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Premature and full-term two-year-olds: Developmental status, behavioural style, and parental stress.

Helen Elaine Martin
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Premature and Full-Term Two-Year-Olds:
Developmental Status, Behavioural Style, and
Parental Stress

by

Helen Elaine Martin

M.A. University of Windsor, 1985

A Dissertation
Submitted to the Faculty of Graduate Studies
through the Department of Psychology
in Partial Fulfillment of the
Requirements for the Degree
of Doctor of Philosophy at the
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1990
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Abstract

The premature birth of an infant is a stressful event for parents (Fleischman, 1986). However, the duration of and reasons for parental stress are unclear. The present study examined characteristics (i.e., developmental status and behavioural style) of preterm and full-term 2-year-olds and parental stress. Sixty parent-infant dyads were selected and assigned to the following three groups according to the infants' gestational ages: very premature, 24-30 weeks; premature 31-37 weeks; and full-term, 38-41 weeks. Infants who had sensory deficits or observable congenital anomalies at birth were excluded from the study.

The full-term group achieved significantly higher Mental Developmental Indices (MDIs) on the Bayley Mental Scale (Bayley, 1969) than the very premature group; the scores of the premature group did not differ significantly from the other two groups. These group differences were not significant when MDIs were calculated using ages corrected for prematurity. There were significant differences among the groups in behavioural style as measured by the Infant Behaviour Record (Bayley, 1969). Both premature groups were more active and less attentive to tasks than the full-term group. In spite of these group differences there were no differences among the groups in stress levels reported by the parents on the Parenting Stress Index. When the groups were collapsed there was a negative relationship between the infants' developmental status and parent-reported stress (i.e., the lower the MDI, the higher the stress). Also, parents whose infants' were less task-oriented, less outgoing, and less cooperative reported higher stress levels.

It was encouraging to observe that in this study parents of healthy preterm 2-year-olds did not experience their toddlers as any more stressful than did parents of full-term toddlers. It was also encouraging to observe that at 2 years chronological age the MDI means of both premature
groups were within the average range without correction for prematurity. The behavioural style demonstrated by both groups of premature infants, however, differed from that of the full-term group. These differences are of concern because they may be related to the higher incidence of learning difficulties experienced by premature children on entering school systems.
Acknowledgements

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CHAPTER 1
INTRODUCTION

The purpose of the present study was to evaluate premature and full-term 2-year-olds on developmental status and behavioural style, and to assess stress levels as reported by their parents. The relationship of premature birth status to parental stress is a matter of concern because the preterm group is overrepresented in populations of children who show failure to thrive, and among those exposed to abuse and neglect (Brown & Bakeman, 1980). Recognizing and responding to parental stress might minimize and prevent some problematic situations from occurring in families.

According to several researchers (Bhat, Rajut, & Vidyasagar, 1978; Davies, 1984; Rose, 1983; Stewart, Reynolds, & Liscomb, 1981) the prognosis for infants who are born prematurely is now generally quite positive (i.e., decreased neonatal mortality, low incidence rates of major intellectual, sensory and/or other handicaps). However, when subtle behaviours are examined, preterm populations frequently obtain less optimal scores than their fullterm counterparts (Caputo, Goldstein, & Taub, 1979; Goldberg & DiVitto, 1983; Ross, 1985). Also, toddlers who were born prematurely are frequently reported to demonstrate a more "difficult" behavioural style than that of toddlers who were born at term (Field, Dempsey, & Shuman, 1979; Meisels, Cross, & Plunkett, 1987; Shirley, 1939). Which particular premature infants exhibit these "difficult" behaviours remains a matter of conjecture because of the heterogeneous nature of the population.

On the parent side, studies that have examined maternal stress report heightened stress levels in mothers of premature infants at both 3 and 6 months after the infants' birth (Zakreski,
1983). However, whether stress remains higher in these parents when their infants become toddlers relative to parents who have had full-term babies and whether this stress is related to aspects of their toddlers' development or behavioural style is still unclear.

Overview

This section will begin with a brief discussion on how prematurity and related issues have been defined and dealt with in the literature. This will be followed by presentation of the literature on difficulties encountered by parents of premature infants during the neonatal period and early infancy. Studies that have examined interactional patterns, mental development, and behavioural styles of older premature infants and parental stress will then be reviewed. The section will conclude with an outline of the rationale and purpose of the present study.

Prematurity

In 1964, the American Academy of Pediatrics suggested that the term(s) "premature" and "preterm" be restricted to those infants born before 37 weeks gestation and that infants weighing less than 2,500 grams be termed "low-birth weight". Prior to this, "premature" sometimes had been used to describe infants of low birth weight who were born at term (i.e., 40 weeks).

With recent medical developments, many infants with gestational periods as short as 24 weeks are now surviving. Infants whose gestational periods are closer to term require much less in the way of environmental supports and medical treatment than do premature infants born with shorter gestational periods (Als, 1982). Therefore, the former are usually at much less risk in terms of survival and developmental outcome than the latter (Davies, 1984; Hertzig, 1981). Thus, the words "premature" and "preterm", which can be used interchangeably, apply to a broad range
of infants born before 37 weeks gestation regardless of birth weight and do not define a homogenous population (Landry, Chapieski, & Fletcher, 1988; Piper, Kunos, Willis, & Mager, 1985).

Several of the more recent studies have attempted to address this problem of lack of homogeneity by limiting the premature sample to infants weighing less than a certain birth weight. For example, the categories low birth weight (LBW) and very low birth weight (VLBW) are often cited. The former refers to infants born weighing less than 2500 grams and the latter to infants born weighing less than 1500 grams. Meisels et al. (1987) point out that these criteria may involve a confounding between level of maturation (i.e., gestational period) and level of intrauterine growth. That is, an infant may not have attained the expected weight for his/her gestation period. Generally, an infant born at term is expected to weigh over 2500 grams, whereas an infant born at 30 weeks is expected to weigh 1500 grams (Usher & McLean, 1969). Small-for-date/gestation age (SGA) describes those infants who have not attained weight appropriate to their length of gestation in contrast to those whose weight is appropriate to their length of gestation (AGA).

The above is an important consideration because according to Sell, Luick, Poisson, & Hill (1980), a significant number of premature babies weigh less than expected for their gestational age. Thus, even when birth weight is used to categorize premature infants, it is important to consider it in the context of the infants' gestational age. In spite of recognition of these difficulties, researchers have continued to use different criteria for prematurity (e.g., birth weight, gestational age, an illness associated with prematurity, or a combination of these). In the present study, babies will be classified according to gestational age. The following provides a rationale for the practice of using length of gestation in determining group/subgroup membership in premature populations.
Als and colleagues Lester, Tronick, and Brazelton (1979, 1982) have written extensively about the problems of providing very preterm infants with an extrauterine environment that will ensure their survival and optimize their development. Als (1978, 1982, 1987) proposed a developmental model which she termed "synactic". In her view, there are five systems that operate in continuous interplay with the environment and each other (i.e., they support one another or infringe on the other's stability). Als' model describes development from conception and outlines the infant's developmental agenda from that time (see Appendix A for diagram). According to Als, the infant's developmental agenda is to seek new levels of modulated subsystem functioning with each level a prerequisite for a subsequent one and qualitatively different from it. The developmental agenda of the 24-week infant is different than that of a 38-week infant. For example, the former is struggling with the stabilization and integration of physiological functions, whereas in the healthy full-term newborn, differentiation of the attentional-interactive system is the primary task with which the infant is dealing.

In view of Als' model of development and the increased risks for infants with shorter gestational periods (Hertzig, 1981), categorizing infants according to length of gestation appears to be a reasonable method of studying the heterogeneous population of premature infants. Techniques such as the Dubowitz Assessment of Gestational Age (Dubowitz & Dubowitz, 1977; Dubowitz, Dubowitz, & Goldberg, 1970) now allow clinicians and researchers to calculate gestational age with a relatively small margin of error, thus making groupings according to gestational age feasible.

In addition to problems in defining and categorizing premature populations (i.e., weight, gestational age, or both), there is the problem of deciding what age to consider an infant who has been born prematurely. There is general agreement that development begins at conception (Als, 1982; Gessell & Amatruda, 1947; Goldberg & DiVitto, 1983). Thus, an infant born at 28 weeks
gestation is not expected to look or behave like an infant born at term when the two are compared, for example, at one month after birth (i.e., chronological age). To adjust for this fact, researchers frequently use "corrected age" (i.e., obtained by subtracting the number of weeks that the infant was born prematurely from his/her chronological age) when consulting test norms and when making comparisons to full-term infants. For the most part, the pattern of development appears to be the same for preterm and full-term infants (Gessell & Amatruda, 1947; Goldberg & DiVitto, 1983).

Usually most healthy premature infants appear to "catch up" to their full-term counterparts in their development over time (i.e., uncorrected developmental quotients fall within the average range). Reasons offered for this apparent "catch-up" are: 1) the relative weight of the correction factor (i.e., the proportion of time that the infant was born prematurely to chronological age) decreases markedly as the infant matures, and 2) the rate of development slows down after the first year (Goldberg, Brachfeld, & DiVitto; 1980). The point at which preterm infants "catch up" remains unclear, however, the practice of "correcting" for prematurity usually continues until the infants reach approximately 2 years of age. Researchers have documented that although preterm infants may achieve scores within the average range, their performance in some areas is still below that of full-term infants up to and during preschool years. (Caputo et al., 1979; Goldberg & DiVitto, 1983; Landry et al., 1988; and Siegel, 1982, 1983). Thus, there is some question as to whether some prematurely born infants do in fact catch up.

Some researchers suggest that scores based on chronological age (i.e., based on date from birth) yield better predictions (Davies, 1984; Siegel, 1983), whereas other researchers propose that corrected age offers a fairer assessment of the infant's abilities (Gesell & Amatruda, 1947). Thus, the infant's age and the purpose of the study determine whether chronological or corrected
age is calculated. In the studies that are cited in the following sections, both methods of age
calculation are used.

Regardless of how prematurity is defined or how the child's age is calculated, having a
baby born prematurely is a stressful event for the infant's mother and father. In the following
section, parental stress during the period shortly after the infant's birth will be discussed.

**Parental Stress in the Neonatal Period**

Selye (1952), a researcher instrumental in popularizing the construct of stress, stated that
stress is a non-specific demand requiring readjustment or adaptation of the individual; a stressor
was defined as any factor requiring such a demand. Although stressors are frequently thought of
as negative, Selye argued they could also be positive. Thus, the birth of a baby which requires
adjustments in a family is stressful (Fleischman, 1986). Generally, when the pregnancy has been
planned, carried to term, and the family unit is intact and has support, these adjustments are made
with relative ease. However, when the birth is premature the transition to parenthood can become
a family crisis (Fleischman, 1986; Goldberg & Divitto, 1983).

Premature birth by its nature is unexpected and violates parental expectations for a
healthy full-term baby. Als, Lester, and Brazelton (1979) point out that parents as well as infants
are "premature" in that they did not have the "full term" to adjust to the pregnancy and their
subsequent roles as parents.

Several authors (Goldberg & DiVitto, 1983; Fleischman, 1986; Perlman, 1986; and
Shosenberg & Lennox, 1985) have written sensitive portrayals of the immediate impact of the
birth of a premature, low birth weight infant on the family and emphasized parents' need for
support and comfort in dealing with the intense feelings that they experience after the birth of
their baby. For example, mothers often feel guilt and a sense of failure because they did not carry
their baby to term. In addition, parents worry about the neonate's outcome, both in terms of immediate survival and future development (McCarton, 1986). They may feel helpless and have little control because in hospital the baby often requires the specialized treatment of a Neonatal Intensive Care Unit (NICU). Although it is the current practice in many hospitals to welcome parental visits, major caretaking of the infant is left to specialists.

Fleischman (1986) compares the stages that parents of premature infants have to work through as they mourn the loss of their expected perfect child to the grief process that takes place when a loved one dies. He also points out the important role that fathers have to assume especially if the baby was transferred to another hospital.

Once the newborn's situation has become stabilized, the infant's survival ensured, and plans made for hospital discharge, parents with preterm infants continue to face a different situation than those of full-term infants (Goldberg, 1978; Goldberg & Divitto, 1983; Shosenberg & Lennox, 1985). The former have been less involved in their infants' care, separated from them for longer periods, and thus, frequently have doubts about their ability to care for their once very fragile infant. This already stressful situation is compounded by the isolation they often experience. When they bring their baby home they may be reluctant to leave him or her with a sitter and/or may have difficulty in obtaining volunteers to look after an infant who has had such a difficult course in hospital.

In addition to the problems cited, parents of preterm infants are faced with a baby with whom it is difficult to interact. The following section discusses the research that has been done in this area.
Parent-Infant Interaction Patterns in Early Infancy

Goldberg (1977) presents a parent-infant interaction model which assumes that the interaction process will be facilitated by 1) parent confidence and 2) a socially competent infant. As reported in the previous section, parents taking a preterm infant home from hospital are very likely to have less confidence in their parenting ability than those whose infants are born at term. Adding further complications to an already at-risk interactional system are behaviours of preterm infants at time of hospital discharge.

Field, Hallock, Dempsey, and Shuman (1978) report preterm/full-term differences on the Brazelton Neonatal Assessment Scale (BNAS; Brazelton, 1973) and a modified version of the scale (MABI) which assessed mothers' perceptions of their infants on many of the same behaviours as the BNAS. Behaviours assessed included: orienting responses to inanimate visual and auditory stimuli, attention to faces and voices, arousability, cuddliness, and consolability. A group of preterm infants suffering from Respiratory Distress Syndrome and a group of full-term infants were assessed prior to hospital discharge and again one month later. The preterm infants received less optimal scores than the full-term infants on three out of four a priori clusters on the BNAS (i.e., social interaction, motoric processes, and state control). The preterm infants were described as having infrequent periods of alertness, and flat, depressed responses to stimulation. They were also not very cuddly, "being rather like a sack of meal" (p. 80). In addition, the preterm group's motor responses were inferior to those of the full-term group's and were characterized by jerkiness, overshooting their limbs, and floppyness. These preterm/full-term differences continued to persist at the one-month follow-up assessment. Comparison of mothers' and clinicians' ratings of the infants indicated similar scoring on three out of the four clusters.

