zeskind and Lester (1978). The subjects in this study were mothers of children past infancy.

Low birthweight children may continue to be a disappointment to their parents after the period of infancy, because their development in motor, social and cognitive spheres is often delayed over the first two years (Wright, 1971). Their slower development of social responsiveness, their possibly delayed language development, their later learning difficulties, their greater likelihood of being hyperactive or accident prone, could all contribute to the burden and stress of raising a preterm child, and be factors in the high rate of parental abuse found among these children (Parke & Collmer, 1975).

The second factor that has proved of interest in investigating the low birthweight-abuse relationship is the customarily long separation of mother and infant during the postnatal period. Klaus, Kennell and their associates have demonstrated that events in that period may influence later maternal attachment behaviours, competence and confidence (Fanaroff, Kennell & Klaus, 1972; Kennell, Gordon & Klaus, 1970; Kennell, Trause & Klaus, 1975; Klaus, Jerauld, Kreger, McAlpine, Steffa & Kennell, 1972; Klaus & Kennell, 1976; Leiderman & Seashore, 1975; Leifer, Leiderman, Barnett & Williams, 1972). Seashore, Leifer, Barnett, and Leiderman (1972) found that their group of mothers who had not been permitted early contact with their babies were less confident in both instrumental tasks such as feeding and bathing, and social tasks, such as soothing, responding and showing affection, at one month post discharge. Separated mothers were more likely to hold their infants at a greater distance, and engage in less

physical contact, as well as less en face and talking behaviour, than the mothers who had been permitted early contact.

Of more immediate relevance to the preterm-child abuse relationship is the study of Fanaroff et al. (1972) which found that the maternal visiting pattern was predictive of "mothering disorders", including failure to thrive, battering, abandonment, and fostering. Mothers with a low visiting record, less than three times in two weeks, showed a mothering disorder rate of 23%, or nine out of 38 mothers, while the more frequent visitors (111) had an incidence of mothering disorder of only 1.8%. At the time of the study the mothers had almost unlimited access to the nursery. That these mothers visited so little supports the contention of Hunter et al. (1978) that it is not enough to offer unlimited visiting privileges. There appear to be some mothers of preterm infants who undergo voluntary separation.

The findings of these studies provide strong evidence that the amount of early maternal involvement with the newborn infant influences later maternal attitudes and skills. They do not, however, provide convincing evidence to support the premise that a sensitive period for the formation of maternal attachment exists, as suggested by Hales, Lozoff, Sosa, and Kennell (1977) and Kennell et al. (1975). According to Rutter (1979), this latter hypothesis seems implausible, if for no other reason than that adoptive parents, deprived of any neonatal experience, nonetheless seem to make close attachments to their children. He suggests that, rather than the separation itself, the damage done to parenting behaviours may stem from the helplessness and fear engendered by having an infant in intensive care. Caplan (1960) and Kaplan and Mason (1960) would add the feelings of failure in

having been unable to carry an infant to term, and the withdrawal from the child in the early days as a protection from too deep an investment in a baby who might not survive, as contributing factors to less than optimal mothering behaviours.

As many of the problems of survival of the preterm infant are well on the way to being solved, research interest has turned towards improving the longterm outlook for the survivors. Interventions have taken the form of increased sensory stimulation in a variety of modalities, in an attempt to prevent neurological and sensory deficits. The rationale for increasing such stimulation stems from two arguments. Firstly, it has been theorized that the rapid maturation seen in infant rats who have had extra handling (Denenberg, 1962; Levine, 1957) would also be apparent in human infants given similar treatment. The second argument has been that the preterm infant, spending his first days or weeks in an intensive care nursery, is living in a sensorily deprived environment (Rothchild, 1967) and that extra stimulation might make up for this deprivation. Cornell and Gottfried (1976) question the validity of this assumption, suggesting that the modern high risk nursery, with its personnel, activity, and equipment, offers a large and varied sensory experience. Whether sensorily deprived or not, the environment of the preterm infant is vastly different from the uterine environment on the one hand, and from that experienced by the healthy fullterm infant, who is usually in the home, with its sights, sounds, and social interaction, after only a very few days in hospital.

There have been two approaches to selection of the type of stimulation which might prove most beneficial to preterm infants. A number of researchers have tried to simulate the sensory experiences

of uterine life, attempting to replace the possible deprivation caused by the early expulsion from the womb. The fetus receives almost constant tactile, kinesthetic, vestibular, and auditory stimulation in the uterus, as a result of the mother's movements, the uterine walls and the amniotic fluid, the placenta, his own body movements, and the sounds of the mother's heartbeat and digestive processes (Vaughan, 1969). Investigators bent on partially replacing intrauterine stimulation have variously offered stroking and rocking (Hasselmeyer, 1964), oscillating waterbeds (Korner, Kraemer, Paffner, & Cosper, 1975), motorized rocking hammocks which maintained the infant in a fetal position (Neal, 1968), and rocking waterbed accompanied by the tape of a heartbeat (Kramer & Pierpoint, 1976). Other investigators have employed types of stimulation that they have considered more typical of fullterm newborn experiences, such as extra handling (Rice, 1977; Rose, 1980; Scarr-Salapatek & Williams, 1973), tapes of the mother's voice (Katz, 1971; Segall, 1972), an enriched visual scene (Scarr-Salapatek & Williams, 1973), and social stimulation (Rice, 1977, Scarr-Salapatek & Williams, 1973). It has appeared to some investigators that, just as the respiratory and digestive systems alter their methods of functioning at birth, so would the sensory systems, resulting in the preterm infant needing forms of stimulation different from those experienced by the unborn fetus (Scarr-Salapatek & Williams, 1973).

The majority of the stimulation studies have been carried out in hospital and have investigated the immediate effects of stimulation, either multimodal or unimodal, while the infant was still in the nursery. In one of the earliest studies of multimodal stimulation, Hasselmeyer (1964) gave her high stimulation group 260 minutes a day

of extra stroking, handling and rocking, beginning between the 7th and 14th days, and continuing for 14 days, while her low stimulation group received 95 minutes a day of the same type of stimulation. She found that the high stimulation group showed more quiescent behaviour, while the low handling group cried more. There was no difference in weight gain between the two groups. It is difficult to compare this study with subsequent studies, as even Hasselmeyer's low handling group received more extra stimulation than the experimental groups did in most other studies, with the exception of those who were given continuous vestibular stimulation on waterbeds (Korner et al. 1975). Another multimodal intervention was investigated by Kramer and Pierpoint (1976). They combined the vestibular stimulation of a rocking waterbed with the auditory stimulation of a taped heartbeat and the mother's voice, played during the rocking. The stimulation was administered for one hour prior to each feeding, as long as the infant remained in the incubator. Their experimental subjects showed significantly greater weight gain, and greater head circumference growth. In a study of tactile kinesthetic stimulation, involving stroking of the body and flexing of the extremities for 15 minutes an hour for 4 consecutive hours over a 10-day period, White and Labarda (1976) found that the experimental infants gained more weight more rapidly than the control infants. Their formula intake was significantly higher, and the number of feeds a day was lower.

A number of studies have investigated the effects of increasing stimulation in only one mode. Among the unimodal interventions, the early study of Neal (1968) deserves note. She devised a motorized hammock, providing vestibular stimulation, in which her experimental

infants were rocked for 30 minute intervals, three times a day, from the 5th postnatal day until the infant reached 36 weeks postconceptional age, a period which ranged from 4 to 8 weeks. Her experimental infants showed greater weight gain and higher scores on the Graham Rosenblith Test (Rosenblith, 1961), including better motor performance, and visual and auditory performance, at the end of the stimulation programme. In a study of tactile stimulation, Solkoff and Matuszak (1975) showed that infants receiving extra handling over a 10 day period made greater gains on 11 items of the Neonatal Behavioral Assessment Scale (Brazelton, 1973) than did nonhandled controls. There were, however, only five infants in each group, and no statistical analysis was undertaken. In the only unimodal study offering continuous, rather than periodic stimulation, Korner et al. (1975) looked at the effects of vestibular stimulation. They placed their experimental infants on oscillating waterbeds from the 6th to the 13th day after birth. The only significant finding was that the experimental babies suffered fewer episodes of apnea.

Two studies have used auditory stimulation as the only form of intervention. Katz (1971) exposed preterm infants to a taperecording of the mother's voice for 5 minutes, six times a day at 2-hour intervals, for a duration of from 4 to 6 weeks. She found that the experimental infants showed greater maturation on the Graham Rosenblith Test, and better visual and auditory functioning, at 36 weeks conceptional age. In a similar study, Segall (1972) exposed preterm infants to tapes of the mother's voice and found an increased responsivity to auditory stimuli, measured by cardiac acceleration to white noise. The experimental infants, at 36 weeks conceptional age,

showed greater cardiac acceleration and faster habituation than the controls. They also showed greater heart rate deceleration, considered an index of attention, to the sound of a female voice.

The studies discussed thus far have been concerned with the immediate benefits to the infant while still in the hospital nursery. There have also been a few longterm follow-up studies investigating the duration of the benefits of early enrichment. In an early study which included only 10 infants and was not statistically analyzed, Solkoff, Yaffe, Weintraub, and Blase (1969) gave very low birthweight infants tactile stimulation of 5 minutes every hour over a period of 10 days, commencing within 12 hours of delivery. The handled infants regained their birthweight faster, and were found to be more active. This was the first of the stimulation studies to look for longterm benefits. At 7 months postdischarge the infants were examined by a pediatrician, and tested on the Bayley Scales of Infant Development. The five handled children were developing normally, while only one of the five non-handled infants was considered normal. This, and the previously cited Solkoff study (Solkoff & Matuszak, 1975), while frequently cited in the literature, are of limited usefulness because of the size of their samples.

In a study offering both in hospital and home stimulation, Scarr-Salapatek and Williams (1973) provided visual, tactile-kinesthetic, and auditory stimulation for their group of 15 experimental infants during their hospital stay, followed by weekly home visits by a social worker, for 1 year. The social worker demonstrated child care procedures, and brought appropriately stimulating toys. Although the control group of 15 infants were originally somewhat superior in weight and medical

condition, and behaviourally more mature as measured by the Neonatal Behavioral Assessment Scale, by the end of the 4 weeks of stimulation, the experimental infants were found to be ahead on almost all items of the scale. The weight gain was significantly higher for the experimental group. At the end of the first year, the experimental group averaged 10 IQ points higher than the control group, as measured by the Cattell Infant Intelligence Scale. The mean IQ of the experimental infants was 95, while that of the controls was only 85. It is impossible to assess the relative contribution of the hospital stimulation programme and the home visiting regime, to this favourable outcome. The study is of interest, however, in that it attempted to involve the mothers directly in home stimulation of their infants. Powell (1974) also endeavoured to influence maternal behaviour. She had nurses give one of her experimental groups 40 minutes of extra handling each day, from the 3rd postnatal day until the birthweight was regained, and thereafter 20 minutes a day until discharge from the hospital. The second experimental group consisted of infants whose mothers were encouraged to visit their babies and handle them in the nursery. Of the 11 mothers in this group, only four handled their babies as much as 10 minutes a day, so it is evident that the infants in the maternal group received considerably less stimulation than those in the group handled by nurses. For analysis, the maternal data was combined with that of the control group. The high handling group had higher Bayley mental and motor scores at 4 months corrected age, a difference which was no longer evident at 6 months. At 6 months, however, the experimental infants had higher scores on the Bayley Infant Behaviour Record. There was no apparent effect on maternal

behaviour resulting from the opportunity to visit and handle their babies in hospital. Only one study (Rosenfield, Vohr, Cowett, & Oh, 1977, cited in Masi, 1979) has attempted to measure an effect of extra stimulation of preterm infants on maternal behaviour. Parents of stimulated babies increased their visiting frequency, while parents of control babies decreased their visits during the hospital stay.

A very recent study (Rose, 1980) has shown that preterm infants who had received multimodal stimulation (massage and rocking, with visual and auditory components) during the hospital period were indistinguishable from fullterm infants in performance on a visual recognition memory task at 6 months corrected age. The infants who had not received the intervention were found to show visual recognition if the familiarization period was lengthened, suggesting a deficit in the speed of information processing.

The study that has involved mothers most intimately in the stimulation of their preterm infants is that of Rice (1977). It is unique in that mothers carried out 75% of the stimulation, a combination of systematic massage, rocking, and social stimulation, themselves, and that the programme was begun only when the infant was discharged from the hospital. The mother was instructed in the massage technique by a nurse who visited daily over the infant's first month at home. She demonstrated the technique to the mother and then supervised the mother's performance. The mother was then requested to carry out the procedure twice more during the day. Each of the 15 infants in the experimental group was supposed to have received four 15-minute treatments a day for 30 days. At follow-up, when the infants were 4 months chronological age, the experimental infants showed greater

weight gain, and more mature neurological development, as assessed by the disappearance of reflexes which normally are no longer apparent in fullterm infants of 4 months, and the appearance of reflexes that are normally evident in fullterm infants of that age. The experimental infants also had significantly higher scores on the mental scale of the Bayley. The higher scores, however, were no longer evident at 16 months (Rice, Note 3). Rice discussed the possible influence of the intervention on maternal-infant interaction, but no quantitative measurements were taken of either maternal or infant behaviours.

