



**Growing Up
in Ireland**
National Longitudinal
Study of Children



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PARENTING AND INFANT DEVELOPMENT

INFANT COHORT



REPORT 3

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National Longitudinal Study of Children

PARENTING AND INFANT DEVELOPMENT

Elizabeth Nixon, Lorraine Swords and Aisling Murray

November 2013

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EXECUTIVE SUMMARY

This report is concerned with infants' development at nine months of age and how their development is associated with parenting within families. The report also examines factors that are associated with parental sensitivity and stress in families. The analysis was based on data collected on 11,134 nine-month-old infants and their parents as part of Wave 1 from the Infant Cohort of *Growing Up in Ireland*. The following research questions were addressed:

- Do parental sensitivity and infant characteristics (gestational age, birth-weight and temperament) predict infant developmental outcomes?
- Do infant characteristics (difficult temperament, gestational age, birth-weight), parental characteristics (depression, stress) and contextual characteristics (work status, family structure, income and support) predict parental sensitivity?
- Does support/quality of the interparental relationship, parental depression, family type and difficult child temperament predict parental stress?

The findings should be interpreted in light of a number of important caveats. Firstly, the analyses are based on data collected at one point in time. Therefore, no causal interpretations can be made, and infant, parent and contextual characteristics investigated are likely to be reciprocally related in complex ways. Secondly, the data on which many of the analyses are based are derived from mothers' reports, so there is a possibility that there are inherent biases affecting the findings. Finally, the factors considered here represent only part of the picture in trying to understand parenting and infant developmental outcomes, and other factors must be invoked to more fully understand parenting and infant outcomes.

DO PARENTAL SENSITIVITY AND INFANT CHARACTERISTICS PREDICT INFANT DEVELOPMENTAL OUTCOMES?

The findings indicated that infant gestational age (the number of weeks of pregnancy at which infants were born) was one of the most robust predictors of infant developmental outcomes. Being born prematurely (i.e. at a younger gestational age) was related to a lower overall development score. Also significant in terms of poorer infant developmental outcomes was having a low birth-weight and having a difficult temperament, although the strength of these associations was relatively small. Both mothers' and fathers' sensitivity was positively associated with infant developmental outcomes, such that having a more sensitive parent was associated with a higher development score, although the magnitude of these associations was relatively small. It may be that infants who experience sensitive caregiving feel more confident in exploring their environment, which might confer benefits in terms of their cognitive, language and social development, or that parents who are more sensitive also provide their infant with more stimulation and learning opportunities.

DO INFANT, PARENT AND CONTEXTUAL CHARACTERISTICS PREDICT PARENTAL SENSITIVITY?

Child, parent and contextual characteristics were all significant predictors of parental sensitivity, for both mothers and fathers. Specifically, mothers and fathers reported less sensitivity with more temperamentally difficult children. It may be that children who have difficult temperaments (i.e. are fussy and irritable) may evoke fewer positive interactions from their parents, but it is likely that this is a cyclical process wherein lower levels of parental sensitivity may also give rise to higher levels of infant irritability.

In terms of parent characteristics, depression was directly negatively associated with sensitivity for mothers and for fathers, although the strength of this relationship was greater for mothers. Similarly, for both mothers and fathers, high levels of parental stress were associated with lower sensitivity. It may be that stress depletes parents' physical, emotional and psychological resources, and renders it more difficult for them to engage with their infants in a sensitive and responsive manner. Being a single parent was not associated with mothers' sensitivity. Employment of mothers and fathers was weakly associated with a lower level of parental sensitivity.



DO INFANT, PARENT AND CONTEXTUAL CHARACTERISTICS PREDICT PARENTAL STRESS?

For both mothers and fathers, a significant association was noted between higher levels of depression and higher levels of stress. In terms of contextual characteristics, perceptions of support were associated with lower levels of parental stress. Support can either directly reduce the stress experienced by parents (e.g. by providing practical assistance) or can buffer the parent from being adversely affected by stress (e.g. by providing emotional support in times of stress). Maternal stress was strongly associated with infant difficult temperament, with a slightly weaker association for paternal stress. It may be the case that infants with difficult temperaments demand more tolerance and patience from parents and are more stressful to deal with. However, longitudinal data are needed to more clearly ascertain the direction of effects at work here. It may also be that parents who are stressed may perceive their children to be more difficult to deal with. Greater relationship satisfaction for fathers in two-parent households was linked with lower levels of parenting stress. Thus, although stress may impact on marital relationships, the findings also highlight the potential for a positive marital relationship to buffer parents from stress.