Sell et al. (1980) report that very low birth weight neonates (i.e., less than 1500 grams, less than 30 days old) are puzzling and upsetting for parents because they display stress in a
different manner than their full-term counterparts (i.e., primarily by physiological instabilitytremulousness, colour changes, increased motor activity, or sleep). Thus, it is very difficult for parents of premature infants to "read" their babies' cues. Also, in hospital they are frequently asleep and cry little, but by discharge time (usually expected date of delivery) they have become more irritable and difficult to soothe (Friedman, Jacobs, & Werthmann, 1982). This is stressful for parents because they tend to attribute the increased fretfulness in their infant to their inadequate parenting skills. Thus, given the model cited earlier by Goldberg (1977) in which parent confidence facilitates parent/infant interaction, it is not surprising that there are more reports of interactional difficulties in preterm-infant/mother dyads than in full-term-mother/infant dyads.

In their review of interactional patterns, Goldberg and Divitto (1983) point out that early studies (1970s) in this area often focussed on the mothers' behaviour in order to uncover indications of pathology which might help explain the disproportionate numbers of preterm infants who were neglected or abused at later ages. In the research by Goldberg and colleagues (DiVitto & Goldberg, 1979; Goldberg et al. 1980) it was reported that during the newborn period mothers of preterm infants appeared aloof in feeding situations (i.e., holding infants on their laps as opposed to cuddling; touching and talking to their babies less). However, observations of interactions later in the first year have found that, rather than being uninvolved, preterm mothers tend to be overinvolved. They were constantly coaxing and interacting with their infant to the extent that they appeared to be insensitive to their infants' need to take a break (Field, 1979; Field, Dempsey, & Shuman, 1979, 1983). In these studies preterm infants are also described as more fussy and restless and difficult to console than the full-term infants during the interactions.

Goldberg and Divitto (1983) suggest that these differences in interactions between preterm and full-term dyads may indicate adaptations on the parents' part rather than signs of
pathology, given that many preterm infants perform well on later assessments. Parents' overinvolvement may be necessary given that it is so difficult to get these infants to feed and maintain social contact. Thus, because the infant part of the interactional system is lacking in competence, parents may compensate by becoming overactive.

Thus, the first few months are extremely stressful for parents of premature infants. Not only are they presented with an irritable, difficult to console, unresponsive infant, but their babies do not provide them with clear cues about their needs (McGehee & Eckerman, 1983). In addition, other factors such as having to wait longer for rewards such as the "social smile" contribute to the fact that preterm infants are less rewarding (Brown & Bakeman, 1980; Goldberg et al., 1980). Although rationally parents understand that their premature infants will take longer to reach milestones, on an emotional level the smile is an important reward, especially for parents who are struggling with a difficult infant. The chapter title, "Being the Parent: More Work and Less Fun" in Goldberg and Divitto's 1983 book seems an apt description of the struggles faced by parents of premature infants. Thus, there is an empirical basis for expecting higher stress levels in parents of premature infants.

**Parental Stress During Early Infancy**

The literature on parental stress a few months after hospital discharge is sparse and inconsistent. A 1983 article by Crnic, Greenberg, Ragozin, Robinson, and Basham discussed mother/preterm and mother/full-term dyads on a number of measures including life stress at 1 and 4 months after hospital discharge. The preterm group was heterogeneous with criteria of gestational age less than 38 weeks and birth weight less than 1800 grams. None of the infants had "gross neurological or physical impairments" (Crnic et al., 1983, p. 210). No group differences were noted on measures of life stress, general life satisfaction, or satisfaction with
parenting. The authors report that this finding was unexpected and possibly related to the facts that the premature sample was quite healthy and that by the time that the measures were taken the mothers may have become settled with their infants and situations.

On the other hand, stress differences were reported by mothers of preterm and full-term infants when The Parenting Stress Index (Abidin, 1986; Burke & Abidin, 1978) was employed by Zakreski in a 1983 study. It may be that measures selected by Crnic et al. were not sensitive enough or not examining the appropriate variables to detect differences between the two groups. The populations in the two studies may have also been quite different.

Zakreski (1983) studied stress in early infancy (i.e., at 3 and 6 months of age) in mother-infant systems in a sample that included both preterm and full-term infants of single and married mothers. Zakreski employed the Parenting Stress Index (PSI; Abidin, 1986; Burke & Abidin, 1978). Because the PSI is an important measure in the present study, it will be discussed in some detail before outlining Zakreski's findings.

The PSI was designed as a self-report screening instrument to detect parent-child dyads which are under excessive stress and thus, in Abidin's view, at risk for dysfunctional parenting (Abidin, 1986). In constructing the PSI, Abidin reviewed the literature on child development and psychopathology and parent-child interaction. He then selected "those stressors which were most commonly associated with dysfunctional parenting" (Abidin, 1986, p. viii). Questions were developed around these areas and assigned to one of the following three "domains" of stress; Child, Parent, and Life Stress (Abidin, 1986, p. viii). The Child and Parent Domains have several subscales which allow for more precise identification of excessive stressors. Further information about PSI subscales (as reported in the most recent PSI revision, Form 6) is contained in the Appendices B and C.
From Abidin's (1986) perspective, the "difficult child" possesses attributes such as hyperactivity, low sleep requirements, low adaptability, or physical handicap that make the job of parenting more stressful. Although many of the same behaviours included in the Child Domain are found on temperament scales, Abidin states that his scale is not a temperament measure. He did, however, try to include those temperament-related items that have been demonstrated to have the greatest long-term predictability. The Parent Domain assesses areas that might impact on a parent's ability to function as a competent parent (e.g., depression, relationship with spouse). Stress outside the parent-child relationship (e.g., death of a relative, legal problems) is assessed by the Life Stress Scale.

McKinney and Peterson (1984) had graduate students categorize PSI items as either representing stressors or stress reactions. Items on the Child Domain were generally viewed as stressors, whereas two subscales on the Parent Domain, Depression and Sense of Competence, were most often categorized as stress responses. In their review of the PSI, McKinney and Peterson state that although the PSI does not distinguish between stressors and stress reactions, it is useful clinically because a high Total Stress Score (i.e., sum of Child and Parent Domain Scores) indicates "a significant potential or actual problem" (p. 510). The PSI is particularly helpful for identifying children at-risk for development of behavioural and emotional disturbances. Thus, it is a useful measure for addressing parent-child interaction problems in terms of a stress perspective.

Zakreski's (1983) study on stress levels in mothers of preterm and full-term infants included both single and married mothers. The PSI, Form 5 (Burke & Abidin, 1978) was chosen to assess stress levels because of its ability to assess both infant and parent stress factors. Zakreski also employed the Bayley Scales of Infant Development (Bayley, 1969) to assess the relationship between the infants' developmental status and parental stress. Criteria for inclusion
in the preterm group was as follows: gestational age less than 37 weeks and birth weights less than 2500 grams. Data were gathered when the infants were 3 months and 6 months old (chronological age).

Zakreski reported that mothers of preterm infants had higher stress scores on Child and Mother (this domain was renamed Parent in form 6) Domains and Total Scores at both 3 and 6 months than did mothers of full-term babies. Single mothers of premature babies reported the greatest stress. Elevated stress on the Child Domain was expected due to previous documentation regarding preterm infants' adaptability and demandingness. Although the elevation on the Mother/Parent Domain was not predicted, Zakreski states that it was consistent with her clinical impressions of the mothers. Stress levels on this domain at 3 months were lower for preterm mothers who were married than for single mothers.

The premature infants in the Zakreski study received significantly lower Mental Developmental Indices (MDIs) than did the full-term infants. However, these differences were no longer significant when the MDIs were calculated according to corrected ages for the preterm group. Regardless of gestational age, infants whose mothers reported the highest stress levels (on Total Score) received the lowest MDIs.

From the literature discussed in the first section of this paper, it is apparent that parents of premature infants are faced with many problems during the first few months of their babies' lives. As documented by Zakreski's (1983) study, this is a stressful time for parents. Several of these early stressors, especially those related to medical problems, are typically resolved towards the end of the first 6 months. However, research indicates that preterm/full-term differences continue and new ones emerge as premature infants approach their second birthday (Astbury, Orgill, Bajuk, & Yu, 1983; Lasky et al., 1983). The following section will review studies related to developmental status and behavioural style and thus provide a rationale for studying stress in parents of 2-year-old premature infants.
Characteristics of Premature Toddlers

Developmental Status. Research done on cohorts of preterm infants born after the mid-1960s when advanced technology became available for neonatal treatment indicates that outcome is generally quite positive (Astbury et al., 1983; Goldberg & DiVitto, 1983; Klein, Hack, Gallagher, & Fanaroff, 1985; Siegel et al., 1982; and Ungerer & Sigman, 1983). The majority of studies have focussed on global outcome measures such as the Mental Scale of the Bayley Scales of Infant Development (Bayley, 1969).

Typical of these studies is that conducted by Siegel et al. (1982). Preterm very low birth weight (i.e., less than 1500 grams) infants were subdivided into groups depending on whether their birth weight was appropriate-for-gestational age (AGA) or small-for-gestational age (SGA). The infants were assessed on a number of measures at various intervals up to and including 2 years of age (chronological). At 2 years, without correction, the Bayley Mental Development Indices (MDIs) of the preterm infants was significantly lower than those of the fullterm infants. When the MDIs were corrected for prematurity, there were no significant differences between the full-term and any of the preterm groups. Without correction, the preterm AGA infants also received significantly lower scores than the full-term infants on both comprehension and expressive subtests of the Reynell Developmental Language Scale. A follow-up study of these children (Siegel, 1982) indicated that preterm/full-term differences persisted at 5 years of age when scores were not corrected for prematurity.

Ross (1985) went beyond the Bayley summary scores to conduct a micro-analysis of developmental functioning of full-term and preterm very low birth weight infants. The infants were assessed when they were a year old (corrections were made for premature birth so that the infants differed in chronological age). The sample was further restricted to firstborn infants who were appropriate in weight for their gestational age and came from middle- to upper-middle-class
families. As reported in other studies (Field et al., 1979; Landry et al., 1988; and Roth, Eisenberg, & Sell, 1984), the Mental Development Indices (MDIs) of both groups fell within the average range but the full-term group's mean MDI was significantly higher than that of the VLBW infants (i.e., 107.5 versus 101.5). Comparison by group of success rates on individual items showed significant differences on the following six (out of twelve) items: responds to verbal request, attempts to imitate scribble, holds crayon adaptively, jabbers expressively, imitates words, and puts beads in box. In addition, the premature infants as a group demonstrated more variability in their performance than did the full-term group.

Astbury et al. (1983) examined performance of VLBW infants at approximately 1 and 2 years (corrected age) on the Bayley Scales. These authors reported a significant decline in corrected MDIs from 1 year (average MDI of 109) to 2 years (average MDI of 100). This decline is not unusual when MDIs are corrected because the correction factor is smaller at 2 years than at 1 year. Astbury et al. stress the importance of long-term follow-up to detect problems that might not be evident at one stage, but appear later in the infant's development. They also encourage researchers in this area to look beyond summary scores and to incorporate other behavioural measures into their follow-up assessments.

Thus, when healthy preterm infants are assessed on global measures of development, group means indicate that the majority obtain scores within the average range. When their scores are not corrected for prematurity, however, preterm infants frequently obtain mean scores that are lower than those of their full-term counterparts (Klein, Hack, Gallagher, & Fanaroff, 1985; Ungerer & Sigman, 1983).

Earlier in the paper, research citing differences in behavioural and interactional styles between preterm and full-term infants during the neonatal period and early infancy was reviewed. The following section will summarize studies that have examined behavioural styles in older preterm infants.
**Behavioural Style: Examiner's Observations.** Generally, "style" in "behavioural style" refers to how infants approach tasks and people (i.e., examiner and/or parents). For example, in stacking blocks on the Bayley Scales of Infant Development, behavioural style encompasses the ability to follow directions, persistence with the task, distractibility, amount of encouragement required, and so forth. Bayley (1969) developed the Infant Behavior Record (IBR) as part of her Infant Scales to document these more general aspects of infants' behavioural functioning that are observed by the examiner during administration of the Mental and Motor Scales.

Bayley did not provide an overall Index for the 30 IBR items as she did with her other two scales and researchers have combined the items in various ways depending on their particular interests. Several researchers have employed a factor analytic approach to reduce the IBR items. One of the first to do so was Matheny and his colleagues Dolan and Wilson (1974). In later research using a larger sample (i.e., 436 twins) Matheny reported five factors which he labeled: Task Orientation, Test Affect-Extraversion, Activity, Auditory-Visual Awareness, and Motor Coordination (Matheny, 1980; 1983). He stated that the first three factors (composed of ten items) were age- and sex-invariant. He also reported the factor structure over several ages. The present study employed the factor structure at 24 months (refer to Appendix D). Essentially the same factors were obtained by Meisels et al. (1987) when the IBR was used with a preterm population. In the same study, Meisels et al. employed discriminant function analysis with IBR data to differentiate two premature populations from a full-term population.

The IBR has has been employed in a number of studies with "at-risk" infants and found to be useful in discriminating preterm/full-term differences. Lasky et al. (1983) employed the IBR to examine behavioural style in high-risk infants and controls at 1-year corrected age. Examiners were unaware of the infants' risk grouping. The authors report that infants in both
groups came mainly from indigent families. The high-risk sample (birth weight less that 1500 grams, or neonatal illness severe enough to require mechanical ventilation) was subdivided into the following three categories: 1) VLBW, never ventilated; 2) VLBW, ventilated; and 3) birth weight over 1500 grams, ventilated. Principal component analyses were calculated on IBR items which resulted in three interpretable factors which were similar for all groups.

The first component was an overall summary which reflected "a well-developed child, positively oriented to people with a pleasing disposition"; the second reflected "hyperactive" behaviour; the third, "a happy but somewhat delayed and passive infant" (Laskey et al., 1983, p. 1213). An analysis of variance (group x (IBR components) indicated a significant group main effect. Further analyses revealed that the control group received significantly higher (i.e., more positive) scores on the first component (i.e., positively oriented towards people). The other groups followed in the same order as in the overall analysis. On the second component (characterized by hyperactivity) the VLBW ventilated infants received scores indicating that they were the most hyperactive group.

Using Mathey's composites, Roth, et al. (1984) also examined IBR differences between preterm infants (i.e., gestation age of 37 weeks or less, birth weight of 2500 grams or less, and who had received intensive care at birth) and their full-term counterparts. Roth et al. reported that (at 1 year chronological age) the preterm infants scored significantly lower on four out of five of Matheny's composites. There were no differences on the Affect/Extraversion Composite.

Lasky et al. (1983) point out that the at-risk premature infants in their study were chronologically older than the controls but that their behaviour was viewed as less mature by the examiner. This raises the possibility that their older ages leads to higher behavioural expectations from their parents and greater conflict because of their less mature, more difficult behaviour. Thus, again there is evidence that families of these infants may be more likely to experience the
child as a source of stress than families of full-term infants. The following studies add support to the notion that these "difficult" behaviours continue as the infants get older.