The combined evidence of the studies cited shows that early sensorimotor stimulation has proved beneficial to low birthweight infants. The shortterm studies, those wherein the infants received a stimulation programme in the hospital and the effects were measured at or about 36 weeks GA, indicate more rapid weight gain, less irritability, superior scores on infant behavioural scales, and greater responsivity to auditory stimuli. The longterm studies, those which measured effects of stimulation on infant behaviour at 4, 6, or 12 months, have shown more rapid neurological maturation and superior performance on a number of cognitive measures. None of the studies, however, was designed to investigate the effects of the interventions on maternal behaviour.

The current study was part of a larger investigation of longterm benefit of tactual-kinesthetic stimulation of preterm infants in the first month at home. The purpose of this part of the investigation was to compare the effects on infant irritability and maternal behaviour of the Rice (1977) massage and rocking programme, with a programme involving equivalent handling and an identical rocking

technique. It was expected that there would be no significant differences in the effects of massage and handling and that both stimulation programmes would result in less irritable, more alert, and heavier infants, and in mothers who were more confident, and more responsive, than those in a maternal attention control group, in which the infants received no sensorimotor stimulation intervention. The control group mothers were asked to spend time, equivalent to the time spent by the experimental mothers in performing the stimulation programme, in relaxing with their infants, not pursuing any caretaking task. The design was such that any comparison between the massage and handling groups could be interpreted as a test of the systematic massage per se, while any comparison between the control and intervention groups could be interpreted as a test of the general effects of the sensory stimulation programmes on the variable in question.

No systematic attempt has yet been made to assess the effects of participation in a stimulation programme on maternal behaviours, although many authors have alluded to the possibility of their existence. Most of the studies cited have reported faster weight gain in stimulated infants, an effect which may have an enduring positive influence on maternal attitude. Faster weight gain may lead the mother sooner to perceive her infant as normal and healthy, thereby lowering her anxiety and increasing her confidence (Masi, 1979). Some studies (DiVitto & Goldberg, 1979; Klaus & Kennell, 1976) have shown that mothers of preterm babies hold them at a greater distance from their bodies, cuddle, look at them and talk to them less, and hold them less often in the en face position, than do mothers of fullterm infants. It was thus predicted, in the current study, that an

intervention that involved the mother in intimate physical contact with her infant, and which encouraged social stimulation, might contribute to the development of confidence and responsivity in the mother, and the reduction of irritability and increase of visual alertness in the infant. Hasselmeyer's (1964) high stimulation group showed more quiescent behaviour, while her low stimulation group cried more. White and Castle (1964) have shown that newborns who received extra handling over the newborn period, showed more visual attention over the period from $1\frac{1}{2}$ to $3\frac{1}{2}$ months. These studies indicate that stimulation interventions can be expected to result in reduced irritability and increased alertness.

In the current study, information about maternal and infant behaviours was obtained by observing both members of the pair in a situation of mounting stress for the infant. The infant was observed for state, and levels of visual alertness. The behaviours chosen for infant observation were adapted from the work of Korner and Thoman (1970). The mother was observed for such behaviours as vocalizations to the infant, looking at him face to face, ways of holding him, and methods of soothing him when fussing or crying. The maternal behaviours chosen for observation were adapted from those studied in a number of investigations of mother-infant interaction (Beckwith, Cohen, Kopp, Parmelee, & Marcy, 1976; Frederickson & Brown, 1975; Richards & Bernal, 1972).

Subjective information about the mothers' perceptions of infant irritability, and of change in patterns of infant state over the first month at home was obtained by having the mothers keep two 24-hour diary checklists of infant activities. One was kept over the first 24 hours

of the programme, and one over the last 24 hours. The checklist was adapted from the one developed by Bernal (1972) in her study of infant crying during the first 10 days of life. Further subjective data about changes in attitudes to infant crying was obtained by having the mothers rate taped cries of infants, three fullterm and three preterm, on the Zeskind and Lester (1978) scales, at the beginning and end of the study. As well, each mother was asked to rate her level of confidence in her mothering ability, and her perception of how much her baby cried.

It was hypothesized that by the end of the study, the infants who received the stimulation programmes would show a greater weight gain, would prove less irritable and show more visual alertness during the observation periods, and would be perceived as less irritable in the subjective reports by the mothers. It was expected that the mothers in the treatment groups would be observed to vocalize more to their infants, show more en face behaviour and use more effective soothing behaviours, than mothers of infants in the control group. It was also expected that they would perceive the taped cries of infants less negatively than mothers of control babies, and as less negative over time. A further question regarding the baby cries was addressed: whether the whole sample of mothers differentiated the cries of preterm babies from those of fullterm babies.

Method

Subjects

Thirty normal preterm infants, hospitalized in the Neonatal Intensive Care Nursery of the Jewish General Hospital, Montreal, and their mothers, served as subjects. Criteria for inclusion in the study consisted of: gestational age of 36 weeks or less, with a birthweight within two standard deviations of the mean for gestational age (Usher & McLean, 1969); no congenital anomalies, or serious medical condition other than the immediate difficulties of prematurity, such as respiratory distress syndrome (RDS); residence within a 25 mile radius of the hospital; and maternal ability to communicate in either English or French. Infants were assigned to one of three groups: the Rice Infant Sensorimotor Stimulation Group (RISS); the Handling, Rocking and Social Stimulation Group (HRS); or to the maternal attention control group which was termed the Weekly Weigh In Group (WWI). Infants in the middle range of gestational age (31 to 34 weeks) were randomly assigned as they became available, to the three groups. In order, however, to match the triads for gestational age as closely as possible, it was necessary to assign some babies at the lower and upper extremes of the gestational age range without randomization. The maximum discrepancy in gestational age across triads was three-and-a-half weeks. Six of the ten triads had a gestational age range of one week or less. In one case where there was a discrepancy between the due date estimated by the mother's recall of the date of her last menstrual period, and an Ultrasound test, the gestational age estimated by Ultrasound was used.

There was no significant difference between groups on any of the infant variables of interest. Table 1 presents these variables, which

Table 1

Selected Characteristics of the Infant Sample

Variables		Group RISS	HRS	WWI
Gestational Age	$\bar{X}$	31.2	32.0	31.5
(weeks)	s.d.	3.5	2.6	2.8
	range	25-36	26.5-35	25.5-35.5
Birthweight	$\bar{X}$	1828	1762.5	1636.5
(grams)	s.d.	612	500.8	453.7
	range	800-2720	940-2370	860-2600
1-min. Apgar Score	$\bar{X}$	6.3	5.7	6.5
	s.d.	2.4	2.6	1.5
	range	1-9	1-8	4-8
5-min. Apgar Score	$\bar{X}$	8.5	8.7	8.3
	s.d.	1.5	1.1	1.1
	range	5-10	6-10	6-10
Respiratory	$\bar{X}$	1.9	1.6	1.7
Distress Score	s.d.	.8	.6	1.1
	range	1-3	1-2.5	1-4
Days in Hospital	$\bar{X}$	34.3	38.6	47.3
	s.d.	24.4	29.5	37.4
	range	14-86	10-104	5-145
Sex	M	5	5	6
	F	5	5	4
Number with Siblings				
< 6 yrs.		3	4	1
> 6 yrs.		1	2	1

include: gestational age (GA); birthweight; 1- and 5-min. Apgar scores; a score for the level of RDS (as measured on a four-point scale of 1=none, 2=mild, 3=moderate, 4=severe); number of days spent in hospital; sex; number of infants with siblings under 6 years of age, and the number with siblings over 6 years. Relevant source tables are presented in Appendix A. Kruskal-Wallis H values for tests of group differences in 1-min. Apgar scores, 5-min. Apgar scores, and RDS rating were .39, .84, and .65 respectively.

To provide an indication of the level of functioning of the infant at the time of discharge, infants were assessed on the Brazelton Neonatal Behavioral Assessment Scale (NBAS) (Brazelton, 1973) within two days of discharge from the hospital, by one of two trained assessors. The NBAS is a behaviour instrument which allows for identification of an infant's behavioural repertoire and organization, describing his functioning in four dimensions, or clusters: interactive processes, motoric processes, organization processes in state control, and organization processes in physiological response to stress (Als, 1978). The scale consists of 27 items, measuring behaviour in the four dimensions, and 20 elicited reflex responses. There were no significant differences between groups on any of the four NBAS clusters. Each cluster, which is made up of a number of NBAS items, gives the infant a score on a three-point scale (1=superior, 2=adequate, 3=worrisome. The cluster scores were analyzed by the Kruskal-Wallis One Way Analysis of Variance by Ranks. Table 2 displays the mean cluster scores for each group and the Kruskal-Wallis H values.

Table 3 presents information about selected maternal variables, including age; education; her family unit (whether a single parent or

Table 2

Mean Scores and Kruskal-Wallis H Values for NBAS Clusters

NBAS Cluster	Group			H(2)
	RISS	HRS	WWI	
Cluster I (Interactive)	1.9	2.3	2.3	1.45
Cluster II (Motoric)	2.1	2.2	1.8	.16
Cluster III (State Control)	2.1	2.0	2.1	.16
Cluster IV (Physiological Response to Stress)	1.4	1.5	1.4	.03

Table 3

Selected Characteristics of Mothers in the Sample

Variables		Group RISS	HRS	WWI
Maternal Age	$\bar{X}$	26.3	29.1	27.1
	s.d.	4.9	3.8	6.1
	range	20-37	23-34	19-39
Maternal Education	$\bar{X}$	11.1	12.0	12.1
(years)	s.d.	2.2	1.8	3.7
	range	8-16	9-15	8-20
Family Unit	Two Parent Family	9	10	7
	Single Parent	1	0	3
Ethnic Origin	Caucasian	7	5	8
	Black	3	3	2
	Oriental	0	2	0
Parity	One Child	6	4	8
	> One Child	4	6	2
Maternal Smoking Scale	$\bar{X}$	1.6	1.4	1.8
	s.d.	.8	.8	.9
	range	1-3	1-3	1-3
Maternal Alcohol Scale	$\bar{X}$	1.3	1.2	1.5
	s.d.	.7	.4	.6
	range	1-3	1-2	1-3
Maternal Visiting Scale	$\bar{X}$	4.4	4.6	4.4
	s.d.	.7	.6	.6
	range	3-5	3.5-5	3.5-5

living with the father of the infant); ethnic origin; parity; smoking behaviour; alcohol consumption; maternal visiting behaviour. Nineteen of the 30 women, or 64%, reported that they did not smoke at all throughout the pregnancy. Consumption of tobacco during pregnancy averaged less than five cigarettes a day (as measured by a five-point scale of 1=none, 2=1-5 cigarettes a day, 3=10 or more cigarettes a day, 4=1 package or more a day, 5=2 packages or more a day). Consumption of alcohol during pregnancy averaged less than one drink a week (as measured on a seven-point scale of 1=none, 2=one drink a week, 3=3-4 drinks a week, 4=one drink a day, 5=2-3 drinks a day, 6=4-5 drinks a day, 7=six or more drinks a day. Eighteen, or 61% of the women claimed to have consumed no alcohol. Maternal visiting of the infant in hospital (as measured on a five-point scale where 1=once a month, 2=biweekly, 3=once a week, 4=three times a week, 5=daily) was uniformly high across the groups, averaging almost once a day, with no mother visiting less than once a week. Among the families where the two parents were living together, paternal visiting was almost as frequent as maternal. There were no significant differences between groups on any maternal variable. Source tables of analyses of variance of maternal age and years of education may be found in Appendix A. Kruskal-Wallis $\underline{H}$ values for tests of differences between groups in maternal tobacco consumption, maternal alcohol consumption, and maternal visiting were 1.04, 1.70, and 1.31 respectively. The mean ratings of paternal visiting for the two experimental groups and the control group were 4.4, 3.9, and 4.3 respectively. The Kruskal-Wallis $\underline{H}$ value was .58.

Stimulation Programmes and Compliance

The Rice Infant Sensorimotor Stimulation Programme (RISS) consists of 10 minutes of precise, systematic massage, providing a sequential, cephalocaudal progression of stroking and massaging of the infant's nude body, followed by swaddling and 5 minutes of systematic rocking. The massage portion of the programme provided the tactile component. The rocking provided the vestibular stimulation. The massage was carried out for 5 minutes with the infants lying supine on their mothers' laps, or on a table, and for 5 minutes lying prone. The mothers were encouraged to "make eye contact and talk to your baby" while the infant was in the supine position. This provided auditory and social stimulation.