Finally, the household's equivalised income was found to have no significant association with parental stress. Given that proposed mechanisms linking socio-economic disadvantage and stress include the impact of economic disadvantage on parental psychological well-being and access to a support network, it may be that controlling for these variables resulted in the effects of socio-economic disadvantage being no longer apparent.

IMPLICATIONS FOR POLICY

Although longitudinal data will greatly strengthen the confidence in the conclusions that can be drawn from these analyses, a number of policy implications arise from the findings. Across all of the analyses for predicting infant developmental outcomes, infant characteristics, including gestational age and having a low birth-weight, were significant predictors of poorer overall developmental outcomes, with gestational age being the strongest predictor. This highlights the potential role that health-related policies and programmes could play in supporting mothers to look after themselves during pregnancy and in supporting the development of infants born at a younger gestational age or with low birth weight. Pregnant women at risk of engaging in behaviours known to heighten the risk of premature birth or low infant birth-weight need to be identified at the early stages of pregnancy and interventions could be targeted at supporting these women to have a healthy pregnancy.

Following the birth, premature or low birth-weight infants may benefit from having additional home visits from public health nurses, during which practical advice can be dispensed to parents, infants' growth and development can be closely monitored and parents can be supported in their interactions with their infants. Parents may also benefit from receiving information about what to expect in terms of infant and child development, and how to engage in age-appropriate activities that may strengthen the quality of parent-child interaction and the home learning environment. Such interactions may be particularly important when infants appear to be easily aroused and difficult to soothe.

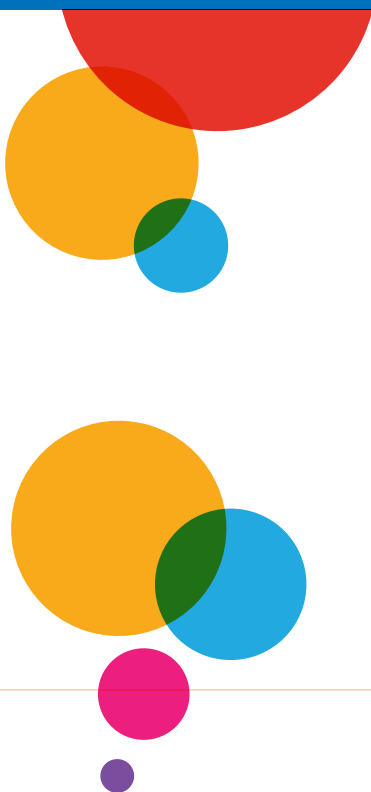
Although the findings are limited by the use of parent report for both parent and child measures, the findings indicate that parents' depression, parenting stress and infant difficult temperament are key predictors of parental sensitivity, and among the key predictors of parental stress are parents' depression and infant difficult temperament. Thus, ameliorating parental stress and depression represent key targets for intervention. It must be recognised that the birth of a child, while typically a joyful experience, may be challenging for some parents. Screening for and diagnosing parental depression in a timely manner and providing access to appropriate treatment and support must be a key priority. Furthermore, while mothers in particular may be at increased risk of depression during the post-natal period, attention should also be paid to how fathers are managing the transition to parenthood.

Other targets for policy include ameliorating stress in the lives of these parents. The results suggest that support and marital satisfaction are positively associated with reduced parental stress – thus maintaining access to support and a good-quality marital relationship may represent important mechanisms for buffering parents from stress. A lack of financial resources is likely to contribute to parental stress, which as noted above is associated with parental sensitivity. Thus, policies aimed at alleviating stress and improving families' access to economic, social and health support, across all types of households, may reduce the risk of parental stress, depression, parental insensitivity and poor child developmental outcomes.