As mentioned previously, Meisels et al. (1987) used discriminant analysis with IBR data on at-risk groups of premature, low birth weight infants and full-term infants. The premature infants were further classified as "sick" (diagnosis of respiratory distress syndrome) or "healthy" (no respiratory distress syndrome, hospitalization of less than one month). This was a cross-sectional study and infants were assessed at 12 or 18 months of age (as calculated from time discharged from hospital).

Meisels et al. obtained two discriminant functions, Responsivity and Task Involvement, which bear some similarity to Matheny's Test Affect-Extraversion and Task Orientation factors. The Responsivity function discriminated the two preterm groups from the full-term group. This function, however, did not discriminate the sick from healthy preterms and suggested that both groups of preterm infants were less likely than the full-term infants to be alert and responsive to novel stimuli. The Task Involvement function differentiated between the two preterm groups but not between the healthy preterm infants and the full-term infants; the sick preterm infants were less able to sustain task-oriented behaviours than the infants in the other two groups.

Field et al. (1979) employed the IBR with middle class, high-risk preterm and "normal" full-term infants at periodic intervals over the first 2 years (i.e., 8, 12, and 24 months corrected age). The high-risk population had experienced respiratory distress syndrome (RDS); average weights and gestational ages for this group were 1600 grams and 32 weeks respectively. Selected items from the IBR were clustered into two composite scores, Primary Cognition and Extraversion, which had been derived by Matheny et al. in 1974. The former reflected behaviours related to attention span, object orientation, and goal directedness and the latter included social orientation to the examiner, cooperation, and emotional tone. (These composites are similar to
the two factors, Task Orientation and Test Affect-Extraversion, that Matheny later reported in 1980 and 1983.) Field et al. report that eight different examiners assessed the infants over the three assessments and that all were blind to group assignment and scores obtained in previous assessments.

Significant differences were found between the "normal" and at-risk infants at all age levels on the Cognition Composite with the at-risk infants receiving scores indicating more problematic behaviour. The scores of infants in both groups on this Composite indicated a general improvement in behaviour from the first to the second testing, however the relative position of the groups was maintained. On the other hand, there were significant differences between the two groups on the Affect-Extraversion Composite only at the 24-month-level with the at-risk infants performing more poorly. Significant correlations were reported between MDIs and the Primary Cognition Composite score. No sex differences were found. Data in the Field et al. (1979) study relative to the Primary Composite score are consistent with other reports that suggest attentional deficits in premature populations.

In an attempt to understand the disproportionate number of children of VLBW births who require special assistance when they reach elementary school, Astbury et al. (1983) also employed the IBR. Premature VLBW infants (mean birth weight, 1248 grams and mean gestational age, 29.7 weeks) from families of relatively high socioeconomic status were examined at approximately 1 and 2 years of age (corrected for prematurity). There was no full-term control group. Examiners who had no knowledge of the infants' neonatal course categorized the infants as either "normal" or "hyperactive" according to a classification system based on IBR ratings. The latter term applied to infants who failed to comply in an age-appropriate fashion on one of the following items: object orientation, goal directedness, attention span, endurance, activity, reactivity, or response to sensory areas of interest. The number of infants rated as "hyperactive"
increased significantly from age 1 to 2 years (11 to 43% respectively), again supporting the need for follow-up to detect those problematic behaviours that may emerge over time. These authors also reported that there was a statistically significant difference in MDIs between those infants who were rated hyperactive and those who were classified as normal; the latter obtained superior scores (i.e., mean MDI of 108 compared to mean MDI of 88).

The above studies demonstrate that there appear to be observable differences in behavioural style (as measured by the IBR) between preterm and full-term infants throughout the first 2 years. Despite the fact that the IBR is quite subjective, full-term/preterm IBR differences have been documented when ratings were made by examiners who were blind to the infants' birth status or classification group (e.g., Field et al., 1979). The studies cited also demonstrate a significant relationship between IBR ratings and performance on the Bayley Mental Scale. Many of the behaviours attributed to the premature infants relate to attentional deficits and hyperactivity. Furthermore, it appears that some of these differences emerge or become more salient as the infants reach 2 years of age.

It seems reasonable to hypothesize on the basis of the IBR research that the older premature infants present more challenges to their parents than full-term infants. With the acceptance of the transactional model of development researchers have come to value the parental experience and perception of the child (Woroby, 1986). There are, however, few studies documenting parental response to these children when they become toddlers. The following section will discuss studies which have examined the preterm infant from the parents' perspective.

**Behavioural Observations: Parents' Perspectives.** Field et al. (1978) collected data from mothers of healthy full-term infants and infants born at-risk (i.e., preterm and respiratory distress syndrome) using the Carey Infant Temperament Questionnaire (Carey, 1970). This instrument is based on the New York Longitudinal Study (NYLS) interview which was
developed by Thomas, Chess, and Birch in their efforts to study differences in children's 
behavioural style as perceived by their parents (Thomas, Chess, & Birch, 1968). From the data 
collected, Thomas et al. (1968) outlined the following nine dimensions of temperament: activity 
level, rhythmicity (regularity), approach or withdrawal to a new stimulus, adaptability, threshold 
of responsiveness, intensity of reaction, distractibility, quality of mood, and persistence. These 
were then clustered to describe the following behavioural styles: "difficult" (arrhythmic, 
withdrawing, low adaptability, intense and negative), "easy" (the opposite characteristics), "slow 
to warm up" (inactive, low in approach and adaptability), and "intermediate" (all others). The 
Carey Questionnaire has a multiple choice format and summary scores are used to categorize the 
infants as having an easy, intermediate, or difficult temperament.

Field et al. (1978) report that preterm infants received more "difficult" ratings than the 
full-term infants at both 4 and 8 months (corrected ages). Specifically, premature infants were 
more difficult to console. No sex differences were noted and the 4- and 8-month ratings were 
significantly correlated. There was also a significant relationship for both groups between 
temperament ratings and performance on the Bayley Mental Scale (i.e., infants with "easy" 
temperaments achieved higher scores on the Bayley Mental Scale). There remain, however, some 
inconsistencies in how mothers view their infants as the results of the following study 
demonstrate.

In contrast to the results of Field et al. (1978) Roth et al. (1984) in a study on 
preterm/full-term infants did not find group differences on the Toddler Temperament Scale 
(Fullard, McDevitt, and Carey, 1979). This scale also incorporates the nine Chess et al. (1968) 
temperament dimensions. Roth et al. reported that the performance of both preterm and full-term 
groups in their study was similar to that of the NYLS standardization sample. As a possible 
explanation for why their results conflicted with those of Field et al. (1978), the authors suggest
that, by one year, preterm mothers may have adapted to their "child's unique and possibly difficult characteristics" (Roth et al., 1984, p. 503). The findings may also relate to the parents' defensiveness in regard to their child's label as premature and the relationship that this has to negative behaviours. Thus, the parents may deny behaviour that could likely be labeled as negative by other observers. Differences between the two studies may have also been due to the differences in measures employed (i.e., Infant versus Toddler version of the scale).

Roth et al. (1984) report that, although the parent reports did not reflect significant group differences, there were significant group differences when examiners' observations (i.e., IBR data) were analyzed. Canonical correlations were employed to explore the relationship between parents' and examiners' ratings. There were no significant relationships reported when the full-term data were analyzed. Analysis of the preterm data indicated that infants high in activity and low in persistence (parent reports) were social, relatively unaware of auditory and visual aspects of the test environment, and had good motor coordination (examiner reports). These data suggest that there may be some correspondence between parent and examiner ratings, but for the most part parents' and examiners' ratings on behavioural style were inconsistent. Again, it may be that parents have become accustomed to and comfortable with their infants' style. It may also be the case that examiners observed the infants in a specific setting which may have served to highlight those behaviours on which the groups differed.

Hertzig and Mittleman (1984) also examined parent-reported temperament differences in full-term and VLBW infants at 6-month intervals during the first 2 years and again at 3 years of age using Thomas-Chess interview data. The preterm group weighed between 1.000 and 1750 grams at birth and had gestational ages which ranged from 26 to 39 weeks. Forty-two percent of the sample were "small for dates" (i.e., weighed lighter than expected given their gestational age). Full-term data were those collected by Thomas and Chess (1977) and Thomas et al. (1968) in the NYLS. Both groups were from middle class families.
When data on both groups of infants were compared on the nine temperament dimensions of Thomas et al. at 1, 2, and 3 years of age, a significant group effect was noted. Further analyses indicated that the preterm children were less adaptable, less distractible (in the sense that they could not be distracted from crying when attempts were made to console them), more intense, and had higher thresholds of responsiveness to sensory stimulation than the full-term infants. A significant age effect was also noted (i.e., rhythmicity and distractability were the only two of the nine dimensions that did not change significantly over the three year period). Changes in temperamental attributes over time were similar for both groups of children. In spite of the above-noted preterm/full-term differences, when scores were compiled to arrive at an index to describe a "difficult child" (irregularity in biological functioning, negative withdrawal from new situations, nonadaptability or slow adaptability to change, and intense negative expressions of mood), no significant differences between the groups were noted. There was, however, a trend for premature infants to obtain higher (more difficult) scores. All children, regardless of birth weight, were considered to be more "difficult" at 2 years of age than at 1 or 3 years of age.

Lack of discrimination between groups at all ages on the "difficult child" index may have been due to the diverse nature of the premature population (i.e., gestational age range and the high proportion of SGA infants) and the relatively long gestational period (i.e., mean age=32 weeks) for these infants. Scores on this index for both groups were highest at the 2-year assessment indicating that according to parents this period is the most difficult during the preschool years. Generalizability of these results using data on infants who were born in the mid-sixties to infants born in the eighties is limited as the treatment of the premature infant has changed dramatically in 20 years.
Summary

In the literature review thus far, research that has documented ways that premature infants differ from their full-term counterparts has been presented. As reported, differences during the perinatal period are very obvious and it is well-documented that this is an especially stressful time for parents (Beckwith & Cohen, 1980; Shoshenberg & Lennox, 1985). Goldberg and Divitto (1983) have pointed out adaptations that parents have to make in dealing with their premature infants during the first few months. Zakreski (1983) has reported significantly higher levels of stress in mothers of premature infants over mothers of full-term infants at the infants’ chronological ages of 3 and 6 months.

As premature infants move towards the end of the first year, if they are healthy and corrections are made for prematurity, distinctions between them and full-term babies become less obvious. However, in terms of mental development, even though the performance of premature infants is frequently within the average range, it is somewhat lower than and different from that of their full-term counterparts on the Bayley Scales of Infant Development (Ross, 1985). Furthermore, examiners also report differences in premature infants’ behavioural style which are reflected in different IBR ratings (Meisels et al., 1987).

As premature infants approach their second birthday, some of these group IBR differences become even more pronounced, giving support for the notion that it is important to expand our evaluations of these infants beyond cognitive development. Two years of age is a particularly challenging time for parents of "normal" children and IBR findings suggest that it may be even more so for parents of premature toddlers (Field et al., 1979). However, to date there is little information on whether these parents perceive their infants as presenting more stressful characteristics than do parents of full-term infants.
If it is the case that premature toddlers have subtle cognitive and behavioural differences that make them more difficult to parent, it is important that their parents continue to be offered appropriate support and intervention in order to prevent later problems. For example, children born prematurely are over-represented in populations requiring special assistance in school and in populations of children who are abused or neglected.

The premature population is not homogeneous, although several studies on outcome have not taken this into account. It is important for both clinicians and parents to be aware of which particular premature infants are at highest risk. It may be that babies of longer gestational periods who are often not monitored unless significant sensory or neurological problems are noted, will have profiles that indicate that they and their families should be provided with some type of intervention. Provision of early intervention may help prevent this population from resurfacing later in disproportionate numbers in groups requiring special assistance at school or clinics.

Present Study

The purpose of the present study was to examine characteristics of 2-year-old premature and full-term infants and to assess stress levels as reported by their parents. Both mothers and fathers were asked to participate. Because the premature population is not homogeneous and length of gestation was expected to be related to outcome, infants were grouped according to length of gestational period. The three groups were: Group 1, very premature (gestational period of 24 to 30 weeks); Group 2, premature (gestational period of 31 to 37 weeks) and, Group 3, full-term (gestation period 38 to 41 weeks).

The decision to subgroup the premature infants according to length of gestation was based on Als' (1982) model that risk factors increase with the amount of time that the infant is born prematurely. Categorizing the infants in this manner avoids the issue of intrauterine growth
restriction (IUGR) that may occur when weight categories such as LBW and VLBW (less than 2500 and 1500 grams respectively) are used. In other words, a SGA 1500 gram infant who has experienced IUGR may be approximately 36-37 weeks gestation. This infant will have developed to the extent (e.g., produces surfactant, has sucking reflex) that makes his/her adaptation to the extrauterine environment much easier than that of an infant at 1500 grams whose weight is appropriate for gestation. The gestation divisions chosen for this study correspond closely to the categories LBW and VLBW.

Infants were assessed on developmental status and behavioural style and their parents completed a measure to assess parental stress. Thus, the dependent variables were 1) infants' developmental status, 2) infants' behavioural style, and 3) parental stress.

More specifically, developmental status was assessed by the Mental Development Index (MDI) of the Bayley Scales of Infant Development (Bayley, 1969). The Infant Behavior Record (IBR; Bayley, 1969) was completed to gain information about infants' general behavioural style as perceived by the examiner. Parental stress was assessed by the Parenting Stress Index-Form 6 (PSI; Abidin, 1986). As stated earlier, the PSI Child Domain provides information about parents' perceptions of their infants, whereas the PSI Parent Domain reflects how the parents feel about themselves. The PSI Total Score is the sum of Child and Parent Domain Scores and the Life Stress Score accounts for stress outside the parent-infant dyad (e.g., death of a family member, legal problems, a new mortgage, etc.).

Although the general developmental status of premature infants is not markedly delayed when compared to normative data (Astbury et al., 1983), premature infants have been shown to demonstrate delays relative to full-term infants (Seigel et al., 1982) and more variable intra-individual performance (Ross, 1985). Furthermore, researchers who have examined behavioural style of premature infants during formal assessments report that they are more active (Laskey et
al., 1983), less task-oriented (Meisels et al., 1987), and receive less favourable scores on a factor reflecting a pleasing disposition (Laskey et al., 1983) than full-term infants. Parent reports also indicate preterm/full-term differences in behaviour suggesting that premature infants are more demanding (Field et al., 1978; Goldberg & Divitto, 1983) and Zakreski (1983) has reported higher stress levels in mothers of 3- and 6-month-old premature infants than in mothers of full-term infants of the same age.