The Handling, Rocking and Social Stimulation Programme (HRS) consisted of unsystematic stroking and patting of the infant's nude body, eye contact and vocalization. The HRS treatment continued for the same length of time as the RISS, with the same turning from the supine to the prone position, and was followed by the same swaddling and rocking. The instructions to all the mothers in the experimental groups were identical, except for the specific details of the two types of tactile stimulation. Instructions to the mothers in both experimental groups, as well as instructions to the mothers in the WWI control group, appear in Appendix B.

The mothers' compliance in carrying out the programmes was estimated by having them record each treatment given, on a programme diary, a copy of which appears in Appendix C. As well, they completed a compliance questionnaire which touched on questions of satisfaction, convenience, frequency of treatment, and expectations of benefit.

This questionnaire was adapted from one developed by Sackett and Haynes (1976). A copy of the questionnaire appears in Appendix D, with the scores for each answer.

Pre- and Posttreatment Measures

Maternal rating scales. At the time of recruitment, while the infant was still hospitalized, the mother rated her confidence in her caretaking capacity on a five-point scale (1=Very Worried, 2=Moderately Worried, 3=Somewhat Confident, 4=Moderately Confident, 5=Very Confident). At the same time she rated her expectations of her infant's crying behaviour, again on a five-point scale (1=Very Little, 3=Moderate Amount, 5=A Great Deal). These scales were presented again after a month, to get a measure of change in confidence over time, and to compare expectations of amount of crying to perceptions of actual crying, after one month's experience of living with the infant.

Maternal ratings of taperecorded infant cries. A taperecording of six infant cries, three fullterm and three preterm, was presented to each mother at the beginning of the study. The cries had been recorded in hospital nurseries, just prior to discharge, while the infant was undergoing routine medical examination. The taped cries were presented in 12 20-sec. segments, interspersed with 20-sec. periods of silence, in ABBABA-ABABBA order. Each cry was presented twice. On the first presentation the mother was asked to rate it on the first four characteristics of eight rating scales, and on the second presentation, she rated it on the last four characteristics. The scales, devised by Zeskind and Lester (1978) consisted of Urgent versus Not Urgent, Grating versus Pleasing, Sick versus Healthy, Arousing versus Soothing, Piercing versus Not Piercing, Discomforting versus Comforting, Aversive

versus Non-aversive, Distressing versus Non-distressing. The ratings on these scales served as the pretest measure of each mother's response to infant cries and her sensitivity to any differing qualities of the cries of fullterm and preterm infants. A second presentation of the tape-recording provided data for investigating any changes in her perception of the cries after a month at home with her own infant. The mothers entered their ratings in the 12 page booklets provided, one page for each cry segment. Appendix E presents a copy of the instructions given to the mothers, and of the rating scales.

24-hour checklist of infant activity. Each mother was asked to record her infant's behaviour on a checklist, every 15 minutes, over the first 24 hours the baby was home. The infant behaviours of interest were: crying in the crib; crying out of the crib; awake, not crying; feeding; sleeping. It was impressed upon each mother that if she was sleeping she could safely assume that the infant was also sleeping, and that she might check the sleeping column for the time that she had slept. The checklist was adapted from one developed by Bernal (1972) for her study of crying during the first 10 days of life. The mother was asked to complete a second 24-hour checklist over the last day of her participation in the study, so that a picture of any changes in the infant's pattern of behaviour over the first month at home might emerge. A copy of the checklist appears in Appendix F.

Observation schedule. At each of the five weekly home visits the mother-infant dyad was observed over an 8-minute period. The first 5 minutes involved increasing stress for the infants: 1 minute clothed, and held by the mother; 1 minute being undressed by the mother; 1 minute nude on the experimenter's lap; 1 minute being weighed, nude on the

scale; and a further minute on the scale with a Kleenex held over their eyes. The mother was then asked to take the infant, and the behaviours of both members of the dyad were recorded for a further 3 minutes. Over the 8-minute period samples of maternal and infant behaviours were recorded at 30-second intervals.

The infant behaviours observed were adapted from a scale devised by Korner and Thoman (1970) for their study of visual alertness of neonates as evoked by maternal care. The behaviours observed included: sleeping; drowsy with glassy unfocussed eyes; awake and quiet with bright eyes open briefly; awake and quiet with bright eyes but no directed attention; awake and quiet with bright eyes focussed on a particular person or object; awake and quiet with bright eyes scanning; awake and fussing; crying. For the analysis of the data it was decided to combine the drowsy data with the eyes open briefly data under one category of "Drowsy", as reliability of observations proved higher with the behaviours combined than with either behaviour separately. Similarly, for analysis, it was decided to combine the three visually alert behaviours: bright eyes with no directed attention, bright focussed eyes, and bright eyes scanning, under one category of "Visually Alert", in the interests of reliability of observations.

The maternal behaviours recorded included: hovering close to the scale or the experimenter; verbalizing anxiety; looking at the baby's eyes or face; vocalizing to the infant; smiling at the infant; swaddling the infant; patting or stroking him; rocking him in her arms; lifting him to her shoulder; holding him in a cradled position, at her shoulder, on her outstretched arm, or on her lap; walking the baby; giving him a pacifier; kissing him. Some behaviours, such as

verbalizing anxiety, smiling, swaddling, walking the baby, giving a pacifier, and kissing, occurred so rarely during the observations that it was decided not to include them in the analysis. Hovering close to the scale or the experimenter occurred frequently with some mothers, but others were inclined to leave the room while the experimenter had charge of the infant, to pursue some household task. It was therefore decided to drop the "hovering" category from the analysis. A copy of the observation data sheet appears in Appendix G.

Reliability of observations was checked by having a developmental psychologist accompany the experimenter, once in the series of five visits. Because of scheduling difficulties this was achieved for only 23 of the 30 mother-infant dyads. Reliability checks were made most frequently on visit four (16), with one being made on visit three, and six on visit five. Interrater reliability of infant behavioural observations was found to have a mean correlation of $\underline{r}=.83$, with a range of .61 to .98. When calculated as Percent Agreement on target behaviours, the range was from 54.2% for Drowsy, to 87% for Visually Alert. Percent Agreement on maternal behavioural observations ranged from 70% for Vocalizes to Baby, minutes one and two, to 97% for Cradles Baby, minutes six to eight. The reliability data are presented in Table 4.

Procedure

The mothers and infants were recruited to the project while the infants were still in hospital, usually while the mother, or both parents were visiting their baby. Once the maternal consent form was signed (see Appendix H) the mother was asked for demographic information about herself, and the father of the child if he was still

Table 4

Interrater Reliability

Infant Behaviour Min. 1-8	Percent Agreement	Maternal Behaviour	Percent Agreement
Sleeping	85.4	Looks at Baby, Min. 1-2	80.0
Drowsy	54.2	Looks at Baby, Min. 6-8	71.2
Visually Alert	87.0	Vocalizes to Baby, Min. 1-2	70.0
Fussing	70.7	Vocalizes to Baby, Min. 6-8	76.3
Crying	77.4	Pats, Strokes or Rocks Baby, Min. 6-8	94.9
		Holds Baby at Shoulder, Min. 6-8	85.0
		Cradles Baby, Min. 6-8	97.0
		Holds Baby on Lap, Min. 6-8	96.2

involved with her and their infant. Information was also acquired about tobacco and alcohol consumption during pregnancy, and the visiting frequency of both parents to the baby in the hospital. Appendix I contains a copy of the Parental Information Questionnaire. At the time of recruitment, information about the pregnancy, delivery, and the medical status of the infant was obtained from the hospital record. A copy of the Infant Information Sheet appears in Appendix J. Arrangements were made to have the infant assessed on the NBAS within two days of discharge from hospital. In three cases, however, discharge came unexpectedly soon, and the infants were assessed on the NBAS at home, the day after their arrival.

Within 72 hours of the infant's discharge from hospital, the trainer, an experienced social worker who had been trained in the RISS technique, visited the homes of all families in the study. Mothers in the RISS experimental group were instructed in the RISS technique. Mothers in the HRS experimental group were instructed in its requirements. The trainer made two visits on consecutive days to the mothers in the experimental groups. Those mothers were asked to do the assigned treatment four times a day, and to record the times they did it on the programme diary provided. The mothers in the WWI group were visited by the trainer only once, at which time they were requested to take at least four 10-minute periods during the day to relax with their infants when not involved in caretaking activities. At her first visit, the trainer gave the mothers in all three groups the 24-hour checklist, to be filled out over the following 24-hour period. Mothers in all three groups were also given the Programme Diary, to commence recording the treatments given the infants.

On the day following the trainer's second visit, the experimenter visited the mother and baby at home. She weighed the infant and observed and recorded maternal and infant behaviours. On the first home visit, after completing the observations, the experimenter re-demonstrated the appropriate stimulation technique to the mothers in the experimental groups, and then watched while the mother performed it. Each mother was asked to perform it twice more that day, and four times on days when there was no visitor.

On the day of the experimenter's first home visit, the taperecording of infant cries was played to the mother, and she was asked to rate the cries in the booklet provided. At the time of the last home visit the routine of the behavioural observations was repeated. As well, the taperecording of cries was re-rated, the mother re-rated her level of confidence in her caretaking ability, and her perception of the amount of crying her infant engaged in. The second 24-hour checklist, which the mother had completed over the day prior to the last visit, was collected. Each mother was also required to complete a questionnaire concerning her compliance and satisfaction with the programme she had followed with her baby.

As well as the first and last home visits by the experimenter, which occurred on approximately the third and 32nd post-discharge days, weekly visits were paid on the 11th, 18th and 25th days, for weighing and behavioural observations. In all, each experimental dyad received seven home visits, two from the trainer and five from the experimenter. The trainer demonstrated the treatment and then observed the mother's technique. At each of her visits, the experimenter observed the mother's technique, demonstrating only if she appeared to

be having any difficulty. This never happened beyond the second visit. Therefore, each baby in the experimental groups was observed receiving the prescribed stimulation on nine occasions, while the mother recorded treatments given when no visitor was present, usually a further 107.

Results

The first analysis undertaken was of the Maternal Compliance data, analyzed by the Kruskal-Wallis One Way Analysis of Variance by Ranks. There were no significant differences between groups for the Compliance Questionnaire. The means for the RISS, HRS and WWI groups were 23.3, 24.6, and 23.9 respectively, Kruskal-Wallis $\underline{H}(2)=.60$. The Programme Diaries showed that there were no significant differences between groups in the percentage of required treatments that were performed. The mean percentages for the RISS, HRS, and WWI groups were 88.3, 69.5, and 78.8 respectively, Kruskal-Wallis $\underline{H}(2)=4.26$. The Programme Diary data, however, are difficult to interpret, because seven diaries were said to be lost, or were not maintained. One diary was missing from the RISS group, four from the HRS group, and two from the WWI group.

To verify that the first five minutes of the behavioural observations constituted a period of increasing stress for the infants, the Friedman Two-Way Analysis of Variance by Ranks was applied to the cry data of the first 5 minutes of observations of Visits 1 and 5 combined. The results were significant, $\chi^2(4)=72.76$, $\underline{p}<.001$. Subsequently Wilcoxon Matched Pairs Signed Rank Tests were applied to the same data, with the result that Minute 5 was significantly more productive of crying than Minutes 4, 3, 2, and 1; Minute 4 produced significantly more crying than Minutes 3, 2, and 1; Minute 3, produced more crying than Minute 1. (See Table 5). To demonstrate that the infants were rapidly soothed in Minute 6, when their mothers retrieved them from the scale, the combined crying behaviour observed during Visits 1 and 5, over Minutes 5 and 6 was compared by the Wilcoxon

Table 5

T Values of Wilcoxon Matched Pairs Signed Rank Tests of Crying Observations, Minutes 1 Through 5, Visits 1 and 5 Combined

	Min. 1	Min. 2	Min. 3	Min. 4	Min. 5
Min. 1		2.5(6)	2.5(9)*	0(26)**	0(29)**
Min. 2			14.5(11)	0(25)**	0(29)**
Min. 3				5.5(23)**	0(29)**
Min. 4					39(22)**

Note. Numbers in parentheses indicate n for each test.

* $p < .02$

** $p < .01$

Matched Pairs Signed Rank Test. There was significantly less crying during Minute 6, $T=4.5$, $n'=27$, $p<.001$. The mean crying score for Minutes 5 and 6 respectively were 1.6 and .5. There was significantly more crying observed during Minute 5 on Visit 5, than on Visit 1, when compared by a t-test for related measures, $t(29)=1.90$, $p<.05$. Figure 1 illustrates the increase in stress and the rapid soothability of the infants.