Chapter 1

INTRODUCTION



INTRODUCTION

Infancy is the phase of the lifecycle when adult caregiving is at its most intense and is thought to exert its most significant influence. Infancy, derived from the Latin word for 'non-speaker', is generally defined as the period of life between birth and the emergence of language at around 1½ to 2 years of age (Bornstein, 2002). At this stage of life, the child is most dependent and parents and other caregivers are responsible for shaping many of the infant's earliest experiences. This report examines the developmental progress of infants in Ireland and how their development is associated with parenting. It also examines broader family and contextual factors that are associated with parenting in these families.

The analysis is based on data on 11,134 nine-month-old infants and their parents collected between 2008 and 2009, as part of the first wave from the Infant Cohort of *Growing Up in Ireland* (see Greene *et al*, 2010a for details on the background and conceptual framework of the study). The sample was a nationally representative sample of infants born between December 2007 and May 2008, selected from the Child Benefit Register maintained by the Department of Social Protection. The sample response was 65 per cent of all families approached. The sample data were statistically reweighted in line with external population estimates to ensure that they were representative of all infants in Ireland (Williams *et al*, 2010).

Growing Up in Ireland is underpinned by a bioecological framework (Bronfenbrenner and Morris, 2006), which conceptualises the child's world as a multi-layered system of nested and interconnected environments, all of which influence the child, either directly or indirectly. The child is seen as being influenced by his or her most immediate environment (termed the microsystem), which in infancy comprises contexts such as the home and childcare setting. In addition, the child is affected by links between their microsystems (termed the mesosystem) and by what happens within the wider community (termed the exosystem and macrosystem), either directly or indirectly through effects on the microsystem (Greene *et al*, 2010a). For example, the circumstances of a parent's workplace may affect his or her stress levels, which, in turn, impact on his or her interactions with the child.

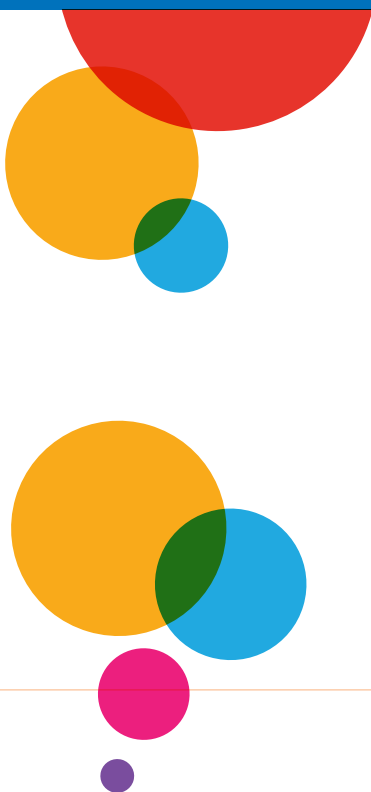
In addition to Bronfenbrenner's framework, this analysis was informed by previous research on parenting and its association with children's development. Firstly, attachment theory and parenting research propose that early affective bonds between parents and children foster healthy development in children and that children fare best when parents engage with them in a sensitive and responsive manner (Bowlby, 1969). Therefore, the association of parental sensitivity with developmental outcomes at nine months of age is examined. Secondly, Belsky's (1984) process model of parenting proposes that the quality of parenting is influenced by factors within three domains: parental characteristics (such as mental health), child characteristics (such as temperament) and factors in the family and wider context (such as marital quality and income). Therefore, the analyses consider how factors within these domains are related to the parenting of mothers and fathers in the families of nine-month-old infants.

Following this Introduction, **Chapter 2** presents a review of the literature within the context of relevant theoretical frameworks and a presentation of the specific research questions to be addressed. Following this, the methodology chapter (**Chapter 3**) provides an overview of the infant sample of *Growing Up in Ireland*. Details of the data collection procedure and the measures used in the analyses are presented. This chapter concludes with an overview of the data analysis process. Findings of the analysis are presented in **Chapter 4**. Initially, variations in parental stress, sensitivity and infant developmental outcomes are examined in relation to family structure and socio-economic status. Following this, models of the predictors of mothers' and fathers' parental sensitivity and developmental outcomes are developed and tested. In the concluding chapter of the report, the findings are discussed and implications for policy are considered (**Chapter 5**).