Predictions

1) Based upon previous research (Astbury et al., 1983; Ross, 1985; and Seigel et al., 1982) and the healthy status of the infants in all groups, it was expected that the means for all three groups on the Bayley Mental Scale would fall within the average range (both with and without correction for prematurity). It was also predicted that the least optimal developmental status would be demonstrated by the very premature group, followed in order by the premature group, and the full-term group.

2) On the basis of the work of Meisels et al., (1987) and others (Field et al., 1979; and Laskey et al., 1983), it was expected that the very premature group would receive scores reflecting the most "suspect" or "difficult" behaviours, as measured by the IBR composite scores of Activity, Affect-Extraversion and Orientation; whereas the full-term group would receive the most optimal scores. The premature group was expected to fall in the intermediate range between the other two groups.

3) Because premature infants have been reported to exhibit more difficult or suspect behaviour (Meisels et al., 1987), it was predicted that stress scores on the Parenting Stress Index (Abidin, 1986) would be highest in the very premature group of infants, followed by the premature, and full-term groups. The majority of this stress would most likely be accounted for
by Child factors and not Parent factors. It was expected that, regardless of birth status, mothers would report higher stress levels than fathers. This would be consistent with the limited normative data which compared fathers' and mothers' scores (Abidin, 1986).

4) There is limited information on the concordance between examiner and parent ratings. However, it was expected that there would be a correspondence between the IBR Composite Scores and the PSI Child Domain score because the two measures assess similar types of behaviours.
CHAPTER 2
METHOD

Subjects

Sixty mother-infant dyads were selected and assigned to the following three groups of 20 dyads per group according to the infant's gestational age at birth: Group 1, very premature, 24 to 30 weeks; Group 2, premature, 31 to 37 weeks; and Group 3, full-term, 38 to 41 weeks. Table 1 presents mean gestational ages and birth weights by group.

Fathers were also encouraged to participate in the study. Full participation was not obtained, but the following subsample of father-infant dyads was obtained: Group 1, very premature, 12; Group 2, premature, 12; and Group 3, full-term, 15.

Infants in the very premature and premature groups were selected from the case records of the Salvation Army Grace Hospital in Windsor, Ontario which is designated as a modified level III hospital¹ and from infant programmes in Windsor, Sarnia, and Chatham, Ontario. These infant programmes provide monitoring services and/or treatment to families of infants who have documented developmental delays or who are considered to be at-risk for delays. The number of premature infants obtained from each setting was as follows: Infant and Family Program in Windsor, 17; Salvation Army Grace Hospital in Windsor, 15; the Early Intervention

¹ Modified level III describes a hospital which has a neonatal intensive care unit which provides regionalized intensive care to newborns; modified refers to the fact that it is not a teaching hospital.
Table 1

*Mean Gestational Age, Birth Weight, and Age at Assessment*

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<th>Gestation (weeks)</th>
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<th>Birth Weight (grams)</th>
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<tr>
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<td>2137</td>
<td>3478</td>
</tr>
<tr>
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<td>334</td>
<td>560</td>
<td>228</td>
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<tr>
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<td>610-1840</td>
<td>1250-2930</td>
<td>3040-3785</td>
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</table>

<table>
<thead>
<tr>
<th>Chronological age (months)</th>
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</tr>
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<tbody>
<tr>
<td>Mean</td>
<td>27.1</td>
<td>26.5</td>
<td>24.9</td>
</tr>
<tr>
<td>SD</td>
<td>1.2</td>
<td>1.3</td>
<td>1.2</td>
</tr>
<tr>
<td>Range</td>
<td>25.0-29.3</td>
<td>24.0-28.5</td>
<td>22.4-26.6</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Corrected age (months)</th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>24.1</td>
<td>24.9</td>
<td>24.9</td>
</tr>
<tr>
<td>SD</td>
<td>1.2</td>
<td>1.2</td>
<td>1.2</td>
</tr>
<tr>
<td>Range</td>
<td>22.3-25.9</td>
<td>22.7-26.8</td>
<td>22.4-26.6</td>
</tr>
</tbody>
</table>
Home Service Unit at the Sarnia Lambton Centre for Children and Youth, 6; and the Kent-Chatham Health Unit, 2. Gestational age for infants in these groups was established from records at the hospital and/or infant programme.

Infants in the full-term group were obtained from Salvation Army Grace Hospital, informal networks, and The Family Centre, a neighbourhood drop-in centre in Windsor. There were difficulties in tracking families from hospital records and in obtaining sufficient numbers of infants from families of lower socioeconomic status, consequently it was necessary to gather referrals from sources other than hospital records. Thus, The Family Centre in Windsor and families who were in the study were approached to supply names of infants. The Family Centre is located in a neighbourhood with several subsidized housing units and was established as a setting where parents (usually mothers) could drop in with their young children and spend time with other parents while their children played together. The number of full-term children obtained from each method was as follows: Salvation Army Grace Hospital, 9; informal network, 7; and Family Drop-In Centre, 4.

No infants were included in the study if they had documented congenital (unrelated to prematurity) and/or chromosomal anomalies. At the time of testing, all infants were ambulatory, and with no reported visual or hearing problems that were uncorrected. Thus, the preterm infants could be defined as "healthy preterms."² Infants were excluded from the full-term group who: (a) required neonatal intensive care, (b) were hospitalized following hospital discharge after birth, or (c) had birth weights less than 3000 grams or over 4500 grams. Information regarding eligibility was documented by hospital or infant programme records for the premature infants and by hospital records and/or parent reports for the full-term infants.

² Two infants (one in each premature group) had received intraventricular shunts because of hydrocephalous; they were not involved in any specialized treatment when assessed.
Assessments were conducted from July, 1988 to June, 1989 by the author in the infants' homes when the infants were approximately 24 months of age (i.e., between 22.0 and 26.9 months of age, corrected in the case of the premature infants). Table 1 reports chronological and corrected\(^3\) ages at assessment. Attempts were made to equate the three groups on the following variables: corrected age at assessment, socioeconomic status (as determined by Hollingshead, 1975), number of parents living in the home, parity (i.e., first-born versus later-born), and infants' sex (refer to Table 2 for specifics of group membership).

**Measures.**

**Bayley Mental Development Index.** The Bayley Scales of Infant Development (Bayley, 1969) are the most widely used measures to assess developmental status in infancy and have received very favorable reviews (e.g., Sattler, 1982). They are designed for use with infants whose ages fall between 2 and 30 months of age. At the 2-year level, items on the Mental Scale assess fine motor, early verbal communication, shape discrimination, and problem-solving abilities. A standard score called a Mental Development Index (MDI) is obtained which has a mean of 100 and a standard deviation of 16.

Bayley (1969) reports split-half reliability coefficients for the Mental Scale ranging from .81 to .93 for the 14 age groups in the normative sample (.89 at 24 months). The standard error of measurement for the MDI for the 14 age groups ranged from 4.2 to 6.9 standard score points and was 5.5 at 24 months. Interrater reliability was reported in the manual as 89.4% agreement (i.e., the mean percentage of agreement on 59 items was 89.4%). More recently Roth et al. (1984) reported that the percent of exact agreement on the Mental Scale items was 99.4. Meisels et al. (1987) also report excellent interrater reliability.

\(^3\) the number of weeks that the infant was born prematurely subtracted from his/her chronological age.
Table 2

Summary of Demographic Data

<table>
<thead>
<tr>
<th>Group</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very Premature</td>
<td>n</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Socioeconomic status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I &amp; II</td>
<td>6</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>III</td>
<td>6</td>
<td>11</td>
<td>4</td>
</tr>
<tr>
<td>IV &amp; V</td>
<td>8</td>
<td>3</td>
<td>7</td>
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<tr>
<td>Sex</td>
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</tr>
<tr>
<td>females</td>
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<td>9</td>
<td>9</td>
</tr>
<tr>
<td>males</td>
<td>9</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>firstborn</td>
<td>8</td>
<td>11</td>
<td>8</td>
</tr>
<tr>
<td>laterborn</td>
<td>12</td>
<td>9</td>
<td>12</td>
</tr>
<tr>
<td>Parent participation</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>mothers</td>
<td>20</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>fathers</td>
<td>12</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>Single-Parent Home</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>
**Infant Behavior Record (IBR).** The IBR provides a standard format for documenting the infant's general behavioural style and is completed by the examiner immediately following the assessment. There are 30 items which include areas such as cooperativeness, tension, activity, social behaviour, attention span, and object orientation. In other words, it assesses "how" the infant behaves rather than "what" skills he/she performs (Lasky et al. 1983). McGowan, Johnson, and Maxwell (1981) report that these items overlap with the nine-dimension temperament scale which was developed by Thomas et al. (1968).

Although Bayley provides the distribution of ratings and modal scores according to age group for the first 24 IBR items, no overall global score (similar to the MDI) has been provided in the manual. To facilitate IBR interpretation, Matheny (1980, 1983) factor analyzed the IBR items. He reported the following three factors which were essentially age- and sex invariant: Activity (i.e., energy level), Test Affect-Extraversion (i.e., positive and outgoing), and Task Orientation (i.e., involved with the testing situation). The present study utilized these factors with the items which were obtained at 24 months (Appendix D).

Field et al. (1979) report an IBR interrater reliability coefficient of .91 when the IBR was completed by trained examiners. Roth et al. (1984) reported that the percentage of close agreement for each of five IBR factors was 89-100%.

**Parenting Stress Index (PSI), Form B.** The PSI (Abidin, 1986) was designed to detect parent-child systems which are under excessive "stress" and thus at risk for parenting problems or behavioural problems in the child. The Child and Parent Domains assess the contributions of the child's behavioural characteristics and parent qualities respectively to stress in the parent-child system. Questions such as "My child is more easily upset than other children his/her age" are answered by endorsing one of five responses ranging from "strongly agree" to "strongly disagree." The PSI is usually completed in 20-30 minutes and requires reading skills at
a Grade 5 level (McKinney & Peterson, 1984). It can be used with parents who have children ranging in age from birth to ten years of age. It is, however, most applicable for parents who have children less than three years of age based on the characteristics of the normative sample (McKinney & Peterson, 1984).

The Child Domain (47 items) assesses child characteristics that are thought to make the job of parenting particularly difficult. Although items on this domain were not designed as measures of temperament, they do "tap into those temperament characteristics which reveal the greatest long-term predictive validity" (Abidin, 1986, p.2). What differentiates the PSI from other measures designed to assess these types of behaviours is that Abidin has tried to incorporate the parents' perceptions of the behaviour as opposed to measuring the behaviour (e.g., activity) in the "pure" sense. Child Domain items are organized into the following six subscales: Adaptability, Acceptability, Demandingness, Mood, Distractibility/Hyperactivity and Reinforces Parent. These subscales are summarized in Appendix B.

The seven subscales (54 items total) on the Parent Domain assess aspects of parent characteristics and family context variables that could lead to dysfunctional parenting skills. The subscales are: Depression, Attachment, Restriction of Role, Sense of Competence, Social Isolation, Relationship with Spouse, and Parental Health (Appendix C).

In addition to the Child and Parental Domains, 19 items on the Life Stress Scale provide a measure of stress outside the parent-child relationship (e.g., began a new job). The Life Stress items are not included in the Total Score.

Abidin (1986) reports that Total Scores (Parent plus Child Domain Scores) between 180 and 250 (approximately 15th to 80th centiles) are within the average range. According to Abidin a Total Score of greater than 267 indicates excessive stress within the system and should occasion counselling or referrals for such. Total Scores below 175 (i.e., approximately the 10th centile)
may be false negatives and indicate that the parent is "very defensive, fearful or mildly paranoid" or lack commitment to his/her parenting role (Abidin, 1986, p. 40). Loyd and Abidin (1985) recommend that the Child and Parent Domain scores should be examined separately to see if either is reflective of excessive stress. Subscale scores can be further analyzed to detect more specific areas of stress.

Test-retest stability (i.e., one to three months time between administrations) on a small clinical sample, as reported by Pearson correlation coefficients were .63 for the Child Domain, .91 for the Parent Domain, and .96 for the Total Score (Abidin, 1986). The 1986 PSI Manual reports internal reliability coefficients (based on responses of 534 mothers) of .89, .93, and .95 for the Child and Parent Domains and Total Scores respectively, indicating a high degree of internal consistency. Subscale coefficients ranged from .62 (i.e., Demandingness) to .70 (i.e., Reinforces Parent) for the Child Domain and from .55 (i.e., Attachment) to .80 (i.e., Depression) for the Parent Domain. Factor analyses supported the division of the items into Child and Parent Domains and the unique entities of the subscales (Loyd & Abidin, 1985).

**Questionnaire.** A brief questionnaire (see Appendix E) was designed for this study. It provided demographic data from which socioeconomic status was derived according to Hollingshead's formula (Hollingshead, 1975). Where both parents are employed outside the home, the Hollingshead includes both mothers' and fathers' education and occupation in determining at which of five levels the family is ranked.

**Procedure**

Parents were contacted by the hospital/agency/family with which they were involved and verbally agreed to be approached to participate in the study. The author made the initial contact with the family by telephone. At this time the parents had the opportunity to discuss questions
that they had about the study. If verbal consent for participation was obtained, copies of the PSI (Form 6) were mailed to the parents and an appointment was scheduled to assess the infant. During the telephone conversation, parents were given instructions on completion of the PSI and encouraged to fill out the forms separately without consulting with each other.

Assessments were conducted by the author in the infant's home. The procedure followed was to go over the demographic questionnaire with the mother and to collect (and answer any questions that the parent may have had about) the PSI. This format allowed the toddler time to become accustomed to the examiner. The Bayley Mental Scale was then administered in the parent's presence (usually mother) after which feedback was given orally to the parent(s) who was(were) present during the assessment.

The IBR is a more subjective measure than the Bayley MDI, thus inter-rater reliability was established. A second examiner accompanied the author to observe the Bayley Mental Scale administration in order to complete an independent IBR assessment of nine infants (i.e., three per group). These reliability checks took place between July, 1988 and January, 1989. This second examiner was a doctoral candidate in Psychology at the University of Windsor and she was experienced in assessing preschool children. Assessments were conducted in the families' homes (where no one-way mirrors were available) so it was not always possible for the observer to be "blind" to the infants' birth status (i.e., mothers often discussed their baby's birth status during the assessment). The IBR rating sheet was completed independently without consultation immediately after leaving the infants' home.