Separate Analyses of Variance (ANOVA) were then carried out on infant behaviours observed during the first home visit; these showed no significant differences between groups. Subsequently Analyses of Covariance (ANACOVA) were calculated on the observational data of the fifth and last home visit, with the pretreatment behavioural data covaried out. The RISS group was significantly more drowsy than the WWI controls, $F(2,26)=3.46$, $p<.05$. The Scheffé test, ($S=2.32$) indicated that there was a significant difference between the RISS and WWI groups, but no significant differences between the HRS group and either of the other two. The RISS group's greater sleeping time approached significance, $F(2,26)=2.62$, $p<.10$. Although the RISS group showed significantly less Eyes Open, No Scanning behaviour than the controls, $F(2,26)=4.16$, $p<.05$, scanning data, or lack of it, cannot be considered valid, as interrater reliability could not be obtained for this behaviour. When all Visually Alert measures were combined, rater reliability was strong (87% agreement), and the RISS group continued to show less of this behaviour than either of the other two groups, although the difference only approached significance, $F(2,26)=3.01$, $p<.10$. There were no significant differences between groups on measures of irritability. The data are summarized in

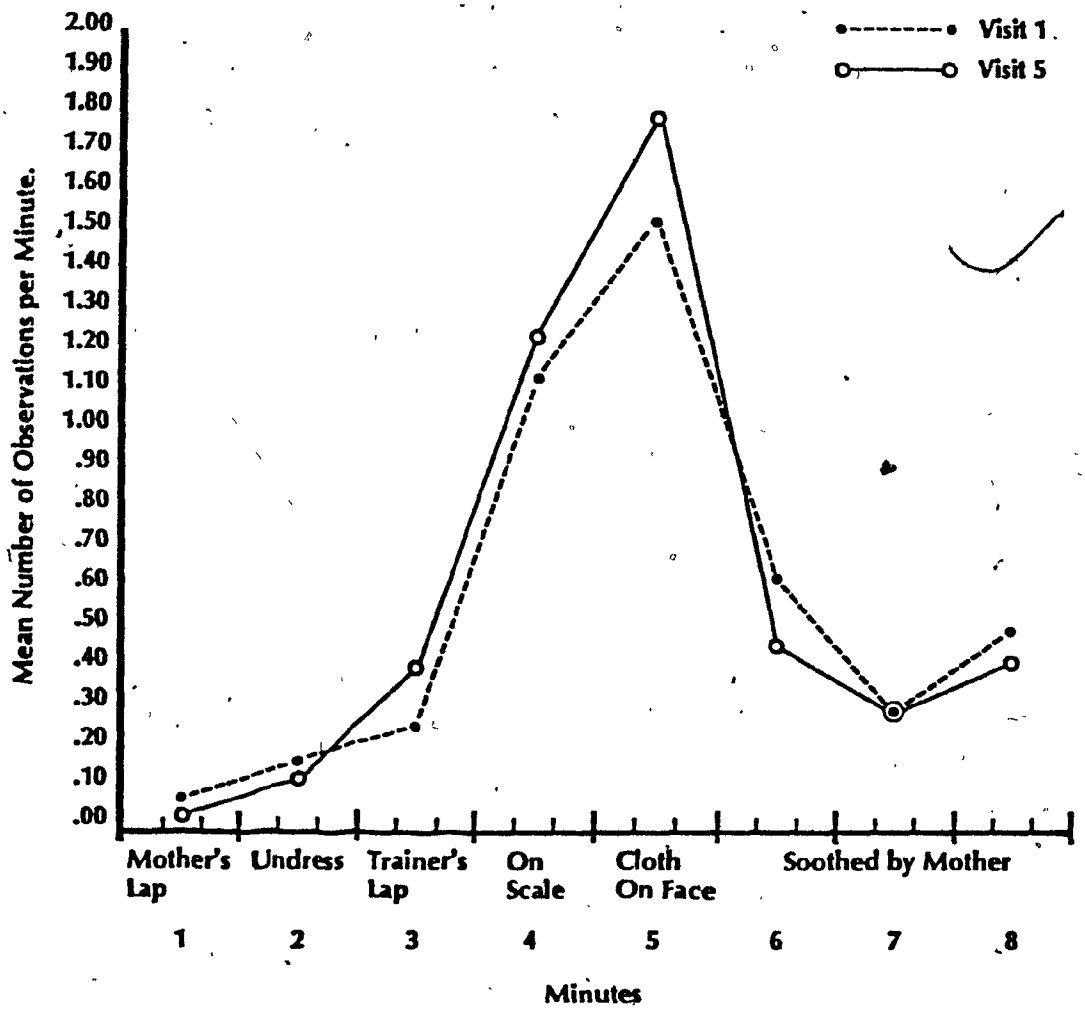

Figure 1. Mean number of crying observations per minute

Tables 6 and 7. Fussing and Crying data were further analyzed by ANACOVAs, for Minute 5, the peak minute of stress, and Minute 6, when the mothers began to soothe their babies. There were no significant group differences for either of these minutes.

The hypotheses that the treated babies would appear less irritable and show more visually alert behaviour during observation periods were not directly supported by the results. The result that the RISS infants were significantly more drowsy than the controls, however, suggests indirect support for the hypothesis, but only for the one stimulation group. To insure that the significant difference was not merely the result of chance behaviours observed on one day, ANACOVAs for the observations made on the fourth visit were calculated. While there were no significant differences in sleeping, drowsy, and visually alert data, group differences in visually alert behaviours again approached significance, $F(2,26)=3.24$, $p < .10$. The adjusted means for the RISS, HRS, and WWI groups were 6.0, 8.2, and 12.3 respectively.

Data from the initial 24-Hour Checklist, reporting the infants' behaviour over the first day at home, was analyzed by Analysis of Variance. Table 8 presents the results. The HRS group spent significantly more time awake, not crying, than did either of the other groups, $F(2,27)=3.34$, $p < .05$. There were no significant differences in sleeping, or crying. ANACOVAs calculated on the data of the final 24-Hour Checklist, which the mothers completed over the last 24 hours of their participation in the study, showed that the difference in awake, not crying behaviour had disappeared. Differences in crying and sleeping behaviour remained nonsignificant. The

Table 6

Mean Scores and F Ratios of ANOVAs of Infant Behavioural Observations, Visit 1

Behaviour	Group			F(2,27)
Min. 1-8	RISS	HRS	WWI	
Sleeping	4.3	2.4	4.4	.47
Drowsy	5.0	5.0	4.2	.26
Visually Alert	4.9	6.0	7.5	.83
Fussing	4.7	5.3	3.0	2.16
Crying	4.4	4.7	4.4	.02

Table 7

Adjusted Mean Scores and F Ratios of ANACOVAs of Infant Behavioural Observations, Visit 5

Behaviour	Group			F(2,26)
Min. 1-8	RISS	HRS	WWI	
Sleeping	3.0	.9	.8	2.62*
Drowsy	3.8	3.0	1.2	3.46**
Visually Alert	6.8	12.2	11.2	3.01*
Fussing	4.5	3.5	5.1	.89
Crying	5.5	4.2	4.8	.39

*p<.10

**p<.05

Table 8

Mean Percentages of 24-Hour Period Spent in Target Behaviours and F Ratios of ANOVAs of Initial Checklist

Behaviour	Group			F(2,27)
	RISS	HRS	WWI	
Crying	6.6	5.0	7.2	.64
Awake, Not Crying	12.6	20.5	14.4	3.84*
Sleeping	67.0	60.0	63.5	2.38

*p < .05

ANACOVA information appears in Table 9. The hypotheses that the treated babies would be less irritable and more alert were not supported by the data from the mothers' checklists.

To investigate changes in the infants' behaviours over the month of participation in the study, t-tests for related measures were carried out on the observational data of the three groups combined, comparing Visits 1 and 5, as well as on the initial and final checklists. At the final visit the babies slept significantly less, $t(29)=2.20$, $p<.05$; they were significantly less drowsy, $t(29)=3.38$, $p<.01$, and they displayed significantly more visually alert behaviour, $t(29)=3.39$, $p<.01$. As Table 10 indicates, there were no significant differences over time in the global irritability measures. A comparison of the initial and final checklists shows that awake, not crying behaviour did not change significantly over the elapsed month. The infants were reported, however, to cry significantly more in the final checklist, $t(28)=3.87$, $p<.02$. The mean percentage of the day spent crying was 6.3 for the initial checklist, and 9.5 for the final checklist. They were also reported to sleep significantly less, $t(28)=2.73$, $p<.02$, with means of 63.2 and 58.8 for initial and final checklists, respectively.

The hypothesis that the experimental infants would show greater weight gain than the controls was not supported. There were no significant differences between groups in weight gained over the first month at home. The mean weight gain, in grams, for the RISS, HRS, and WWI groups was 1164, 1110, and 1002, respectively. An ANOVA on these data showed $F(2,27)=1.21$. An ANACOVA of weight gain with Day 1 weight as covariate was not undertaken because there was very little variability in the weight of the babies when they were discharged from

Table 9

Adjusted Mean Percentages of 24 Hour Period Spent in Target Behaviours and F Ratios of ANACOVAs of Final Checklist

Behaviour	Group			F(2,25)
	RISS	HRS	WWI	
Crying	8.9	10.2	9.3	.12
Awake, Not Crying	17.7	13.2	18.1	2.21
Sleeping	59.9	57.6	58.4	.05

Table 10

Mean Scores and t Values of Infant Behavioural Observations, Comparing Visit 1 to Visit 5

Behaviour Min. 1-8	Visits 1	5	t(29)
Sleeping	3.7	1.8	2.20*
Drowsy	4.7	2.7	3.38**
Visually Alert	6.1	10.0	3.39**
Fussing	4.3	4.4	.06
Crying	4.5	4.8	.39

*$p < .05$

**$p < .01$

the hospital (mean=2615 grams; range: 2210-3120 grams). ANACOVAs were calculated on weight gain with GA covaried out, $F(2,26)=1.14$, and with birthweight covaried out, $F(2,26)=.83$; neither ANACOVA indicated significant differences between groups. In addition, Pearson Product Moment Coefficients of Correlation were calculated to investigate possible relationships between weight gain and measures of irritability, as well as between weight gain and the major perinatal variables of GA, birthweight, RDS ratings, and length of hospital stay. Weight gain correlated negatively with length of hospital stay, $r=-.46$, $p<.02$. There were no significant relations between weight gain and the irritability measures, or the other perinatal variables. Weight gain did, however, correlate positively with time spent sleeping, as recorded in the mothers' final checklist, $r=.58$, $p<.001$, and with observations of drowsiness on the last home visit, $r=.42$, $p<.05$. Weight gain also correlated, negatively, with the NBAS Alertness score, $r=-.51$, $p<.01$. Because so many correlations were calculated, the acceptable level for significance was set at .02.

Further Pearson Product Moment Coefficients of Correlation were calculated, again using a .02 level of significance, to detect any possible relationships between NBAS measures of irritability and alertness, and the measures of irritability and alertness used in the study. The NBAS Peak of Excitement score correlated positively with crying observed on Visit 1, $r=.39$, $p<.05$. Peak of Excitement is a measure of the intensity of an infant's reaction to aversive stimuli. This correlation did not reach the required level of significance and no other correlations approached significance. The correlations are presented in Tables 11 and 12. Pearson Product Moment Coefficients of

Table 11

Pearson Product Moment Correlation Coefficients of NBAS Scores With Alertness Measures

Alertness Measure	NBAS Measure	
	Alert	Animate Visual
Home Visit		
Visually Alert		
Visit 1	.18	.02
Visit 5	-.30	-.09
Maternal Report		
Initial Checklist, Awake	-.32	-.12
Final Checklist, Awake	.32	.20

Table 12

Pearson Product Moment Correlation Coefficients of NBAS Scores With Irritability Measures

Irritability Measure	NBAS Measure		
	Rate of Buildup	Peak of Excitement	Irritability
Home Visit			
Fussing			
Visit 1	.31	.21	.11
Visit 5	.07	-.02	.11
Crying			
Visit 1	.05	.39*	.26
Visit 5	.02	-.13	-.03
Maternal Report			
Initial Checklist			
Crying	.17	-.07	.05
Final Checklist			
Crying	.09	-.04	-.06

*$p < .05$

Correlation were also calculated to investigate possible relationships between the various irritability measures of the study, and GA, birth-weight, and RDS ratings. None of these correlations approached significance.

ANOVAs carried out on the observations of maternal behaviour made during the first home visit, showed no significant differences between groups. The data appear in Table 13. ANACOVAs were calculated on the maternal behavioural data of the fifth visit, with the data of the first visit covaried out. Table 14 shows that there were no significant differences between groups. Cradling, however, approached significance, $F(2,26)=2.54$, $p<.10$, with the RISS group tending to show more of this behaviour than the controls. The hypotheses of the study, that the mothers of treated babies would look at their babies more, vocalize to them more, and display more effective soothing behaviours, were not supported by the results.