Chapter 2

LITERATURE REVIEW – PARENTING IN THE FIRST YEAR AND INFANT DEVELOPMENT



2.1 INTRODUCTION

Despite the fact that the period of infancy constitutes only a small fraction of the average person's lifetime, it is a period highly attended to and invested in by parents all over the world. Parenting responsibilities are greatest at this time due to the child's total dependence and inability to survive alone (Bornstein, 2002). A range of activities constitute the parenting role during the period of infancy, including nurturing behaviours, interacting socially, providing cognitive stimulation and otherwise organising the child's physical and social environment. A number of theories highlight the significance of parenting during infancy, related to the belief that experiences in infancy are of crucial significance for the life course (Freud, 1949; Bowlby, 1969; Lorenz, 1970; Stern, 1985). The characteristics developed during infancy may well endure, or at least constitute a base on which subsequent developments are built (Bornstein, 2002). However, while early experiences may be formative, they are not necessarily determinative, owing to the plasticity and adaptability of individuals to changing conditions (Clarke and Clarke, 1998). Thus, parenting the infant does not fix development to a particular pathway, but it does represent a critical influence.

As a framework for the current analysis of *Growing Up in Ireland* data, this chapter reviews research and theory pertaining to infant development and parenting. Following this, the research questions that will be addressed in this report are presented.

2.2 DEVELOPMENT DURING INFANCY

Infancy – typically defined as the period of life over the first 2 years – is a time of rapid change in the physical, social, emotional and cognitive domains. A brief overview of development in these domains over the first nine months is provided here to give a sense of what milestones might be typically achieved by nine months. It should, however, be borne in mind that not all babies develop at the same rate and within the bounds of typical development, there is considerable variability in the rates at which babies achieve developmental milestones (Greene *et al*, 2010b).

Physical development during the period of infancy is rapid. By nine months, infants will have grown by approximately half of their birth length, while their weight may be threefold their birth-weight by the age of one year (Greene *et al*, 2010b). Motor development proceeds in a head-downward direction, such that achievements involving the head and neck and trunk (such as sitting) precede those involving the lower extremities (such as standing). By around nine months of age, almost all babies will be able to sit without support, two-thirds of babies will be able to stand with assistance and half of babies will be able to walk holding on to a support, stand momentarily without support and crawl on their hands and knees (Bayley, 1993; WHO Multicentre Growth Reference Study Group, 2006). Fine motor skills refer to the ability to engage physically with objects in the environment through hand–eye coordination – reaching, grasping and manipulating (Greene *et al*, 2010b). Over the first few months of life, grasping movements involve the entire palm (palmar grasp) and these movements are governed primarily by an instinctual reflex. From five–eight months, infants can reach for and grasp objects using one hand. From about six months, skills with the fingers improve and near the end of the first year, infants begin to use their thumbs and forefingers in a coordinated way to lift and explore objects (known as the pincer grasp) (Goldfield and Wolff, 2002).

Communication skills over the first year of life are both verbal and non-verbal. Non-verbal communication is marked by a number of major transitions (Lock and Zukow-Goldring, 2010). Over the first three months, caregivers and infants spend increasing amounts of time staring at each other. This interest in mutual gaze is related to the infants' increased ability to maintain a transitory state of quiet alertness (Wolff, 1987). From three–six months, infants display more interest in people, their facial expressions become more animated and the tongue and lips move more during interactions – developments that have been termed pre-speech (Trevvarthen, 1979). Infants at this age are in a state of alert awareness around 80 per cent of



their waking time (Wolff, 1987) and participate in turn-taking, as they begin to vocalise, and imitate and respond to others' vocalisations. From six months of age, caregivers play an important role in directing the infant's attention towards objects and these practices are believed to lead the infant to learn associations between words and objects (Gogate *et al*, 2001). From nine months, infants develop a number of gestures that can display meaning – for example, interesting and desired objects can be 'requested' by reaching towards them and whining, or arms can be raised up as a sign to be picked up (Lock and Zukow-Goldring, 2010). These are important signs of intentional communication.