The overall percentage of agreement (to within one point) on the 14 IBR items was 89.7%. This percentage is comparable to other estimates of IBR inter-rater reliability (Field et al., 1979; and Roth et al., 1984). On those items for which there was a difference of more than one point between the two examiners' ratings, reconciled scores (i.e., mean of the two scores) were used in the data analyses.
For clients of the three infant programmes, summary reports were written in the form of a letter to the parent; these were sent to both the child's parents and to the Director of the agency involved. These reports were reviewed and cosigned by a registered psychologist. Appendices F and G contain the information letter and a copy of the release form obtained from the parents.

**Design and Analyses**

The present study was a quasi experimental design because it was not possible to randomly assign subjects to groups. The infants were selected for group assignment from naturally occurring groups based on gestational age at birth. Thus, the independent variable was gestational age at birth. The infants were grouped into one of three categories: very premature, gestational age 24 to 30 weeks; premature, gestational age 31 to 37 weeks; and full-term, 38 to 41 weeks. The dependent variables were: infant developmental status as measured by the Mental Developmental Index of the Bayley Scales of Infant Development (Bayley, 1969); infant behavioural style as assessed by the three composite scores, Activity, Affect, and Orientation which were derived by Matheny (1980) from the Bayley Infant Record (Bayley, 1969); and parental stress as measured by the Parenting Stress Index (Abidin, 1986). To control for extraneous factors which have been reported to or might influence the dependent variables, attempts were made to match the groups on the following variables: age (corrected) at assessment, socioeconomic status (SES), number of parents living in the home, parity (i.e., first born versus later born), and infant's sex.

The data were analyzed using Statistical Analysis System Programs (SAS Institute, 1985). A univariate analysis of variance (ANOVA) (group x Mental Development Index) was performed to evaluate group differences in developmental status. Group differences in infants' behavioural style as perceived by the examiner were analyzed by means of a multivariate analysis
of covariance (MANCOVA) with the three IBR composites, Activity, Affect, and Task Orientation as the dependent variables and corrected age as covariate. Separate MANCOVAs were performed to analyze group differences on PSI Child and Parent subtests; ANCOVAs (corrected age served as the covariate) were employed to analyze group differences on PSI summary scores (i.e., Child and Parent Domain and Total and Life Scores). Paired t-tests were used to compare mothers' and fathers' PSI scores.

Pearson correlations were calculated to examine the relationships among the summary scores of the dependent measures. Finally because many studies employ birthweight to categorize this population of at-risk infants, the data were reanalyzed with the infants regrouped according to birthweight categories.
Chapter 3

RESULTS

Attempts were made to equate the three groups on the following variables: corrected age at assessment, socioeconomic status (as determined by Hollingshead, 1975), number of parents living in the home, parity (i.e., first-born versus later-born), and infants’ sex (refer to Table 2 for specifics of group membership). Univariate analyses of variance (ANOVAs) were performed to evaluate group differences in (a) chronological and (b) corrected ages. Both ANOVAs indicated a significant group effect [F(2,57) = 16.64, p = .0001 for chronological age and F(2,57) = 3.80, p = .03 for corrected age]. With regard to chronological age, post hoc Scheffe tests (at p<.05) indicated that the full-term infants were significantly younger than the two preterm groups; Scheffe tests did not specify the group differences for corrected age. Chi-square analyses on socioeconomic status (with the two groups at the upper and lower ends collapsed), parity, and infant’s sex, indicated that there were no significant group differences on these variables \[X^2 (4, N = 60) = 6.90, p = .14; X^2 (2, N = 60) = .94, p = .63; X^2 (2, N = 60) = .53, p = .77\] respectively. There were insufficient numbers to statistically calculate the group differences in single- versus two-parent families. The majority of infants in each group came from two-parent families (i.e., 90% in the very premature group, 95% in the premature group, and 80% in the full-term group).

The data were analyzed to evaluate the differences between very premature, premature, and full-term groups on: 1) developmental status (as measured by the Bayley Mental Scale), 2) behavioural style (as measured by the Bayley Infant Behaviour Record), and 3) parent-reported stress (as measured by the Parenting Stress Index). Corrected age at time of testing was
controlled for statistically by using corrected age as a covariate when group comparisons were made. The exception to this was when the dependent variable was the Bayley Mental Development Index because the index is a standard score based on the infant's age.

Subsequent analyses examined the relationship of both developmental status and behavioural style to parental stress. Finally, because many studies in this area employ birthweight to categorize at-risk premature infants, the data were reclassified by birthweight and examined for group differences on the dependent measures.

**Bayley Mental Development Index**

Table 3 reports the group means, standard deviations, ranges, and results from statistical tests for the Bayley Mental Development Indices (MDIs). The means of the two premature groups are reported in terms of both chronological and corrected ages. It was predicted that, given the healthy status of the premature infants, mean MDIs for all groups would fall within the average range, with the least optimal performance demonstrated by the very premature group, followed in order by the premature, and the full-term groups.

As predicted, a univariate analysis of variance (ANOVA, group x MDI calculated according to chronological age), indicated a significant group effect, $F(2, 57) = 9.47, p = .0003$. A follow-up comparison of group means using the Scheffe test ($p<.05$) revealed that the very premature group scored significantly lower than the full-term group; the premature group did not differ significantly from either the very premature or the full group. When the ANOVA was performed using MDIs calculated with corrected ages for the premature infants, there was no longer a significant group effect, $F(2, 57) = 1.29, p = .28$.

---

4 Corrected ages were obtained by subtracting the number of weeks that the infants were born prematurely from their chronological ages.
Table 3

*Means, Standard Deviations, Ranges, and Statistical Tests on the Bayley Mental Development Index (MDI)*

<table>
<thead>
<tr>
<th>Group</th>
<th>Very</th>
<th>Premature</th>
<th>Premature</th>
<th>Full-Term</th>
<th>$F(2, 57)$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>MDI (Chronological Age)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>91$^a$</td>
<td>102$^{ab}$</td>
<td>116$^b$</td>
<td></td>
<td>9.47$^*$</td>
</tr>
<tr>
<td>SD</td>
<td>15</td>
<td>20</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>64-126</td>
<td>69-140</td>
<td>87-145</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDI (Corrected Age)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>106</td>
<td>111</td>
<td>116</td>
<td></td>
<td>1.29</td>
</tr>
<tr>
<td>SD</td>
<td>17</td>
<td>20</td>
<td>19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>80-140</td>
<td>79-150</td>
<td>87-145</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. N = 60, 20 in each group. Standardized MDI scores have a mean of 100 and a standard deviation of 16.*

$^a,b$. Means with different superscripts are significantly different from each other ($p<.05$).

$^*p = .0003$. 
MDIs (without correction for prematurity) ranged from 64 to 145, and with correction from 79 to 150. None of the infants in the full-term group received an MDI more than one standard deviation below the mean (i.e., 85). Twenty-five percent of the infants in both premature groups scored below 85 when no age correction was made. The percentage was reduced to 10% for each group with correction. In terms of infants who were born after the shortest gestational periods, seven infants in the very premature group had gestational ages between 24 and 26 weeks. Three of these seven infants achieved uncorrected MDIs in the 90s. With correction, all but one of these infants (MDI of 80) earned MDIs within one standard deviation of the mean.

_I infant Behavior Record_

The Infant Behavior Record (IBR) was used to assess the infants’ behavioural style as scored by the examiner. The IBR items used in this project were those selected and grouped according to the three factors, Activity, Affect, and Task Orientation (Matheny, 1983; Appendix D). High scores on these factors reflect greater energy and movement, more sociable behaviour, and greater ability to maintain attention to the test items for Activity, Affect, and Orientation respectively.

It was predicted that the very premature group would receive IBR scores reflecting a difficult behavioural style (i.e., high scores on Activity and low scores on both Affect and Orientation relative to the other two groups). The full-term group was expected to receive scores reflecting the least difficult behavioural style (i.e., a reversal of the above score pattern) and it was predicted that the preterm group would receive scores mid-way between the other two groups.
A one-way multivariate analysis of covariance (MANCOVA) was performed to compare behavioural style across groups (group x Activity, Affect, and Orientation; corrected age served as the covariate). The results indicated a significant overall group effect \( F(6, 108) = 2.70, p = .02 \).

Table 4 reports descriptive statistics for the three IBR factors. To evaluate the nature of the group differences on the three factors, three one-way analyses of covariance (ANCOVAs), one for each IBR composite with corrected age as covariate, were calculated. As reported in Table 4, a significant group effect was obtained for all three factors [Activity, \( F(3, 56) = 5.70, p = .002 \); Affect, \( F(3, 56) = 3.69, p = .02 \); and Orientation, \( F(3, 56) = 8.26, p = .0001 \)].

To further explore group differences on the individual IBR composites, post hoc Scheffe tests (\( p < .05 \)) were performed. In all three cases, the means were in the predicted direction. The results revealed that with regard to Activity, the two premature groups were significantly more active than the full-term group but not different from each other. In terms of Affect the Scheffe test, which is quite conservative, did not indicate any differences between the groups in spite of the significant ANCOVA. The full-term group scored significantly higher on the Orientation factor than both the preterm groups; the preterm groups did not differ from each other.

**Parenting Stress Index (PSI)**

As reported in the Method section, PSI scores were obtained from the mothers of all sixty infants. Thirty-nine of the infants' fathers also completed the PSI with group participation as follows: very premature, 12; premature, 12; and full-term, 15. It was predicted that the highest Child Domain and Total scores (the higher the score, the greater the stress) would be reported by the parents of the very premature group, followed in order by the parents of the premature group and the full-term group. Scores on the Parent Domain and Life Stress Scale were expected to be
Table 4
Means, Standard Deviations, Ranges, and Statistical Tests for IBR Factors, Activity, Affect, and Orientation

<table>
<thead>
<tr>
<th>Group</th>
<th>Very</th>
<th></th>
<th></th>
<th>F(3, 56)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Premature</td>
<td>Premature</td>
<td>Full-Term</td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>21.1&lt;sup&gt;a&lt;/sup&gt;</td>
<td>20.6&lt;sup&gt;*&lt;/sup&gt;</td>
<td>17.6&lt;sup&gt;b&lt;/sup&gt;</td>
<td>5.70**</td>
</tr>
<tr>
<td>SD</td>
<td>2.9</td>
<td>2.9</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>15-26</td>
<td>14-25</td>
<td>12-23</td>
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<tr>
<td>Affect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>29.5</td>
<td>30.3</td>
<td>33.0</td>
<td>3.69*</td>
</tr>
<tr>
<td>SD</td>
<td>4.3</td>
<td>6.3</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>21-36</td>
<td>16-39</td>
<td>22-43</td>
<td></td>
</tr>
<tr>
<td>Orientation</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>26.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>28.2&lt;sup&gt;a&lt;/sup&gt;</td>
<td>31.7&lt;sup&gt;b&lt;/sup&gt;</td>
<td>8.26***</td>
</tr>
<tr>
<td>SD</td>
<td>3.2</td>
<td>4.9</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>20-33</td>
<td>18-36</td>
<td>23-38</td>
<td></td>
</tr>
</tbody>
</table>

Note. N = 60, 20 in each group. Higher scores indicate greater amounts of attributes. Modal scores are: Activity = 17, Affect = 32, and Orientation = 31.

<sup>a,b</sup> means with different superscripts differ significantly at p<.05.

approximately the same for all three groups. The same group pattern was predicted for the mothers' and fathers' scores but fathers' scores were expected to be lower than those reported by mothers.

**Mother-Reported PSI Scores.** PSI Child and Parent Domain subtests were subjected to two separate one-way MANCOVAs (corrected age served as covariate) to screen for group differences on each set of subtests. This procedure was employed as a safeguard against Type I error which increases with the number of comparisons that are made. Neither MANCOVA indicated group differences at the \( p<.05 \) level \([F(12, 102) = 0.69 \text{ for Child subtests and } F(14, 100) = 1.06 \text{ for Parent subtests}]\). Given the lack of significant MANCOVA findings and the similarity among group subtest means (refer to Table 5), no further analyses were conducted on the subtest means.

The means, standard deviations, and ranges for the four PSI summary scores (i.e., Child and Parent Domain and Total and Life Stress Scales) are reported in Table 6. One-way ANCOVAs (group \( \times \) summary score with corrected age serving as covariate) revealed no significant main effect at the \( p<.05 \) level for the Total Score, \( F(3, 56) = .39 \), or Life Score, \( F(3, 56) = .92 \). Consistent with the MANCOVA results, the two ANCOVAs performed on Child and Parent Domain scores were also not significant at the \( p < .05 \) level.

Abidin (1986) reports that the normal range for all domains and subtests is the 15th to the 80th percentile. The percentage of Child Domain Scores above the 80th percentile by group are as follows: very premature, 30%; premature, 30%; and full-term, 10%. The percent of Parent Domain Scores above the 80th percentile were the same for all groups (i.e., 15% for each group).