Table 15 shows an analysis by t-tests for related measures to look for changes in maternal behaviours over time. After a month at home with their infants, mothers spent more time looking in their babies' faces during the first 2 observational minutes, while holding and then undressing them, $t(29)=2.44$, $p<.05$. They also held them at their shoulders more during the last 3 minutes, while soothing them, $t(29)=3.28$, $p<.01$. To compare the behaviour of experienced mothers, those who had at least one living child at home, and inexperienced mothers, those for whom the subject was the only living child, t-tests for independent means were calculated. There were no significant differences arising out of the observations of Visit 1 or Visit 5.

Table 13

Mean Per Minute Scores and F Ratios of ANOVAs of Maternal Behavioural Observations, Visit 1

Behaviour	Group			F(2,27)
	RISS	HRS	WWI	
Distal, Min. 1-2				
Looks at Baby	1.2	2.0	1.8	1.60
Vocalizes to Baby	1.8	1.2	1.5	.80
Distal, Min. 6-8				
Looks at Baby	1.7	1.3	1.5	.31
Vocalizes to Baby	1.9	1.4	1.8	.78
Proximal, Min. 6-8				
Pats, Strokes or Rocks Baby	1.8	2.1	1.9	.26
Holds at Shoulder	.5	1.0	1.6	1.67
Cradles Baby	2.2	2.2	1.7	.60
Holds on Lap	.5	.3	.3	.22

Table 14

Adjusted Mean Per Minute Scores and F Ratios of ANACOVAs of Maternal Behavioural Observations, Visit 5

Behaviour	Group			F(2,26)
	RISS	HRS	WWI	
Distal, Min. 1-2				
Looks at Baby	2.1	2.0	2.4	1.45
Vocalizes to Baby	1.5	2.0	1.4	1.06
Distal, Min. 6-8				
Looks at Baby	1.5	1.5	1.6	.58
Vocalizes to Baby	1.9	2.1	1.5	.82
Proximal, Min. 6-8				
Pats, Strokes or Rocks Baby	1.2	1.3	1.6	.96
Holds at Shoulder	1.0	1.6	1.4	.54
Cradles Baby	1.6	1.0	.5	2.54*
Holds on Lap	.1	.2	.6	1.30

*$p < .10$

Table 15

Mean Per Minute Scores and t Values of Maternal Behavioural Observations, Comparing Visits 1 and 5

Behaviour	Visit 1	Visit 5	t(29)
Distal, Min. 1-2			
Looks at Baby	1.6	2.2	2.44*
Vocalizes to Baby	1.5	1.6	.68
Distal, Min. 6-8			
Looks at Baby	1.5	1.5	.07
Vocalizes to Baby	1.7	1.7	.22
Proximal, Min. 6-8			
Pats, Strokes or Rocks Baby	1.4	1.4	.06
Holds at Shoulder	.8	1.4	3.28**
Cradles Baby	1.5	1.1	1.40
Holds on Lap	.4	.3	.30

*$p < .05$

**$p < .01$

There were no significant differences between groups on the maternal rating scales of Caretaking Confidence, or of Expectation and Perception of Crying, as analyzed by the Kruskal-Wallis test, either before or after treatment. The pretreatment means of the Confidence scale were: RISS=3.9, HRS=3.4, WWI=4.0, Kruskal-Wallis $\underline{H}(2)=1.39$. The posttreatment means were: RISS=4.5, HRS=4.7, WWI=4.4, Kruskal-Wallis $\underline{H}(2)=1.03$. The means of the Expectation of Crying scale were: RISS=2.5, HRS=3.1, WWI=2.7, Kruskal-Wallis $\underline{H}(2)=2.0$. The means of the Perception of Crying scale were: RISS=2.4, HRS=2.8, WWI=2.4, Kruskal-Wallis $\underline{H}(2)=.70$. The Wilcoxon test was applied to test for changes over time in the maternal rating scales. This showed a significant increase in Confidence over the period of participation in the study, $\underline{T}=15$, $n'=22$, $\underline{p}<.001$, with pre- and posttreatment means of 3.7 (close to "moderately confident") and 4.5 (close to "very confident"), respectively. The same test showed no significant differences between Expectations of Crying (mean=2.8) and Perception of Crying (mean=2.5), $\underline{T}=34$, $n'=14$.

Table 16 displays the findings of 2(Cry Type) x 3 (Treatment Group) ANOVAs which were calculated on mothers' ratings of taperecordings of the cries of preterm and fullterm infants, at the time of the first home visit. Separate ANOVAs were calculated for each of the eight scales. Fullterm cries were initially found to be more Urgent, $\underline{F}(1,54)=7.94$, $\underline{p}<.01$; more Piercing, $\underline{F}(1,54)=27.14$, $p<.001$; more Discomforting, $\underline{F}(1,54)=4.31$, $\underline{p}<.05$, and more Distreesing, $\underline{F}(1,54)=7.33$, $\underline{p}<.01$. There were no significant differences between groups, and no significant Cry Type x Treatment Group interactions.

Table 17 shows the results of 2(Cry Type) x 3(Treatment Group)

Table 16

Mean Ratings and F Ratios of ANOVAs of Mothers' Responses to Taperecorded Cries of Preterm and Fullterm Infants, Visit 1

Scale	Group			F(2,54)	Cry Type		F(1,54)
	RISS	HRS	WWI		PT	FT	
Urgent	4.1	3.6	4.2	1.62	3.6	4.4	7.94**
Grating	4.2	3.7	4.4	3.04	4.0	4.2	1.28
Sick	3.2	2.8	3.2	.91	3.0	3.2	.64
Arousing	3.8	3.8	4.2	.61	4.0	3.9	.15
Piercing	4.3	4.0	4.5	1.54	3.6	4.9	27.14***
Discomforting	4.9	4.5	5.2	2.30	4.6	5.1	4.31*
Aversive	3.8	3.6	4.1	1.37	3.6	4.0	3.47
Distressing	4.5	4.0	3.9	1.95	3.8	4.5	7.33**

*$p < .05$

**$p < .01$

***$p < .001$

Table 17

Adjusted Mean Ratings and F Ratios of ANACOVAs of Mothers' Ratings of Taperecorded Cries of Preterm and Fullterm Infants, Visit 5

Scale	Group			F(2,53)	Cry Type		F(1,54)
	RISS	HRS	WWI		PT	FT	
Urgent	3.8	3.8	3.3	1.28	3.4	3.8	1.55
Grating	4.0	4.6	4.2	2.76	4.0	4.5	7.10**
Sick	3.2	3.1	3.0	.15	2.8	3.4	3.10
Arousing	4.4	4.0	4.2	1.02	3.8	4.5	9.24***
Piercing	4.4	4.1	4.4	.73	4.0	4.6	5.24*
Discomforting	4.3	4.9	4.6	2.26	4.5	4.7	.38
Aversive	4.0	3.7	3.9	.75	3.7	4.1	3.57*
Distressing	3.8	4.2	4.0	.58	3.8	4.1	1.34

*$p < .05$

**$p < .01$

***$p < .005$

factorial ANACOVAs calculated on the mothers' ratings of the same tape-recording, after a month of living with the cries of their own infants. Again, separate ANACOVAs were calculated for each of the eight rating scales. With the original responses covaried out, there were no significant group differences or Cry Type by Treatment Group interactions. Fullterm cries were, however, perceived as significantly more Grating, $F(1,53)=7.1$, $p<.01$; more Arousing, $F(1,53)=9.24$, $p<.005$; more Piercing, $F(1,53)=5.24$, $p<.05$, and more Aversive, $F(1,53)=3.57$, $p<.05$. The only scale to achieve significance on both initial and final visits was Piercing. Mothers' original perceptions of fullterm cries as more Urgent, Discomforting and Distressing faded over the month, and were replaced by finding them more Grating, Arousing and Aversive.

Changes in perception of preterm cries over time, and of fullterm cries over time, were analyzed by t-tests, for the entire sample. Mothers perceived fullterm cries as significantly more Arousing on the last visit than they had on the first, $t(29)=2.25$, $p<.05$. Although the changes only approached significance, mothers perceived fullterm cries as more Grating over time, $t(29)=1.90$, $p<.10$, and preterm cries as less Urgent over time, $t(29)=1.93$, $p<.10$. These data are presented in Table 18.

In summary, the results indicated that the RISS programme had a soothing effect on the infants, in that they were more drowsy during observations than the WWI controls, and that they tended to sleep more, and to show less visually alert behaviour. There were no significant differences between groups on the direct irritability measures of the observations, or of crying as recorded by the mothers

Table 18

Mean Ratings and t Values Comparing Maternal Ratings of Taperecorded Cries of Preterm and Fullterm Infants on Visits 1 and 5

Scale	Preterm Visit		t(29)	Fullterm Visit		t(29)
	1	5		1	5	
Urgent	3.6	3.2	1.93*	4.4	4.0	1.45
Grating	4.0	3.9	.16	4.2	4.6	1.90*
Sick	3.0	2.8	.89	3.2	3.4	.56
Arousing	4.0	3.9	.64	3.9	4.5	2.25**
Piercing	3.6	3.8	.96	4.9	4.8	.81
Discomforting	4.6	4.3	1.49	5.1	4.8	1.34
Aversive	3.6	3.7	.20	4.0	4.1	.44
Distressing	3.8	3.6	.72	4.5	4.3	1.01

*$p < .10$

**$p < .05$

on the 24-Hour Checklists. There were no significant group differences in weight gain. Weight gain, however, correlated negatively with the length of hospital stay, and with the NBAS Alertness score, while it correlated positively with time spent sleeping, as recorded by their mothers. Maternal behavioural measures showed no significant differences between groups; neither did the maternal ratings of caretaking confidence and perception of infant crying. The responses to taperecordings of infant cries of mothers of treated infants did not differ significantly from the responses of control mothers.

When comparing the behaviours of the infant sample as a whole, over time, the babies slept less, and were less drowsy during the final visit than during the first visit, and were more visually alert. The 24-Hour Checklists supported this impression, with the mothers recording less sleeping and more crying in the final checklist, recorded over the last 24 hours of participation in the study, than in the first checklist, recorded over the first day after discharge from the hospital. Maternal behaviour also indicated change over the time of the study, with mothers looking at their babies more during the first 2 minutes of observation, while they were holding and then undressing them, and holding them at their shoulders more for the last 3 minutes of observation, while they were soothing them after retrieving them from the scale. When they rated the taperecordings of infant cries during the first home visit, mothers found fullterm cries more Urgent, Piercing, Discomforting and Distressing than the cries of preterm infants. When asked to rerate the cries during the last visit, they found fullterm cries more Grating, Arousing, Piercing and Aversive than preterm cries.

Discussion

The results of the study do not directly support the hypotheses that the treated infants would be less irritable and more visually alert than the controls, and that they would show greater weight gain over the period of the study. If, however, one looks on irritability as a point on a continuum of infant arousal, from sleeping at one end to crying at the other, then the RISS group's tendency to sleep more, their showing of more drowsy behaviour during observations, and their tendency to be less visually alert, suggests that the treatment had made them less arousable, even though once aroused, they cried as much as the babies in the other two groups. This lower arousability was seen only in the RISS treatment group, although it had been hypothesized that the HRS treatment would have effects similar to the RISS. It must therefore be assumed that the systematic massage of the RISS programme had a relaxing effect on the infants that the handling of the HRS programme lacked, as in all other respects the programmes were identical. Preliminary results of the 4 month follow-up of the sample (Taylor, Messmer, Elder, Papageorgiou, & Brender, Note 4) indicate a longterm effect of the RISS programme. The RISS group showed the more mature response of briefer fixations to a visual stimulus, than the WWI controls. The HRS group did not differ significantly in fixation time from either of the other groups.

Even though the RISS group's slightly superior weight gain did not approach significance, the significant correlations of weight gain with sleeping as recorded by the mothers on the final checklist, and with drowsiness as observed on the final home visit, suggest that low

arousability is a contributing factor to weight gain in very small babies. The significant negative correlation of the NBAS Alertness score with weight gain indicates that the infants who appeared most alert at the time of discharge gained the least weight during their first month at home. As weight gain is an important concern in preterm infants, a programme which engenders more sleep and drowsiness in infants during the early days at home, and thereby influences weight gain, can be considered beneficial in the shortterm. The significant negative correlation of weight gain with length of hospital stay would seem to indicate that the babies whose condition at birth, or subsequently, necessitated the longest stays in hospital, were still handicapped in the ability to gain weight at the time of discharge, even though all babies were of similar weight at that time (ca. 2500 grams).