**Father-Reported PSI Scores.** Prior to analyzing father PSI scores, analyses were carried out to determine if families with father participation differed from those without father participation. The characteristics examined for family differences were: infants' sex, infants'
<table>
<thead>
<tr>
<th></th>
<th>Group</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very</td>
<td>Premature</td>
<td>Premature</td>
</tr>
<tr>
<td>Child</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adaptability</td>
<td>25</td>
<td>26</td>
<td>25</td>
</tr>
<tr>
<td>Acceptability</td>
<td>13</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Demandingness</td>
<td>19</td>
<td>18</td>
<td>17</td>
</tr>
<tr>
<td>Mood</td>
<td>11</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>Distractibility</td>
<td>27</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Reinforces</td>
<td>9</td>
<td>10</td>
<td>8</td>
</tr>
<tr>
<td>Parent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td>20</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Attachment</td>
<td>12</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>Restriction</td>
<td>18</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Competence</td>
<td>27</td>
<td>29</td>
<td>28</td>
</tr>
<tr>
<td>Isolation</td>
<td>13</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Spouse</td>
<td>16</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Health</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
</tbody>
</table>

Note.  \(N = 60\), 20 in each group.
Table 6

Means, Standard Deviations, Ranges, and Statistical Tests on Mother-Reported PSI Summary Scores

<table>
<thead>
<tr>
<th>Group</th>
<th>Very</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Child</td>
<td>Premature</td>
<td>Premature</td>
<td>Full-Term</td>
<td>$F(3, 56)^*$</td>
</tr>
<tr>
<td>Mean</td>
<td>104</td>
<td>100</td>
<td>96</td>
<td>1.33</td>
</tr>
<tr>
<td>SD</td>
<td>17</td>
<td>19</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Range</td>
<td>75-138</td>
<td>61-133</td>
<td>71-136</td>
<td></td>
</tr>
<tr>
<td>Parent</td>
<td>Mean</td>
<td>117</td>
<td>116</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>19</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>85-160</td>
<td>81-151</td>
<td>90-160</td>
</tr>
<tr>
<td>Total</td>
<td>Mean</td>
<td>221</td>
<td>217</td>
<td>216</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>31</td>
<td>38</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>176-286</td>
<td>152-270</td>
<td>166-296</td>
</tr>
<tr>
<td>Life Stress</td>
<td>Mean</td>
<td>6.2</td>
<td>4.3</td>
<td>6.9</td>
</tr>
<tr>
<td></td>
<td>SD</td>
<td>5.9</td>
<td>4.8</td>
<td>5.5</td>
</tr>
<tr>
<td></td>
<td>Range</td>
<td>0-23</td>
<td>0-16</td>
<td>0-21</td>
</tr>
</tbody>
</table>

Note. $N = 60$, 20 in each group. Higher scores reflect greater stress; normal range for Total = 180 to 250. High score = 122 for Child, 153 for Parent, and 17 for Life Stress. ^ None of these values reached significance at $p = .05$. 
birth order, number of siblings, and the families' socioeconomic status. Table 7 presents this
demographic data according to father participation as well as chi square values for each category.
As indicated, the only factor on which the father-participation families differed was
socioeconomic status, $X^2 (2, N = 60) = 8.12, p = .02$. The frequency counts in Table 7 suggests
that fathers who participated were from families of higher socioeconomic status than fathers who
did not participate. Infants' group membership had no bearing on fathers' tendency to participate
in the study [$X^2 (2, N = 60) = 1.32, p = .52$].

As was the case for the mother-reported scores, two one-way MANCOVAs (corrected
age as covariate) were employed to separately assess the groups for differences on Child Domain
and Parent Domain subtests. Neither MANCOVA revealed significant group differences at the
$p<.05$ level [$F(12, 60) = 1.14$ for Child subtests and $F(14, 58) = 1.01$ for Parent subtests]. (Refer
to Table 8 for subtest means.)

Means and standard deviations for the 39 father-reported Child and Parent Domains and
Total and Life Stress scores are presented, by group, in Table 9. One-way ANCOVAs (corrected
age as covariate) on Total, $F(3, 35) = .21$, and Life Stress Scores, $F(3, 35) = .14$, were not
indicative of group differences at the $p>.05$ level. These findings were consistent with results of
mother-reported data ($N = 60$). In spite of the bias towards higher socioeconomic status in father-
participation families, comparison with mothers' scores (reported in Table 6) indicates that the
fathers' PSI scores were very similar to those reported by the total sample of 60 mothers.

Comparison of Subsample of Father and Mother PSI Scores. Comparisons, by
group, between father- and mother-reported scores (for the subset of 39 infants whose both
parents completed the PSI) were made by paired-$t$ tests (Horvath, 1988). This analysis follows
the same procedure as that for repeated measure and yields an $F$ value. There were no significant
differences at the $p<.05$ level between mothers and fathers on the four PSI summary scores (i.e.,
<table>
<thead>
<tr>
<th>Demographics</th>
<th>Father Participation</th>
<th>No Father Participation</th>
<th>Chi Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infants' Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>19</td>
<td>12</td>
<td>.39</td>
</tr>
<tr>
<td>Female</td>
<td>20</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Infants' Birth Order</td>
<td></td>
<td></td>
<td>.01</td>
</tr>
<tr>
<td>First-born</td>
<td>18</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Not first-born</td>
<td>21</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Siblings</td>
<td></td>
<td></td>
<td>.19</td>
</tr>
<tr>
<td>None</td>
<td>13</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>17</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>More Than One</td>
<td>9</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Socioeconomic Status</td>
<td></td>
<td></td>
<td>8.12*</td>
</tr>
<tr>
<td>Upper</td>
<td>17</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Middle</td>
<td>15</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Lower</td>
<td>7</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

*p < .02
Child and Parent Domains, Total or Life Stress Scales) for any of the groups (Table 9 reports summary scores and $F$ values).

Mean subtest scores for both Child and Parent Domains are reported in Table 8. No comparisons between fathers' and mothers' subtest scores were calculated because of lack of significant findings on the Child and Parent Domain scores. Also, observation of the subtest scores suggests that they do not differ significantly.

**Relationship Among Measures**

Table 10 reports Pearson Correlation Coefficients which were computed to assess relationships among the summary scores of the dependent measures. These correlations are those obtained with the full sample of 60 infants so that the PSI scores are those reported by the infants' mothers.

As reported in Table 10, developmental status (i.e., MDI and MDIC) was negatively related to PSI Child scores [$r(60) = -.34, p = .009$ for MDI and $r(60) = -.25, p = .05$ for MDIC]. That is, regardless of group membership parents whose infants received lower MDIs rated their infants as having more stressful characteristics. Neither MDI nor MDIC were related to either PSI Parent or Total scores at the $p<.05$ level.

In terms of behavioural style, two of the three IBR composites were significantly related to the PSI Child Domain score. That is, both IBR composites Affect [$r(60) = -.28, p = .03$] and Orientation [$r(60) = -.34, p = .01$] were negatively related to the PSI Child Domain Score. In other words, children who were rated by the examiner as having more pleasing, outgoing dispositions and children possessing better task orientation behaviours were perceived by parents to be less stressful. The relationship between Activity and PSI Child Domain was not significant at the $p<.05$ level. As was the case with developmental status, behavioural style was also not
Table 8

Mean PSI Subtest Scores as Reported by Subsample of Mothers and Fathers

<table>
<thead>
<tr>
<th>Child</th>
<th>Group</th>
<th>Very Premature</th>
<th>Premature</th>
<th>Full-term</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>n = 12</td>
<td>n = 12</td>
<td>n = 15</td>
</tr>
<tr>
<td></td>
<td></td>
<td>M   F</td>
<td>M   F</td>
<td>M   F</td>
</tr>
<tr>
<td>Adaptability</td>
<td></td>
<td>27  28</td>
<td>26  27</td>
<td>24  25</td>
</tr>
<tr>
<td>Acceptability</td>
<td></td>
<td>14  14</td>
<td>12  12</td>
<td>11  11</td>
</tr>
<tr>
<td>Demandingness</td>
<td></td>
<td>18  18</td>
<td>18  17</td>
<td>17  16</td>
</tr>
<tr>
<td>Mood</td>
<td></td>
<td>10  10</td>
<td>9   10</td>
<td>8  9</td>
</tr>
<tr>
<td>Distractibility</td>
<td></td>
<td>25  25</td>
<td>23  26</td>
<td>24  25</td>
</tr>
<tr>
<td>Reinforcing</td>
<td></td>
<td>10  10</td>
<td>9   8</td>
<td>8  9</td>
</tr>
<tr>
<td>Parent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depression</td>
<td></td>
<td>20  18</td>
<td>18  18</td>
<td>18  17</td>
</tr>
<tr>
<td>Attachment</td>
<td></td>
<td>12  13</td>
<td>12  12</td>
<td>11  12</td>
</tr>
<tr>
<td>Restriction</td>
<td></td>
<td>19  17</td>
<td>18  17</td>
<td>18  18</td>
</tr>
<tr>
<td>Competence</td>
<td></td>
<td>27  27</td>
<td>29  26</td>
<td>27  27</td>
</tr>
<tr>
<td>Isolation</td>
<td></td>
<td>13  12</td>
<td>11  12</td>
<td>12  14</td>
</tr>
<tr>
<td>Spouse</td>
<td></td>
<td>16  16</td>
<td>15  16</td>
<td>17  16</td>
</tr>
<tr>
<td>Health</td>
<td></td>
<td>12  12</td>
<td>13  12</td>
<td>12  11</td>
</tr>
</tbody>
</table>

Note. M = mother, F = Father.
Table 9

*Means, Standard Deviations and Statistical Tests for PSI Summary Scores as Reported by Subsample of Mothers and Fathers*

<table>
<thead>
<tr>
<th>Parent Group</th>
<th>Mother</th>
<th>Father</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
<td>M</td>
</tr>
<tr>
<td>Very Premature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td>104</td>
<td>18</td>
<td>104</td>
</tr>
<tr>
<td>Parent</td>
<td>118</td>
<td>16</td>
<td>113</td>
</tr>
<tr>
<td>Total</td>
<td>222</td>
<td>29</td>
<td>217</td>
</tr>
<tr>
<td>Life</td>
<td>6</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>F(1,11)^a</td>
<td>.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Premature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td>97</td>
<td>13</td>
<td>99</td>
</tr>
<tr>
<td>Parent</td>
<td>115</td>
<td>23</td>
<td>113</td>
</tr>
<tr>
<td>Total</td>
<td>212</td>
<td>34</td>
<td>213</td>
</tr>
<tr>
<td>Life</td>
<td>6</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>F(1,11)</td>
<td>.19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full-Term</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td>92</td>
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<td>95</td>
</tr>
<tr>
<td>Parent</td>
<td>117</td>
<td>15</td>
<td>115</td>
</tr>
<tr>
<td>Total</td>
<td>209</td>
<td>24</td>
<td>210</td>
</tr>
<tr>
<td>Life</td>
<td>6</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>F(1,14)</td>
<td>.89</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. n = 12 for very premature and premature groups; n = 15 for full-term group.*

^a None of these values reached significance at p = .05.
significantly related (at $p<.05$ level) to parental stress as measured by PSI Parent Domain or Total scores.

There was a strong relationship between developmental status (with and without correction for prematurity) and all aspects of behavioural style. Pearson Correlation Coefficients between MDI (calculated according to chronological age) and the three IBR factors were as follows: Activity, $r(60) = -.57$; Affect, $r(60) = .55$; and Orientation $r(60) = .74$ ($p<.0001$ for all three correlations). As reported in Table 10, similar relationships were obtained when developmental status was corrected for prematurity (i.e., MDIC). There were also strong relationships among the IBR composites (i.e., all significant at $p<.001$).

**Sex Differences**

The total sample of infants included 29 females and 31 males, evenly distributed across the gestational age groups. Table 11 presents the mean scores on 15 dependent measures according to the infants' sex. Comparisons by $t$ tests (with a conservative $p<.01$ level due to the number of comparisons being made) did not yield any significant differences between males and females.

**Performance by Birth Weight**

Many studies examining the outcome of prematurity employ birth weight to categorize infants. Thus, the data were reanalyzed using the often-cited categories of 1) very low birth weight (VLBW), $<1501$ grams; 2) low birth weight (LBW), $>1500$ and $<2501$ grams; and 3) full-term, $>2500$ grams. With this recategorization, three infants moved from the original group 1 (i.e., the very premature infants, gestational period from 24 to 30 weeks) to the new group 2 (based on birth weight) and three infants moved from the original group 2 (premature, gestational
Table 10

*Intercorrelations Among Dependent Variables, Developmental Status, IBR Factors, and PSI Scores*

<table>
<thead>
<tr>
<th></th>
<th>Child</th>
<th>Parent</th>
<th>Total</th>
<th>MDI</th>
<th>MDIC</th>
<th>Active</th>
<th>Affect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parent</td>
<td>.58***</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
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<td>.90***</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDI</td>
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<td>-.07</td>
<td>-.22</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDIC</td>
<td>-.25*</td>
<td>-.10</td>
<td>-.19</td>
<td>.93***</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active</td>
<td>.09</td>
<td>-.14</td>
<td>-.04</td>
<td>-.57***</td>
<td>-.46**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Affect</td>
<td>-.28*</td>
<td>-.02</td>
<td>-.16</td>
<td>.55***</td>
<td>.51***</td>
<td>-.44**</td>
<td>-</td>
</tr>
<tr>
<td>Orient</td>
<td>-.34*</td>
<td>.04</td>
<td>-.15</td>
<td>.74***</td>
<td>.63***</td>
<td>-.68***</td>
<td>.66***</td>
</tr>
</tbody>
</table>

Note.  $N = 60$

*p<.05.  **p<.001.  ***p<.0001.*
Table 11

Means on Dependent Measures for Boys and Girls

<table>
<thead>
<tr>
<th>Variable</th>
<th>Females</th>
<th>Males</th>
<th>t(58)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$n = 29$</td>
<td>$n = 31$</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>Developmental Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDI</td>
<td>103</td>
<td>19</td>
<td>104</td>
</tr>
<tr>
<td>MDIC</td>
<td>111</td>
<td>17</td>
<td>111</td>
</tr>
<tr>
<td>IBR Composites</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>19</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Affect</td>
<td>31</td>
<td>6</td>
<td>31</td>
</tr>
<tr>
<td>Orientation</td>
<td>28</td>
<td>5</td>
<td>29</td>
</tr>
<tr>
<td>PSI Scores</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td>103</td>
<td>18</td>
<td>98</td>
</tr>
<tr>
<td>Parent</td>
<td>120</td>
<td>19</td>
<td>116</td>
</tr>
<tr>
<td>Life</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>223</td>
<td>33</td>
<td>213</td>
</tr>
<tr>
<td>Adaptability</td>
<td>26</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Acceptability</td>
<td>13</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Demandingness</td>
<td>19</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>Mood</td>
<td>11</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Distractibility</td>
<td>26</td>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>Reinforcing</td>
<td>10</td>
<td>3</td>
<td>8</td>
</tr>
</tbody>
</table>

* None of the comparisons reached significance at $p = .05$. 
period from 31 to 37 weeks) to the new group 1. Seven infants in the premature group were reclassified as full-term (i.e., group 3) under the birth weight category, bringing the number in the new full-term group to 27.

Appendix H reports the mean summary scores on the dependent measures according to the two methods of classifying the infants. Table 12 presents a comparison of results of relevant analyses\(^5\) which were calculated to determine group differences on the dependent measures using the two methods of categorizing the infants. Recategorizing the infants did not change the outcome of the analyses in terms of overall group effect. In a few cases, it did result in slight changes in differentiating group 2 from the other two groups.

More specifically, one-way ANOVAs to determine group differences in developmental status were significant at \(p = .0003\) level for both categories of infants \([F(2, 57) = 9.47\) for gestational age groupings and \(F(2, 57) = 12.18\) for birth weight groupings]. In both cases, post hoc Scheffe comparisons \((p < .05)\) on group MDI means differentiated group 1 (i.e., very premature/VLBW) from group 3 (i.e., full-term). Using birth weight categories, the middle group (i.e., premature/LBW) was found to differ significantly from group 3; this difference was not obtained with gestational age categories. The two premature groups, regardless of categorization method, did not differ significantly from each other.

The results of MANCOVAs (corrected age served as covariate), calculated to determine group differences in behavioural style (Activity, Affect, and Orientation), indicated a significant group effect for both categories of infants \([F(6, 108) = 2.72\) for birth weight, \(p = .02\) and \(F(6, 108) = 2.70, p = .02\) for gestational age]. As reported in Table 10, one-way ANCOVAs on the individual IBR composites (corrected age as covariate) yielded significant group effects on all

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\(^5\) Analyses calculated were: ANOVAs for developmental status, MANCOVAs for overall behavioural style and PSI Child and Parent subtests, and ANCOVAs for individual IBR composites and FSI summary scores.
Table 12

Results of Analyses to Determine Group Differences on Dependent Variables Based on Two Classification Systems

<table>
<thead>
<tr>
<th>Variable</th>
<th>Classification System</th>
<th>Gestational Age</th>
<th>Birth Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>df</td>
<td>F</td>
<td>p</td>
</tr>
<tr>
<td>Developmental Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MDI</td>
<td>(2,57)</td>
<td>9.47</td>
<td>***</td>
</tr>
<tr>
<td>MDIC</td>
<td>(2,57)</td>
<td>1.29</td>
<td>n.s.</td>
</tr>
<tr>
<td>Behavioural Style</td>
<td>(6,108)</td>
<td>2.70</td>
<td>*</td>
</tr>
<tr>
<td>Activity</td>
<td>(3,56)</td>
<td>5.70</td>
<td>**</td>
</tr>
<tr>
<td>Affect</td>
<td>(3,56)</td>
<td>3.69</td>
<td>*</td>
</tr>
<tr>
<td>Orientation</td>
<td>(3,56)</td>
<td>8.26</td>
<td>****</td>
</tr>
<tr>
<td>PSI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td>(12,102)</td>
<td>.69</td>
<td>n.s.</td>
</tr>
<tr>
<td>Parent</td>
<td>(14,100)</td>
<td>1.06</td>
<td>n.s.</td>
</tr>
<tr>
<td>Total</td>
<td>(3,56)</td>
<td>.39</td>
<td>n.s.</td>
</tr>
<tr>
<td>Life</td>
<td>(3,56)</td>
<td>.92</td>
<td>n.s.</td>
</tr>
</tbody>
</table>

*p<.05. **p<.005. ***p<.0005. ****p<.0001.
three composites regardless of categorization method. Scheffe tests on individual group means (at $p<.05$ level) indicated the same pattern in group differences on Activity and Affect for both categories of infants (i.e., both premature groups were significantly more active than the full-term groups and there were no group differences on the Affect composite). The only difference with redistribution of infants by birth weight was on the Orientation factor. In the original analyses using gestational age groups, Scheffe tests indicated that the full-term group differed significantly from both groups 1 and 2 which did not differ from each other. With the groupings by weight, groups 2 and 3 no longer differed significantly.

As indicated in Table 12, categorization method did not effect outcome of analyses performed on PSI data (obtained from full sample of 60 mothers). Two separate MANCOVAs on PSI Child and Parent subtests were not significant (at $p<.05$ level) with either classification; ANCOVAs on PSI Total and Life Stress Scores also did not yield significant results regardless of classification method.
CHAPTER 4
Summary and Discussion

The purpose of the present study was to evaluate 2-year-old premature and full-term
toddlers on developmental status and behavioural style and to assess levels of stress as reported
by their parents. "Premature" describes infants born any time before 38 weeks gestation, thus the
term applies to infants who have been exposed to a broad range of risk factors. The premature
infants in the present study were further differentiated into the following two groups according to
the length of their gestation: (a) very premature (i.e., between 24 and 30 weeks gestation) and (b)
premature (i.e., between 31 and 37 weeks gestation). This final chapter will review and discuss
the findings and their implications.

Summary of Findings

Developmental Status. Based on the healthy status of the premature infants it was
predicted that MDI means for all groups would fall within the average range. It was also
predicted that the group MDI means would be ordered as follows: lowest MDI mean would be
obtained by the very premature group followed by higher means by the premature and full-term
groups respectively. The trend in group MDI means was as predicted. When no corrections for
prematurity were made the mean MDI of the very premature infants was significantly lower than
that of the full-term group but was not significantly lower than the mean MDI obtained by the
premature infants ($p = .05$). The premature group also did not differ significantly from the full-
term group. The trend in scores was also as predicted when MDIs were calculated according to
dates corrected for prematurity. However, the trends did not result in significant group differences
($p = .05$).

**Behavioural Style.** The IBR was used to assess how the infants related to the
examiner and to the tasks presented. It was predicted that the very premature group would
receive scores reflective of the most "difficult" behavioural style$^6$ followed in order by the
premature and full-term groups. There was a significant group effect in the predicted direction
for all three IBR factors ($p<.05$). More specifically, post hoc Scheffe tests ($p<.05$) indicated that
(a) the two premature groups were more active than the full-term group and (b) the two premature
groups also had more difficulty in attending to tasks than the full-term group. In other words, the
children in the preterm groups needed more encouragement to complete tasks, had less endurance
and less tolerance for frustration, and shorter attention spans. At times it appeared that they had
the necessary skills to complete the task, but were unable to persevere. Post hoc tests failed to
specify group differences on the third IBR factor (outgoing and co-operative behaviour).

**Parental Stress.** It had been predicted that parent-reported stress scores on the PSI
would be highest (i.e., indicating the most stress) for the very premature group, followed in turn
by those for the premature and full-term groups. It was therefore unexpected that there were
no differences in stress levels among the groups on the four PSI summary scores (i.e., Child,
Parent, Total, and Life Stress). It had also been predicted that mothers would score higher than
fathers on the PSI. Fathers who participated in the study were from families of higher
socioeconomic status than families from the sample as a whole. Despite this difference the
fathers' mean scores on PSI summary scores were similar to the mean summary scores obtained
by the 60 mothers. Comparison within families did not reveal a significant difference between
fathers' and mothers' scores ($p = .05$). This finding held across all groups.

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$^6$ as measured by the IBR composite scores Activity, Affect, and Task Orientation
Correspondence Between Examiner and Parent Ratings. It had been expected that children who were viewed as difficult by the examiner (as assessed by IBR ratings) would also be perceived as more stressful by their parents. As reported above, when mothers' perceptions of their toddlers were compared there were no significant group differences; the examiner's ratings, however, indicated significant differences among the groups. When the groups were collapsed Pearson Correlation Coefficients indicated a significant relationship between PSI Child scores and IBR Task Orientation \((p = .05)\) and Affect \((p = .05)\). There was no significant relationship between PSI Child scores and IBR Activity ratings.

Correlates With Stress. The relationship between behavioural style and mother-reported stress (i.e., PSI Child score) was reported above. Further analyses (with the groups collapsed) indicated that developmental status \((r = -.34)\) was significantly related to the Child score \((p<.05)\). Neither sex of the toddler or socioeconomic status was related to the Child score.

Discussion

Developmental Status.

One of the purposes of the present study was to break down the heterogeneous sample of premature infants to gain information about subgroups of premature infants. As stated above, the lower the gestational age, the higher the risk for developmental problems. It was encouraging to see that with a sample of "healthy" premature infants the only significant group difference on MDIs occurred between the full-term and very premature infants. This difference disappeared when the MDIs were corrected for prematurity. It was also encouraging to observe that the group mean MDI of the very premature group (which was considered most at-risk for developmental delays) was within the average range even without correction for prematurity. Thus, with the breakdown of the premature infants into gestational age groupings, this study documents that the
majority of healthy premature infants who were considered to be at higher risk (i.e., born before 31 weeks gestation) are functioning well when global measures of development are considered. Inability to significantly differentiate the middle/premature group from the other two groups (for both chronological and corrected ages) was likely due to the large variability within each group created by the broad range in MDIs.

The results of the present study are consistent with findings of previous researchers who have reported that the outcome for the majority of healthy premature toddlers is currently quite positive (Brown & Bakeman, 1980; Goldberg & DiVitto, 1983; and Seigel et al., 1982). The finding that premature infants have not "caught up" at two years of age is similar to results reported by Seigel (1982).

Thus, when developmental status is considered differences between premature and full-term populations are subtle and in some part depend on whether corrections are made for prematurity. As demonstrated by the overlap in scores among the groups many premature infants (in both risk groups) are performing well, but a significant number are receiving lower scores than their full-term counterparts.

**Behavioural Style.** As reported in an earlier section of this paper Bayley (1969) did not present a global index (or subtest scores) for the IBR items. Researchers have devised methods of summarizing the items according to their particular research interests (e.g., Astbury et al., 1983; Matheny, 1983; and Meisels et al. 1983). In spite of the different combinations of IBR items there is a common finding of differences in preterm and full-term infants' behaviours over the first two years of life (Field et al., 1979; Meisels et al., 1983). The results of the present study are consistent with past research in documenting more favourable IBR scores for full-term infants over those for premature infants. For example, Field et al. (1979) reported superior ratings for full-term over preterm infants on a grouping of IBR ratings named the Primary Cognitive
Constellation. This index is very similar to the Task Orientation Factor in the present study on which both premature groups received less favourable scores than the full-term infants. Astbury et al. (1983) used the IBR to rate premature infants as "hyperactive". These authors reported that the percentage of "hyperactive" infants increased from 11% to 24% from 1 year of age to 2 years of age. The Astbury et al. study did not use a control group however, the findings of higher activity levels in the premature groups in the present study would appear to be consistent with their observations. Thus, the present study contributes to the literature which supports the value in using the IBR to gain useful information about differences in behavioural style between populations of healthy premature and full-term infants.

**Parental Stress.** Studies have documented increased stress levels in parents of premature over full-term infants during the infants' first year (Zakreski, 1983). The finding of no differences in stress levels when infants are 2 years of age may be related to the relative reduction in stress from the neonatal period to the infants' second birthday. This reduction is likely to be much greater for parents of premature infants than for parents of full-term infants. During the assessments many parents of premature infants talked about how extremely difficult the neonatal period and the first few months had been for them. By the time the infants were assessed for the present study the home situation had calmed down considerably. In fact, many parents of premature infants (especially in the first group) mentioned that PSI scores would have been much different (i.e., indicative of more stress) had the test been completed a year earlier. Thus, relative to earlier times these infants are now doing well from their parents' perspective.

Many parents who have infants born prematurely have seen their infants survive very stormy neonatal courses. They may view their infants as fighters whose feisty behaviour made it possible for them to survive. This may lead these parents to respect, value, and perhaps even encourage their infants' active, assertive behaviours which would in turn lead to higher tolerance
for some behaviours. This tolerance and relief that their children have survived their turbulent beginnings may also have contributed to lowered PSI scores by parents of prematurely born infants.

It may also be that there is an element of denial on the premature parents' part that makes it difficult for them to endorse negative items about their child. A prevalent early fear of parents of premature infants is that their child will not be "normal" (Goldberg & DiVitto, 1983). In addition, in the early stages parents often feel guilty because their baby was born prematurely (Fleischman, 1986). By the time their infant has reached 2 years of age, parents of premature infants may wish to put these early experiences behind them and let their toddlers get on with "normal" development.

Several studies have documented interactional differences in preterm and full-term parent/infant dyads (Brown & Bakeman, 1980; Field, Dempsey, & Shuman, 1979; Goldberg, 1978; and Goldberg & DiVitto, 1983). Initially, there was concern that these differences might be associated with negative outcome. More recently these differences have been considered adaptations that parents make to meet the special needs of their premature infant (Goldberg & DiVitto, 1983). The finding of no differences among the groups' PSI scores may be taken as a positive indication that parents of the prematurely born infants have adapted to their infants' particular behavioural style.

The finding of no mother-father difference was not consistent with data (i.e., Abidin, 1986) which reported higher scores by mothers. The discrepancy between the findings of the present study and those reported by Abidin may be due to a cohort effect. That is, for the past few years there has been an expectation for fathers to be very involved in the caretaking of their children. At the time when Abidin's data were collected the mother may have taken more responsibility for child care and thus have experienced more stress. The expectation for fathers to
be more involved may have led to increased interaction with the child and collaboration with the mother and other caretakers (e.g., baby sitters, day care staff). These interactions would likely bring about a closer correspondence between fathers' and mothers' scores.

**Relationship to Other Variables.**

It was expected that if the toddler was experienced as active, uncooperative, and inattentive by the examiner that the parents would report increased stress levels. The finding that the examiner perceived the groups to differ but the parents did not may relate to the specific situation in which the examiner observed the child. The parents' assessment of their infants' behaviour encompassed a broad range of situations. On the other hand, the examiner observed the child in a very specific situation which may have served to highlight behavioural differences.

The apparent differences in examiner/parent ratings may also be explained by the two measures which were used. Abidin (1986) states that the PSI is not intended to assess behaviours (e.g., activity) in the pure sense. Rather, the PSI is intended to include the parents' perceptions of the behaviour. In other words the value in the PSI lies in its ability to subjectively assess how the parents feel about their particular child's behaviour and not to determine if the behaviour is present in the objective sense.

When the groups were collapsed correlational analyses indicated that there was a degree of correspondence between the examiner and parent ratings. It is difficult to ascertain why this correspondence occurred for only two of the three IBR factors. Lack of clarity on this issue is consistent with the findings of Roth et al. (1984) who also were unable to determine a consistent pattern between parent and examiner ratings.
Limitations

In the present study, the Bayley Scales of Infant Development were selected as the measure to assess developmental status. Although the Bayley has received excellent reviews and is considered to be the most current infant test of its type, it is important to keep in mind that data on which the scores were standardized were obtained between 1958 and 1961. Goldberg and DiVitto (1983) point out that norms change over time; thus, an important part of test revision is restandardization using current populations. Generally when this is done (on tests for preschool and school-age children) newer cohorts score better relative to the older cohort on which the test was originally standardized. Whether this trend applies to infants is uncertain. In any case, this possibility should be considered when the Bayley Scales are used.

A further limitation of the Bayley is that it tests a wide range of abilities (e.g., language, eye-hand coordination) but provides only a global score. In other words it does not provide a break-down of standardized scores for specific abilities which would offer a more differentiated view of infants.

Unfortunately it was not possible for the examiner to be blind to the infants’ birth status. This is not uncommon in research involving at-risk infants and children (Goldberg, 1979) and may contribute to examiner bias. This bias would most likely have had the most influence on the IBR scores. However, high intrarater coefficients in this study and the consistency of the present results with research that employed blind raters suggests that examiner bias, if present, was not likely sufficient to change the outcome.