The hypotheses of the study concerning maternal behaviour were not supported by the results. There were no significant differences between groups in looking at or vocalizing to the infants, or in soothing behaviours employed. Only holding the baby in a cradled position approached significance, with the RISS mothers tending to do more of this than the controls. This could possibly be accounted for by the fact that the treatment encouraged the mothers to hold their babies this way for the rocking portion of the stimulation treatment. The HRS mothers, however, also rocked their babies during treatment, and the difference between them and the WWI mothers in cradling did not approach significance. The treatment experiences showed no effect on the mothers' confidence as caretakers, or on their perceptions of their babies' crying. Neither did the experimental mothers experience the taperecordings of infant cries as less negative than did the

control mothers.

As no other study of maternal behaviour over the first month at home with the infant has been found, it is hard to be sure if the hypotheses of the study were reasonable or not. Much has been written about premature birth as a psychological crisis for the parents (Caplan, 1960; Kaplan & Mason, 1960), but the attitudes of hospital neonatal intensive care units (NICU) to parents has changed drastically over the intervening two decades since these studies were published. The staff of the NICU from which the current sample was recruited not only allowed unlimited parental visiting, but actively encouraged it, to the point where they telephoned parents if they had missed contact for more than two or three days. The result was, that with very few exceptions, the mothers in the sample had visited their infants almost daily, had had experience with feeding and changing them from the time they were strong enough to be out of the incubator for feeding times, and were even able to bathe them for the last few days of their hospital stay. By the time the babies were able to go home, most of the mothers had gained enough experience to make them "somewhat to moderately" confident in their caretaking capacities. It is therefore possible that to hypothesize that the increased handling of the infants would induce increased confidence and competence in the mothers was to ignore the experience gained while the infants were hospitalized (Mean=40.7 days).

As well as having had much more contact with their infants during their hospital stay than mothers in previous studies, the mothers in the current study differed considerably on demographic dimensions, from those in most of the stimulation studies cited. Taking Rice's

(1977) sample as an example, all her mothers were welfare recipients, and 83% were black or Mexican American. The Canadian health insurance system insures that such a homogeneous sample would not be found in a neonatal unit. Pregnant women of all SES levels at risk for premature delivery are sent, if possible before the birth, to the appropriate centre equipped with a NICU. If she is delivered at a centre not so equipped, the infant is transferred immediately to a centre that can meet the special needs of the preterm. Consequently the current sample is much more heterogeneous than the samples found in the American studies cited. Many levels of SES, and of parental education and occupation are represented, with only 17% being welfare recipients. Only four (13%) of the mothers were not living with the father of the infant, indicating a much more stable sample than Rice's, all but three of whose mothers were single (90%), and most of whom were under 20. The mean age of the current sample was 27.5 years, with only one mother under 20 at the time of the birth. These factors of a higher rate of familial and financial support, and the greater age of the mothers, than found in previous studies, combined with the experience gained while the infants were in the NICU, could account for the level of confidence and competence apparent in these mothers by the end of the study. Their significant increase in confidence over the month of participation in the study is possibly similar to what would be found in a group of mothers of fullterm infants. It would be interesting to compare change in confidence over the first month of the infants' lives, of such a group, with the changes found in the current sample.

While the specific hypotheses have only been indirectly supported,

and only in the case of the drowsiness of the RISS infants, much information about change in behaviour, both infant and maternal, has been generated, by analyzing the sample as a whole. Much of this information seems intuitively right, but behaviour covering this particular period of infancy has not been systematically studied. The infants slept significantly less and were significantly less drowsy during observations at the last home visit than at the first. They also displayed significantly more visually alert behaviour, indicating that they were more easily aroused to a quiet alert state, and better able to maintain it. Figure 1 illustrates that the infants were aroused to more crying at the peak of stress, and were more thoroughly soothed, on the last visit than on the first. The observation data of change over time is supported by the mothers' 24-Hour Checklist Data: the final checklist showed the infants sleeping less, and crying significantly more than had the initial checklist. While diary data must be considered somewhat crude, due to the possibility of the mother forgetting to fill it out at the time of the activity, or her reporting less crying than actually took place in order to "look good", it does serve as support for the more reliable observation data. The mean sleeping time reported in the initial checklist of 15 hours out of the 24, is slightly less than that reported for newborns by Roffwarg, Muzio and Dement (1966) in their study of the development of the human sleep-dream cycle. The current sample was reported by the mothers to sleep an average of 14 hours a day by the end of the first month at home, a figure reached only at the age of 3 months in the study of Roffwarg et al. (1966). By the time of the last home visit the infants had reached a mean conceptional age of 42 weeks, or the equivalent of a 2-week-old

fullterm. It seems likely, if the sleep data of the checklists can be considered at all reliable, that the long extrauterine life in the nursery had led to more rapid maturation of the sleep patterns of these infants.

Changes over time in maternal behaviour included increased looking in their babies' faces during the first 2 minutes of observations, while holding and then undressing them, and holding them up to their shoulders more during the last 3 minutes of observation, while they were soothing them. By the fifth visit, this was the most frequently observed method of holding the baby, while at the first visit, cradling was observed most often. It would seem that these mothers rapidly discovered what Korner and Thoman (1970) have shown experimentally: that holding an infant upright at the shoulder is the most effective way to induce and maintain a quiet alert state. Loose lap holding, without ventral contact, such as described by Liefer et al. (1972), was the hold most rarely observed, accounting for only 10% of the observed holds on the first visit, and 11.25% on the last visit. Liefer and his associates observed this remote hold significantly more frequently among mothers who had been denied early contact with their preterm infants, than among early contact mothers. It can be assumed that the mothers in the current sample, with their frequent visiting, had had ample opportunity to develop attachment behaviours that involved close physical contact with their infants.

Contrary to expectations from existing research (Frodi et al. 1978; Zeskind & Lester, 1978), the mothers in the current sample perceived the cries of fullterm infants as more negative than the cries of preterms. At the time of the first home visit, fullterm

cries were perceived as more urgent, piercing, discomforting and distressing. By the fifth home visit the cries of fullterm infants were perceived as more grating, arousing, piercing and aversive than preterm cries. On none of the eight scales were the preterm cries rated more negatively than the fullterm. One explanation that comes to mind to account for the difference in response of this sample from samples of previous research, is found in the different current experience of the raters. In the Frodi et al. (1978) study, the raters were all parents of 5-month old infants, not of newborns. In the Zeskind and Lester study, half of the subjects were nonparents, and the other half were parents. The authors make no mention of the ages of the subjects' children. In the study of Friedman et al. (Note 2), the subjects were mothers of older children. In the current study, the mothers were in the immediacy of living with the sound of a preterm cry. After many days or weeks of hearing the cries of at risk babies while visiting the NICU, and a month at home with their own babies, it could be assumed that the preterm cries sounded more "normal" to them. The finding that the mothers found the preterm cries less unpleasant than the fullterm ones invites speculation on the effects of the cry on caretaking behaviour. On the one hand, a not unpleasant cry might lead to neglect, as being so undemanding as not to warrant attention. On the other hand its relative pleasantness might lead to the development of positive caretaking behaviour. The area of the relationship of cry features to caretaker response deserves further investigation.

In comparing the mean cry ratings of the current study with those of Zeskind and Lester, it is noteworthy that the current ones are much lower, that is, less negative. This finding may be partly accounted

for by the smaller number of cries used in the taperecording of this study, but it is possible that mothers who are actively caring for very young infants do not perceive their cries as negatively as either non-parents, or parents who are at some remove from the newborn period. If this is so, it would appear to be adaptive for the development of an optimal infant caretaker relationship. Another explanation of the differences in mean ratings from the Zeskind and Lester study might lie in the medical status of the infants whose cries were recorded for the current study. Nothing is known about this except that three infants were preterm and three were fullterm.

The change in the scales that proved significant over the month at home deserves note. On the original rating, shortly after the infants arrived home, when the mothers were only "somewhat to moderately" confident, according to their own ratings, the scales that showed significant differences between preterm and fullterm cries were urgent, discomforting and distressing, adjectives which might be considered to reflect the anxiety of the mothers. Only "piercing" pertained to the unpleasantness of the cries. By the time the month was over, when the mothers rated themselves from "moderately to very" confident, and their own infants' cries could be expected to be similar to the full-term cries on the taperecording, the scales that differed significantly all reflected unpleasant aspects of the cries: grating, arousing, piercing and aversive. It would appear that as their confidence and experience increased, and as their infants sounded more like normal fullterm infants, the mothers' perceptions of fullterm cries focussed less on anxiety inducing components of the cry, and more on aversive components. One can only speculate as to why it was the fullterm

cries that were consistently perceived as more negative by these mothers of preterm infants. There was possibly a quality in the more organized and more rhythmical fullterm cries which appeared alarming and unpleasant to women accustomed to the less organized and more tentative cries of preterm infants.

The mean score on the compliance questionnaire was 23.9 out of a possible score of 30, indicating a moderately high level of satisfaction with the programme, and of compliance in carrying it out. The loss of seven of the Programme Diaries, however, suggests a lack of compliance, at least in record keeping. It is possible that giving the mothers only one recording sheet for the whole four weeks of the study was expecting too much from them. Better records might have been kept if the experimenter had brought a fresh recording sheet at each home visit, thereby accentuating the importance attached to record keeping.

A look at the dropout figures of the study lends some support to Caplan's (1960) theory that troubled families of preterm infants find it difficult to enlist or accept help. Of the seven mothers of 37 recruited to the study who dropped out after receiving at least one home visit, all but one (86%) could be identified as being troubled, either by isolation and lack of family support, a worrisome medical status in the infant, high anxiety, or a combination of these difficulties. That the women who remained in the study found the visits helpful can be in little doubt, judging from their expressions of appreciation, and their apparent pleasure on hearing their babies' latest weight gain. The study was not designed to assess the effect of visiting, which may have been a major contributing factor to the increase in the women's confidence over the month of the study. It

would have been desirable to include a control group of mothers and infants who were visited only twice, once right after discharge, and once after a month at home, in order to assess the effect of visiting on the mothers' confidence and competence. It would also be of value, in further research into the development of maternal behaviour in mothers of preterm infants, to have as a comparison group, fullterm infants and their mothers. It is possible, with the changed atmosphere of NICUs, that these mothers, by the time their babies were ready for discharge, displayed as much confidence and competence as mothers of fullterm infants. It would be equally important to compare the behaviour of the fullterm infants with their preterm counterparts, over the first month at home. Of particular interest would be to discover if preterm infants, by the time of discharge from the hospital, are indeed more irritable than fullterms, as has been reported (Elmer, 1967).

A question that remains is: Are preterm infants still at significantly higher risk for abuse than fullterms, or has that rate lowered concurrently with the increased opportunity for parents to have access to their infants in the NICU? It would be important to have an up-to-date study of the type done by Klein and Stern (1971), covering abuse records over the decade which coincides with the great changes in nursery practice.

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Appendix A

Source Tables

Source Tables for ANOVAs of Selected Characteristics of the Infant Sample

Variable	Source	SS	df	MS	F
Birthweight (in grams)	Between	189.46	2	94.73	.34
	Within	7593.13	27	281.23	
Gestational Age (in weeks)	Between	2.92	2	1.46	.16
	Within	245.12	27	9.08	
Days in Hospital	Between	637.27	2	336.64	.37
	Within	24776.60	27	917.65	
Siblings < 6 years	Between	.60	2	.30	1.07
	Within	7.70	27	.28	
Siblings > 6 years	Between	.47	2	.24	.73
	Within	8.90	27	.33	

Source Tables for ANOVAs of Selected Characteristics of the Maternal Sample

Variable	Source	SS	df	MS	F
Maternal Age (in years)	Between	41.60	2	20.80	.83
	Within	677.90	27	25.10	
Maternal Education (in years)	Between	10.07	2	5.04	.68
	Within	199.40	27	7.38	

Source Tables for ANOVAs of Infant Behavioural Observations

Visit 1

Behaviour, Min. 1-8	Source	SS	df	MS	F
Sleeping	Between	25.40	2	12.70	.47
	Within	734.90	27	27.22	
Drowsy	Between	4.27	2	2.14	.26
	Within	221.60	27	8.21	
Visually Alert	Between	34.08	2	17.04	.83
	Within	555.93	27	20.59	
Fussing	Between	28.47	2	14.24	2.16
	Within	178.20	27	6.60	
Crying	Between	.60	2	.30	.02
	Within	536.90	27	19.88	

Source Tables for ANACOVAs of Infant Behavioural Observations

Visit 5

Behaviour, Min. 1-8	Source	SS	df	MS	F
Sleeping	Between	33.29	2	16.65	2.62
	Within	165.43	26	6.36	
Drowsy	Between	37.14	2	18.57	3.46
	Within	139.54	26	5.37	
Visually Alert	Between	159.05	2	79.52	3.01
	Within	687.84	26	26.45	
Fussing	Between	11.39	2	5.70	.89
	Within	165.89	26	6.38	
Crying	Between	9.08	2	4.54	.39
	Within	304.43	26	11.71	

Source Tables for ANACOVAs of Infant Behavioural Observations

Visit 4

Behaviour, Min. 1-8	Source	SS	df	MS	F
Sleeping	Between	11.53	2	5.76	.38
	Within	388.85	26	14.96	
Drowsy	Between	9.84	2	4.92	.89
	Within	143.16	26	5.51	
Visually Alert	Between	144.68	2	72.34	3.24
	Within	579.71	26	22.30	

Source Tables for ANOVAs of Initial 24-Hour Checklist

Behaviour	Source	SS	df	MS	F
Crying	Between	25.63	2	12.81	.64
	Within	518.44	26	19.94	
Awake, Not Crying	Between	334.25	2	167.12	3.84
	Within	1130.11	26	43.46	
Sleeping	Between	232.95	2	116.48	2.38
	Within	1272.00	26	48.92	

Source Tables for ANACOVAs of Final 24-Hour Checklist

Behaviour	Source	SS	df	MS	F
Crying	Between	8.45	2	4.22	.12
	Within	865.16	25	34.61	
Awake, Not Crying	Between	107.94	2	53.97	2.21
	Within	610.73	25	24.43	
Sleeping	Between	7.83	2	3.92	.05
	Within	2043.09	25	81.72	

Source Tables for ANOVAs of Maternal Behavioural Observations

Visit 1

Behaviour	Source	SS	df	MS	F
Distal, Min. 1-2					
Looks at Baby	Between	14.97	2	7.48	1.60
	Within	125.82	27	4.66	
Vocalizes to Baby	Between	6.07	2	3.04	.80
	Within	102.90	27	3.81	
Distal, Min. 6-8					
Looks at Baby	Between	6.07	2	3.04	.31
	Within	265.30	27	9.82	
Vocalizes to Baby	Between	13.40	2	6.70	.78
	Within	233.30	27	8.64	
Proximal, Min. 6-8					
Pats, Strokes or	Between	3.80	2	1.90	.26
Rocks Baby	Within	200.90	27	7.44	
Holds at Shoulder	Between	32.07	2	16.04	1.67
	Within	258.60	27	9.58	
Cradles Baby	Between	16.07	2	8.04	.60
	Within	358.93	27	13.29	
Holds on Lap	Between	2.60	2	1.30	.22
	Within	156.10	27	5.78	

Source Tables for ANACOVAs of Maternal Behavioural Observations

Visit 5

Behaviour	Source	SS	df	MS	F
Distal, Min. 1-2					
Looks at Baby	Between	5.96	2	2.98	1.45
	Within	53.58	26	2.06	
Vocalizes to Baby	Between	7.53	2	3.76	1.06
	Within	92.30	26	3.55	
Distal, Min. 6-8					
Looks at Baby	Between	7.66	2	3.83	.58
	Within	172.30	26	6.63	
Vocalizes to Baby	Between	11.61	2	5.80	.82
	Within	157.91	26	6.07	
Proximal, Min. 6-8					
Pats, Strokes or	Between	6.51	2	3.26	.96
Rocks Baby	Within	88.40	26	3.40	
Holds at Shoulder	Between	11.25	2	5.62	.54
	Within	272.84	26	10.49	
Cradles Baby	Between	52.17	2	26.08	2.54
	Within	267.24	26	10.28	
Holds on Lap	Between	12.24	2	6.12	1.30
	Within	122.84	26	4.72	

Source Tables for ANOVAs of Mothers' Responses to Taperecorded Cries of Preterm and Fullterm Infants, Visit 1

Scale	Source	SS	df	MS	F
Urgent	Groups	34.30	2	17.15	1.62
	Cry Types	84.02	1	84.02	7.94
	G x CT	9.03	2	4.52	.43
	Error	571.50	54	10.58	
Grating	Groups	49.73	2	24.86	3.04
	Cry Types	10.42	1	10.42	1.28
	G x CT	19.73	2	9.86	1.21
	Error	441.10	54	8.17	
Sick	Groups	20.83	2	10.42	.91
	Cry Types	7.35	1	7.35	.64
	G x CT	33.10	2	16.55	1.44
	Error	620.90	54	11.50	
Arousing	Groups	14.03	2	7.02	.61
	Cry Types	1.67	1	1.67	.15
	G x CT	18.40	2	9.20	.80
	Error	618.83	54	11.46	
Piercing	Groups	27.63	2	13.82	1.54
	Cry Types	244.02	1	244.02	27.14
	G x CT	15.23	2	7.62	.85
	Error	485.30	54	8.99	
Discomforting	Groups	42.70	2	21.35	2.30
	Cry Types	40.02	1	40.02	4.31
	G x CT	4.63	2	2.32	2.50
	Error	501.50	54	9.29	

Source Tables for ANOVAs of Mothers' Responses to Taperecorded Cries of Preterm and Fullterm Infants, Visit 1 (cont'd)

Scale	Source	SS	df	MS	F
Aversive	Groups	17.03	2	8.52	1.37
	Cry Types	21.60	1	21.60	3.47
	G x CT	2.50	2	1.25	.20
	Error	335.80	54	6.22	
Distressing	Groups	41.03	2	20.52	1.95
	Cry Types	77.07	1	77.07	7.33
	G x CT	7.23	2	3.62	.34
	Error	567.60	54	10.51	

Source Tables for ANACOVAs of Mothers' Responses to Taperecorded Cries of Preterm and Fullterm Infants, Visit 5

Scale	Source	SS	df	MS	F
Urgent	Groups	29.19	2	14.60	1.28
	Cry Types	17.69	1	17.69	1.55
	G x CT	6.50	2	3.25	.28
	Error	605.79	53	11.43	
Grating	Groups	20.82	2	10.41	2.76
	Cry Types	26.76	1	26.76	7.10
	G x CT	5.58	2	2.79	.74
	Error	199.95	53	3.77	
Sick	Groups	3.26	2	1.63	.15
	Cry Types	34.49	1	34.49	3.10
	G x CT	22.68	2	11.34	1.02
	Error	590.05	53	11.13	
Arousing	Groups	13.29	2	6.70	1.02
	Cry Types	60.90	1	60.90	9.24
	G x CT	26.70	2	13.35	2.02
	Error	349.20	53	6.59	
Piercing	Groups	12.59	2	6.30	.73
	Cry Types	45.03	1	45.03	5.24
	G x CT	11.63	2	5.82	.68
	Error	455.11	53	8.59	
Discomforting	Groups	37.28	2	18.64	2.26
	Cry Types	3.15	1	3.15	.38
	G x CT	5.60	2	2.80	.34
	Error	436.48	53	8.23	

Source Tables for ANACOVAs of Mothers' Responses to Taperecorded Cries of Preterm and Fullterm Infants, Visit 5 (Cont'd)

Scale	Source	SS	df	MS	F
Aversive	Groups	9.56	2	4.78	.75
	Cry Types	22.86	1	22.86	3.57
	G x CT	16.98	2	8.49	1.33
	Error	339.69	53	6.40	
Distressing	Groups	10.68	2	5.34	.58
	Cry Types	12.33	1	12.33	1.34
	G x CT	21.42	2	10.71	1.16
	Error	487.08	53	9.19	

Appendix B

Instructions to Mothers

The instructions to all experimental mothers were as follows: "The purpose of the programme of which you are a part is to provide your baby with extra sensory stimulation in a variety of areas — touch, visual, auditory and vestibular (movement). Research has shown that these types of stimulation can be beneficial to babies.

"The programme has two parts: the first part provides the tactile stimulation, and the second, through rocking, provides the vestibular, or movement stimulation. Both sections will provide visual and auditory stimulation, as, while your baby is lying on his back on your lap, and while you are rocking him in your arms, you should look in his eyes, say his name, and talk to him in any way that you find comfortable."

Mothers of the infants in the RISS group then received the following instructions: "Unwrap your baby. Place a lightweight blanket under him and have a diaper handy. Lie him on your lap while you sit in a comfortable chair. You and your baby should be in a face to face position while the baby is on his back. Make sure that your fingernails are short and have no rough edges. Each stroke is to be repeated three times. Continue stroking, even if the baby goes to sleep.

"Using the entire palm surface of your hands, stroke from the top of the head down to the chin. Using two fingertips of both your hands, stroke from the centre of the forehead out to the temples. Using one fingertip of each hand, stroke around the eyes, pressing a little more firmly on the inside of the bridge of the nose. With two

fingertips of each hand, stroke from the bridge of the nose over the cheeks and over the ears. With one fingertip stroke around the mouth. Lifting the baby's head with one hand and tilting it back slightly, with two fingertips of the other hand, stroke the chin and down the throat. With one hand still supporting the baby's head, use the other hand to stroke the baby's head, starting at the forehead and stroking to the nape of the neck. If the baby has a lot of hair, stroking the hair might pull it. In such a case, put your fingers under the hair and stroke the scalp.

"Raise the baby's arm with one hand, and with a circular motion, massage the entire arm. Press firmly on the palm of the baby's hand with your thumb. Repeat this procedure on the baby's other arm. Using your entire palm surface, stroke from the neck down over the baby's chest, abdomen and genitals in one gliding movement. Then, with two fingertips, stroke the midline from chin to genitals. Lift one of the baby's legs with one hand, and with the other, encircle the leg and with a rotating motion, massage the leg and press firmly on the sole of the foot with your thumb. Repeat this procedure for the other leg. Gently turn the baby over on his stomach and massage his scalp again, spreading your fingers so that you cover as much of the skin surface as possible, stroking from the forehead to the nape of the neck. Then, using your entire palm surfaces, stroke from the nape of the neck, down the back and over the buttocks. With two fingertips, massage the entire spine in a circular motion over the spinal bones. Lift one of the baby's legs, and with the other hand massage the entire leg in a circular movement, finishing by pressing your thumb firmly on the sole of the foot. Repeat the procedure on the other leg.

"Remember that each movement must be repeated three times. Each time the movement changes, be sure to change the position of only one hand at a time, so the baby is never out of contact with you, always being touched by at least one of your hands. While the baby is on his back, remember to look in his eyes, say his name, and talk to him. The massage section of the programme should take 10 minutes to perform. If you find it takes less time, you may repeat it."

Mothers of infants in the HRS experimental group were given the following instructions: "Unwrap your baby. Place a lightweight blanket under him, and have a diaper handy. Lie him on your lap while you sit in a comfortable chair. You and your baby should be in a face to face position while the baby is on his back. Make sure your fingernails are short and have no rough edges. Continue, even if your baby goes to sleep. Place your hands on your baby's body, and gently rub, pat or stroke him, in any way that seems pleasurable to both of you. After $2\frac{1}{2}$ minutes, turn him over on to his front, and repeat the procedure on his back. After $2\frac{1}{2}$ more minutes return him to lying on his back, and continue to pat or stroke him, and finally, turn him back to lying on his tummy. In all, he should be patted, rubbed and stroked for 10 minutes. Be sure to change the position of only one hand at a time, so that the baby is never out of contact with you, always being touched by at least one of your hands. While the baby is on his back, remember to look in his eyes, say his name, and talk to him in any way that is comfortable for you."

Mothers in both experimental groups were given the following instructions for the rocking part of the programme: "The second part of the treatment consists of rocking your baby for 5 minutes.

Rocking supplies vestibular stimulation, and continues to supply visual and auditory stimulation. Wrap your baby snugly in his blanket, hold him closely in your arms and rock him briskly back and forth. You may continue to sit, or you may walk about with him, whichever appears more comfortable to you. Continue to look in his eyes and talk to him. Keep doing this for 5 minutes."

Mothers of infants in the WWI control group were given the following instructions: "Sometimes mothers of new babies are so busy that they do not take time to enjoy them. Will you take four 10-minute periods a day, when you are not dressing, feeding or bathing your baby, to sit and relax with him (or her)?"

Programme Diary

Baby's Name:

Date	1.			2.			3.			4.			5.			6.			7.		
	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time
	1			1			1			1			1			1			1		
	2			2			2			2			2			2			2		
	3			3			3			3			3			3			3		
	4			4			4			4			4			4			4		
Date	8.			9.			10.			11.			12.			13.			14.		
	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time
	1			1			1			1			1			1			1		
	2			2			2			2			2			2			2		
	3			3			3			3			3			3			3		
	4			4			4			4			4			4			4		
Date	15.			16.			17.			18.			19.			20.			21.		
	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time
	1			1			1			1			1			1			1		
	2			2			2			2			2			2			2		
	3			3			3			3			3			3			3		
	4			4			4			4			4			4			4		
Date	22.			23.			24.			25.			26.			27.			28.		
	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time	No	Init.	Time
	1			1			1			1			1			1			1		
	2			2			2			2			2			2			2		
	3			3			3			3			3			3			3		
	4			4			4			4			4			4			4		

Appendix D

Questionnaire for Parents

Introduction

This questionnaire is to find out how you feel about the programme your child was given. Please answer all the questions as best you can. There are no right or wrong answers, and everything you say will be kept strictly confidential.