In terms of generalizing the results of this study, it is important to bear in mind that the premature infants in this study were selected because they were "healthy". Also many of the premature infants had been monitored and/or received follow-up support from either the neonatal intensive care unit or an infant programme. This intervention may have contributed to "closing the gap" on parental stress scores.
Implications

One of the frustrations in attempting to discern the outcome of at-risk populations is that the Bayley MDI is not a good predictor of future scores on tests of development and/or intelligence. This is especially true when predictions are being attempted for infants whose scores fall within the average range (which is generally the case with healthy premature infants). It has been suggested that incorporating broader measures of behaviours may enhance prediction (Bayley, 1969; Astbury et al., 1983; and McGowen, Johnson, & Maxwell, 1981). The present findings of behavioural differences among the groups are noteworthy because they relate to being able to settle in and attend to tasks. Certainly children who have attentional problems and low tolerance for frustration are at-risk for school difficulties. Again, most premature children do well in school but disproportionate numbers of them require special assistance. The behaviours assessed by the IBR may well be precursors to attentional deficit disorders. Thus incorporation of the IBR may enhance detection of those premature infants who would benefit from further follow-up. It may also be possible to relate early-age behavioural styles to later-age behavioural styles that are correlated with learning difficulties.

One of the dilemmas in evaluating the developmental status of older premature infants is determining whether to use the infants' chronological or corrected age in calculating his/her developmental index. Both professionals working in applied settings and researchers face this quandry. The solution is not straightforward because the question remains as to whether these uncorrected differences are due to: maturational lag, subtle deficits which influence global summary scores in a lower-bound direction, and/or the infants' behavioural style. Methodological problems make it difficult to answer the question (e.g., cohort changes due to advances in neonatal care units, measurement instrument changes from infancy to childhood, and multi-factor influences on development).
The findings of the present study depend on whether corrected or uncorrected scores are examined. This points to the necessity of specifying to which MDI is being referred. The literature on outcome is not always clear on this point perhaps due to a misconception that 2-year-old premature infants have "caught up". Lack of clarity on this issue makes it difficult to evaluate outcome studies. Until more is known about risk factors associated with long-term outcome it may be helpful to include both scores. Reference only to corrected scores might lead to an overly optimistic outlook (both with respect to the individual infant and research outcome) for those premature infants who remain at risk.

Although unexpected, the similarity in parent-reported stress scores among the three groups is really a very positive finding. Health care professionals, who work with parents of premature infants during the stormy first few months will be able with some confidence to ensure these parents that "this too shall pass".

In conclusion, the results of the present study support past research that reports a generally positive outcome for healthy premature infants. It seems that stress reported by parents of premature infants in the early months after birth has lessened by the age of two to the extent that it does not differ significantly from that reported by parents of full-term infants. The finding that preterm infants demonstrated behaviours that place them at-risk in learning situations (e.g., high activity levels and difficulty in attending to tasks) is particularly noteworthy and has implications for future research and for service providers. Future research might concentrate less on global scores of developmental status and more on the infants' behavioural or processing styles. This would require assessments that would highlight ability to: (a) attend to stimuli, (b) exclude extraneous stimuli, and (c) tolerate frustration and remain goal-directed. Furthermore, longitudinal research would establish whether early styles (e.g., at 2 years of age) are predictive of performance at school age.
Finally, parents and service providers (e.g., health nurses, infant developmental workers) might also concentrate less on specific skill attainment and more on helping the infant modulate his/her activity and attentional levels. The number of premature infants infants who are experiencing later difficulties in school might be reduced if research is able to identify problematic behavioural styles and interventions are designed to develop more adaptive behaviour.
REFERENCES


Bhat, R., Raju, T., & Vidyasagar, D. (1978). Immediate and long-term outcome of infants less than 1,000 gm. Critical Care Medicine, 6,(3), 147-150.


Appendix A

ALS' DEVELOPMENTAL MODEL
Appendix A

MODEL OF THE SYNACTIVE ORGANIZATION OF BEHAVIORAL DEVELOPMENT

Systems:
- Attentional/Interactive
- State
- Motor
- Autonomic

ENVIRONMENT
- World at Large
- Parental Extraterine Environment
- Isolette

ORGANISM
- Parental Intrauterine Environment
- Conception

Week | Behavior
-----|---------
47-52 | Object Play
42-46 | Social Reciprocation
37-41 | Focused Alertness
32-36 | Rapid Eye Movement
28-31 | Coordinated Respiration Movement
25-27 | Complex Movements
21-24 | Fetal Respiratory Movement
17-20 | Coordinated Hand-to-Face Movements
13-16 | Eye Opening and Eye Movements
9-12  | Isolated Head and Limb Movements
2-8   | Flexor Posture
1-4   | Twitching Movement
Appendix B

PSI CHILD DOMAIN SUBTESTS
PSI Child Domain Subtests

High scores (i.e., over 122) on Child Domain are associated with "children who display qualities which make it difficult for parents to fulfill their parenting roles" (p. 41; Abidin, 1986). When the score on this domain is elevated above those of Parent and Life Stress Domains, Abidin states that characteristics of the child are the major factor contributing to stress in the family system.

Adaptability

Abidin (1986) cites the following behavioural characteristics which are associated with high scores on this subscale: inability to change from task to task without emotional upset; avoidance of strangers; overreaction to change in routines and changes in sensory stimulation; and difficult to calm once upset. (11 items, high score = 31)

Acceptability

High scores reflect a mismatch between the parent's hoped-for-child in terms of physical, intellectual and/or emotional characteristics and their child. Poor attachment may be an issue when scores are elevated on this scale. (7 items, high score = 17)

Demandingness

Demands may come from child's crying, physically hanging on to parent, requests for help, or a high frequency of minor problem behaviours. Occasionally scores are magnified on this subscale when parents are "overly committed to being the model parent" (p. 42; Abidin, 1986). (9 items, high score = 24)
Mood

This subscale assesses degree of child's unhappiness and extreme scores show evidence of affective dysfunctioning. High scores may be present when there is impairment in maternal attachment, parental absence and/or unavailability due to alcoholism or drug usage. (5 items, high score = 13)

Distractibility/Hyperactivity

Typical symptoms are: overactivity, restlessness, distractibility, and short attention span. In other words, this subscale includes many of the behaviours that are listed in DSM III under Attention Deficit Disorder with Hyperactivity. Abidin states that these behaviours are readily verifiable through observations and when do not fit with examiner observations parents may have unreasonable expectations for their child's behaviours. (9 items, high score = 31)

Reinforces parent

High scores indicate that interactions between child and parent do not produce good feelings within the parent and thus the parent-child bond is threatened. Abidin recommends that intervention proceed rapidly when high scores are noted on this scale. (6 items, high score = 12)
Appendix C

PSI PARENT DOMAIN SUBTESTS
PSI Parent Domain Subtests

The eight subscales on the Parent Domain "flag" aspects of parent characteristics and family context variables that could lead to dysfunctional parenting skills. A score of 155 is considered a high score.

Depression

This subscale is designed to detect the presence of clinically significant depression in the parent. As such, it may indicate that the parent does not have the energy to fulfill their parenting responsibilities. Items also reflect guilt. (9 items, high score = 27)

Parent Attachment

As the name implies, high scores may indicate that the parent does not feel a sense of emotional bonding or closeness with the child. Abidin also attributes the presence of high scores to parent's inability to "read" and/or understand their child. (7 items, high score = 16).

Restriction of Role

Abidin states that reporters of high scores "see themselves as being controlled and dominated by children's demands and needs" (p. 45). Anger and resentment may be directed toward either their child or spouse. (7 items, high score = 26).
Sense of Competence

Young parents of firstborns are expected to score higher on this subscale than multiparous families. High scores are also associated with parents: 1) who possess a limited range of child management skills; 2) who do not find their role of parent as reinforcing as they had expected; or 3) whose children are hyperactive, mentally retarded, or have physical handicaps. (13 items, high score = 37)

Social Isolation

High scores are obtained in cases where there is not a fulfilling relationship with spouse and/or where other emotional support systems are not present. Abidin considers high scores on this subtest a worrisome indicator of considerable stress and a situation that has the potential for child neglect. (6 items, High Score = 18)

Relationship with Spouse

Parents who feel that they do not have emotional and active support in the area of child management as well as other areas obtain high scores on this subtest. (7 items, high score = 23)

Parent Health

The title of this subscale is self-explanatory. Health problems may be either the result of stress (i.e., a stress reaction) or and additional source of stress (i.e., a stressor) in the system. (5 items, high score = 16)
Appendix D

IBR FACTORS AND FACTOR LOADINGS AT 24 MONTHS
IBR Factor Loadings at 24 Months*

Activity
Activity (.83)
Body motion (.83)
Energy (.66)
Sounds-banging (.60)
Endurance (-.48)

Test Affect-Extraversion
Social-Examiner (.79)
Emotional Tone (.79)
Fearfulness (-.71)
Tension (-.57)
Cooperativeness (.57)
Endurance (.47)

Task Orientation
Attention Span (.79)
Goal Directedness (.78)
Object Orientation (.75)
Reactivity (.55)
Endurance (.49)

*Matheny (1980)
Appendix E

PARENT QUESTIONNAIRE
Parent Questionnaire

Participant Number __________ Date Completed __________

Parental Information

Marital Status:
Circle one of: married, single, separated, divorced, widowed

Level of School Completed: Mother Father
less than seventh grade ___ ___
grade nine ___ ___
grade 10 or 11 ___ ___
high school graduate ___ ___
partial college (or at least one year) or specialized training ___ ___
standard college or university graduation ___ ___
graduate professional training (e.g., graduate degree) ___ ___
Please specify training/schooling beyond high school: ______________________

Occupation (Please list): _________ _________

Presently Employed (yes/no)
Fulltime _________ _________
Parttime _________ _________

Infant Information:
Date of Birth __________ Birth Weight ______ Sex___
Premature or Full-term _________
Firstborn Yes___ No ____ Number of siblings_________

Health Problems:

Please check if your infant has experienced problems in any of the following areas:

Eyes ______ Ears ______ Respiratory ______ Digestive ______
Allergies ______ Other (please specify) _______________
Dear Parent:

I am a doctoral student at the University of Windsor. Much of my work as an intern at the Programme for Encouraging Development (i.e., Infant Programme) has involved the assessment of infants. For my doctoral dissertation I wish to learn more about experiences families have in raising young infants and I am asking your assistance in this project.

I would appreciate it if you would complete a questionnaire involving questions about your infant, how you feel as a parent and what sort of events (e.g., moves, divorce) have occurred recently. This will take about 30 minutes of your time. In addition, I would like to schedule a time when I could assess your infant at your home. This will be a developmental assessment and require approximately one hour. Most infants enjoy participating in the assessment which involves completing puzzles, naming objects and so forth. I will provide you with feedback on your baby's performance at the end of the assessment.

All of the responses will be completely confidential. Data will be coded to ensure anonymity and will be used for research purposes only. Thank you for your consideration. I will be contacting you by telephone within the next two weeks.

Yours sincerely,

Helen Martin, M.A.

I consent to allow my child to be assessed and to participate in the research project conducted by Helen Martin, a Psychology student at the University of Windsor.

_________________________  __________________________
date  Parent's Signature

_________________________
Witness
Appendix G

Consent Form
Consent Form

I give my permission for my name and telephone number to be given to Helen Martin, a Doctoral Student in Psychology at the University of Windsor. I understand that she is interested in learning about the experiences of parents of 2-year-olds and that she would like to assess my child using the Bayley Scales of Infant Development. I also know that she would like me to complete a questionnaire about my experiences as a parent.

I understand that the results of this assessment and the information from the questionnaire that I complete will be coded by Helen Martin to ensure anonymity and used by her for research purposes only.

_________ date _________

_________ parent _________

_________ witness _________
Appendix H

Comparison on Dependent Measures by Weight and Gestational Categories
Table H.1

Comparison on Dependent Measures by Weight and Gestational Categories

| Variable | Group 1 | | | Group 2 | | | Group 3 | | |
|----------|---------|---|---|---------|---|---|---------|---|
|          | 24-30   | <1501 | 31-37 | >1500<2501 | 39-41 | >2500 | n=20 | n=20 | n=20 | n=20 | n=13 | n=20 | n=27 |
| MDI      | 91      | 90   | 102  | 99       | 116   | 115  |       |       |       |       |       |       |      |
| MDIC     | 106     | 106  | 111  | 107      | 116   | 117  |       |       |       |       |       |       |      |
| ACTIVITY | 21      | 21   | 21   | 21       | 18    | 18   |       |       |       |       |       |       |      |
| AFFECT   | 30      | 29   | 30   | 31       | 33    | 32   |       |       |       |       |       |       |      |
| ORIENT   | 26      | 26   | 28   | 28       | 32    | 31   |       |       |       |       |       |       |      |
| CHILD    | 104     | 106  | 100  | 102      | 96    | 95   |       |       |       |       |       |       |      |
| PARENT   | 117     | 115  | 116  | 119      | 120   | 119  |       |       |       |       |       |       |      |
| LIFE     | 6       | 6    | 4    | 5        | 7     | 6    |       |       |       |       |       |       |      |
| TOTAL    | 221     | 221  | 217  | 221      | 216   | 214  |       |       |       |       |       |       |      |
| ADAPT    | 25      | 26   | 26   | 26       | 25    | 25   |       |       |       |       |       |       |      |
| ACCEPT   | 13      | 13   | 13   | 13       | 11    | 11   |       |       |       |       |       |       |      |
| DEMAND   | 19      | 19   | 18   | 20       | 17    | 17   |       |       |       |       |       |       |      |
| MOOD     | 11      | 11   | 10   | 9        | 9     | 9    |       |       |       |       |       |       |      |
| DISTRACT | 27      | 27   | 25   | 25       | 25    | 24   |       |       |       |       |       |       |      |
| REINFORCE| 9       | 10   | 10   | 9        | 8     | 9    |       |       |       |       |       |       |      |
Appendix I

Vita Auctoris
Vita Auctoris

Helen Elaine Martin was born in Ottawa, Ontario on November 4, 1943. She graduated from Carleton University (Psychology Major) in 1965 and then attended Ottawa Teachers' College. From 1966 to 1973 she taught elementary school and from 1973 to 1984 she worked as a psychometrist. During this time she also attended the University of Windsor and earned a Bachelor of Arts Degree (Honours, Psychology) in 1982. She then entered Graduate School at the University of Windsor where she completed her Master of Arts degree in May of 1985 and her Doctoral degree in January of 1990.