1. In general, how satisfied have you been with the instruction you received?

1. _____	Very satisfied	(5)*
2. _____	Moderately satisfied	(4)
3. _____	Neither satisfied nor dissatisfied	(3)
4. _____	Moderately dissatisfied	(2)
5. _____	Very dissatisfied	(1)
6. _____	Don't know	(0)

2. In general, how often were you able to carry out the instructions?

1. _____	As prescribed	(5)
2. _____	Less often, specify _____	(3)
3. _____	More often, specify _____	(4)
4. _____	Not at all	(2)
5. _____	Don't know	(0)

3. How likely do you think it is that the programme you have been given will help your child's development?

1. _____	Very likely	(5)
2. _____	Moderately likely	(4)
3. _____	Somewhat likely	(3)
4. _____	Not very likely	(2)
5. _____	Not at all likely	(1)
6. _____	Don't know	(0)

4. Did following the programme inconvenience you or limit your normal daily activities?

1. _____	A great deal	(1)
2. _____	A moderate amount	(2)
3. _____	Somewhat	(3)
4. _____	Just a little	(4)
5. _____	Not at all	(5)
6. _____	Don't know	(0)

5. What were some of the things that might have prevented you from carrying out the programme given to you for your baby?

_____

_____

_____

6. How difficult was it for you to find the time to carry out your baby's programme?

1. _____	Very difficult	(1)
2. _____	Moderately difficult	(2)
3. _____	Somewhat difficult	(3)
4. _____	Not very difficult	(4)
5. _____	Not at all difficult	(5)
6. _____	Don't know	(0)

7. Which of the following statements would you agree applies to the programme given to you for your baby?

1. _____	My baby does not like it	(0)
2. _____	I don't really like doing it	(0)
3. _____	I don't really know how to do it	(0)
4. _____	I feel I am helping my child	(1)
5. _____	I enjoy the activity with my child	(1)
6. _____	I forget to do it	(0)
7. _____	I feel the procedure is helping my child	(1)
8. _____	Other members of the family enjoy helping me carry it out	(1)
9. _____	My child enjoys the procedure	(1)
10. _____	I didn't have the time to do it	(0)
11. _____	I don't think it made any difference to my child	(0)
12. _____	I don't think my child needed the programme	(0)

8. When your baby is crying, what have you found to be the most effective way of soothing him?

_____

*Numbers in parentheses indicate the score given for each answer.

Appendix E

Cry Rating Instructions

Date _____

Name _____

Visit No. _____

You are going to hear the cries of six different very young babies, recorded while they were being weighed or examined. You will hear each cry twice at different points on the tape. After you hear each cry you are to rate it on four 7-point rating scales like the one below. To use a scale, circle the number that represents the degree to which you feel one of the adjectives applies to the cry that you heard. If neither adjective is applicable, circle the number 4 which is the neutral point.

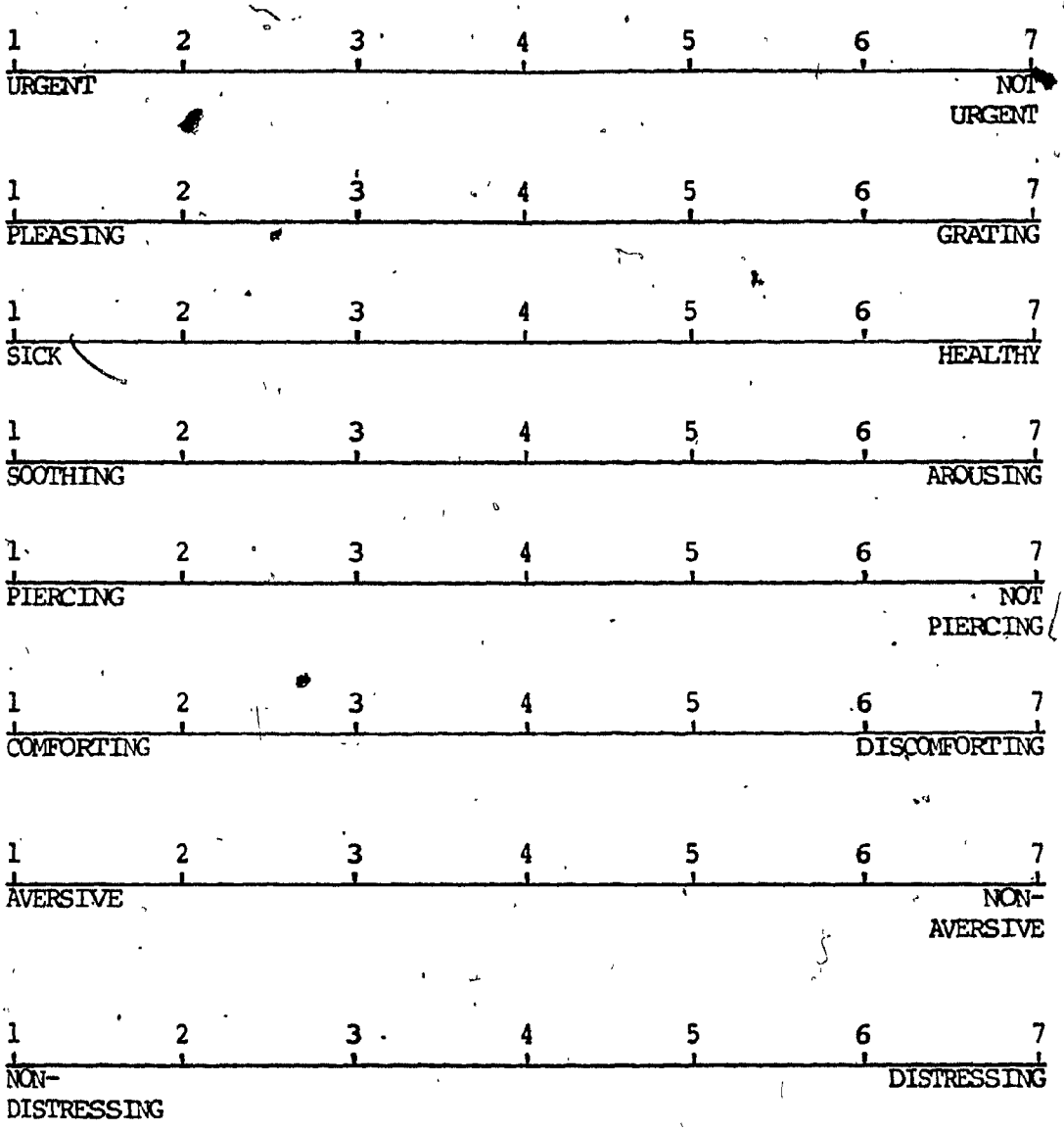
On the scale, 1 or 7 means "definitely appropriate"
2 or 6 means "moderately appropriate"
3 or 5 means "slightly appropriate"

Example:

TODAY'S WEATHER

1	2	3	4	5	6	7
HOT						COLD

Rating Scales



APPENDIX-F

24-Hour Diary of Baby's Activities

Name: Dates: Diary No.

Time	Crying in Crib	Crying out of Crib	Awake not Crying	Feeding	Sleeping	Time	Crying in Crib	Crying out of Crib	Awake not Crying	Feeding	Sleeping
1800						0600					
1815						0615					
1830						0630					
1845						0645					
1900						0700					
1915						0715					
1930						0730					
1945						0745					
2000						0800					
2015						0815					
2030						0830					
2045						0845					
2100						090					
2115						0915					
2130						0930					
2145						0945					
2200						1000					
2215						1015					
2230						1030					
2245						1045					
2300						1100					
2315						1115					
2330						1130					
2345						1145					
2400						1200					
00.15						1215					
00.30						1230					
00.45						1245					
0100						1300					
0115						1315					
0130						1330					
0145						1345					
0200						1400					
0215						1415					
0230						1430					
0245						1445					
0300						1500					
0315						1515					
0330						1530					
0345						1545					
0400						1600					
0415						1615					
0430						1630					
0445						1645					
0500						1700					
0515						1715					
0530						1730					
0545						1745					

Appendix G

Observation Data

Name: Previous Weight :

Date: Visit No. Current Weight :

Infant Behaviour	Min. I & mother				Min Und	
Sleeping						
Drowsy, with glassy unfocussed eyes						
Awake, quiet, eyes open briefly						
Awake, quiet, bright eyes, no directed attention						
Awake quiet, bright focussed eyes						
Awake, quiet, bright eyes scanning						
Awake + Fussing						
Crying						
Suck, Yawn, Smile (S, Y, Sm)						
Maternal Behaviour						
Moves toward scale						
Hovers close to scale or trainer						
Verbalizes anxiety						
Looks baby in eyes or face						
Vocalizes to baby, affectionate, matter of fact						
Smiles at infant, eyes open						
Smiles at infant, eyes closed						
Swaddles infant						
Pats or strokes infant (P, S)						
Rocks baby in arms						
Rocks baby in infant seat or stroller						
Lifts baby to shoulder						
Holds baby : cradle, shoulder, lap (C, S, L)						
Walks baby						
Gives pacifier						

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Previous Weight :

Data No. Current Weight :

	Min. 1 c mother	Min. 2 Undress	Min. 3 c Trainer	Min. 4 On Scale	Min. 5 Cloth	Min. 6 c Mother	Min. 7	Min. 8
focussed eyes								
briefly								
es, no directed attention								
scussed eyes								
es scanning								
S, Y, Sm)								
r								
ie or trainer								
or face								
echionare, matter of fact								
es open								
is closed								
nt (P, S)								
ir seat or stroller								
ier								
, shoulder, lap (C, S, L)								

Appendix H

Consent Form

The Premature Infant Project is a joint research project of the Psychology Department of Concordia University and the Department of Neonatology of the Jewish General Hospital. Its purpose is to compare the longterm benefits of different supervised programmes for premature infants during their first month at home. Each programme involves some participation by the mother who will be supervised by a trained visitor reporting to the Project Director. Which programme a baby would follow is determined by a chance procedure.

Participation in the project means that a visitor will come to your house for about 40 minutes each time, once a week during the baby's first month at home. The particular programme for your baby would consist of _____
As part of the project your baby's progress will be assessed before discharge, in the nursery, and in 2 home visits 4 months after the baby's expected date of delivery, and again at 8 months after the expected date of delivery. The 4 and 8 month progress checks include a standard test of infant development, and a measure of visual attention, both given at home. In addition the mother and male adult of the baby's household will be asked to answer a brief self-perception questionnaire on the first and last days of the programme.

I have read the description of the project given above and wish to participate in it with my baby. I realize that I am free to discontinue at any time.

Date _____ Child's Name (print) _____

Mother's Name (print) _____

Mother's Signature _____

Address _____

Telephone No. _____

Witness _____

Appendix I

Parental Information Questionnaire

Names:
Address:
Phone No.:
Marital status:
Date of marriage (or cohabitation):
No. of other children:
Language spoken in household:
Composition of household:

Mother	Father
Age:	Age:
Parity:	Education:
Education:	Ethnic origin:
Ethnic origin:	Residence in Canada:
Residence in Canada:	Occupation:
Previous employment:	
Expect to return:	
How soon?	

Tobacco Consumption during Pregnancy

1	2	3	4	5
0	1-5/day	10+/day	10+/day	2 pkg+/day

Alcohol Consumption during Pregnancy

1	2	3	4	5	6	7
0	1/wk	3-4/wk	1/day	2-3/day	4-5/day	6+/day

Mother Visiting

1	2	3	4	5
1/mo.	Bi-weekly	1/wk	3/wk	Daily

Father Visiting

1	2	3	4	5
1/mo.	Bi-weekly	1/wk	3/wk	Daily

Caretaking Confidence

1	2	3	4	5
Very worried	Moderately worried	Somewhat confident	Moderately confident	Very confident

Expectations of Crying

1	2	3	4	5
Very little		Moderate amount		A great deal

Appendix J

Infant Information Sheet

Name: Birth date:

Parents' names: Due date:

Sex: Follow up:

Ethnic origin:

Estimated gestational age:

Birthweight:

Type of delivery:

Maternal medication prior to delivery:

Maternal anaesthesia:

Apgar, 1 min.: 5 min.:

Complications:

Time in isolette:

Length of hospital stay:

Respiratory Distress: (RDS)

1	2	3	4
None	Mild	Moderate	Severe