Cooing – the production of vowel sounds – occurs by approximately two months of age, and by four-six months vocal repertoires extend to babbling – repeating vowel/consonant combinations that convey no meaning (e.g. dadada, bababa). The melody of babbling seems to change from about six months, where infants seem to imitate the prosody (intonation and stress patterns) of their native language (Hollich, 2010). From eight-twelve months, infants focus on producing a range of consonants and vowels, along with the prosody of their native language. They use these sounds to communicate meaning, which must be interpreted by the caregivers. From eleven months, infants may string sounds into recognisable words and they are now aware that certain speech sounds have consistent meanings (Ferguson, 1978). The accumulation of vocabulary is slow at this stage, but infants understand the meaning of many words long before they are able to produce them for themselves (Oviat, 1980).

In terms of the development of problem-solving and thinking skills, infants learn about their environment through their senses and through movement and action on objects in their environment. From early in life, infants display imitative abilities – the ability to reproduce behaviour or action they have previously seen (Meltzoff, 1988), suggesting that they are able to construct, store and retrieve mental images. From about eight months of age, infants begin to coordinate two or more actions to achieve a simple goal (e.g. crawling towards a toy that they want, perhaps ignoring or pushing aside other toys) (Sternberg, 2002). Searching for hidden toys and playing peek-a-boo are common play activities with infants that reveal their problem-solving abilities (Greene *et al*, 2010b).

Play is also an important aspect of social development since it is a medium through which children regulate arousal and express a range of emotions (Tamis-Lemonda *et al*, 2002). Over the first few months of life, infants can initiate and terminate play interactions by gazing at or averting their gaze from caregivers. Adult caregivers who appropriately interpret infants' signals can provide more or less stimulation as required in order to reduce infants' negative emotional states or induce pleasurable experiences. Thus, caregivers play an important role in supporting infants' emotional regulation (Stern, 1985).

One of the most significant developments over the first year of the child's life is the development of an attachment relationship to the Primary Caregiver, usually the mother. Attachment formation results from the convergence of an infant's biologically-based tendencies to orient towards a preferential caregiver with whom they interact regularly, and an adult's propensities to read and respond sensitively to the infant's cues and needs (Bowlby, 1969). This is an evolutionary, adaptive relationship, with the principal function of protecting the child. The development of the attachment relationship proceeds through a series of distinct phases. From two-six months, infants display an ability to discriminate between known and unknown individuals, and a preference for the Primary Caregiver will begin to emerge, although infants will still interact readily with others. From six months, most babies will display stranger and separation anxiety – they will protest when they meet or are held by a stranger, and when they are separated from their Primary Caregiver. Thus, for most nine-month-olds, their attachment relationship will be in formation as they display a preference for a particular caregiver (or small group of caregivers) (Greene *et al*, 2010b).

The attachment figure serves two functions for the child: as a secure base from which the child explores his or her environment, and also as a base to which the child can retreat, particularly in times of stress. There

is variability in the quality (or security) of the attachment relationship that develops. The child's confidence in the availability of the attachment figure as a secure base is central to the security of attachment (Cummings and Cummings, 2002). On the one hand, sensitive and responsive caregiving makes possible a secure attachment, where infants develop trust in their caregivers' ability to appropriately understand and meet their needs. On the other hand, insensitive caregiving leads to an insecure attachment, where infants do not develop trust in their caregivers' ability to meet their needs. An internal mental model of the self as unworthy of responsive treatment and of the caregiver as undependable and unresponsive ensues (Cummings and Cummings, 2002).

2.3 PARENTING DURING INFANCY

Parental influence on infants' development occurs through direct and indirect means. Parents who are biologically related to their children influence their genetic make-up. In addition to the contribution of genetics, parents also directly influence their babies' development by providing for their basic physical needs (such as nutrition, warmth and safety). In addition, through interacting with parents, infants acquire social understanding and develop an attachment relationship. Parents also indirectly influence their infants by virtue of each parent's influence on the other and the family environment that they create, as well as their links with a broader social network (Bornstein, 2002; Bronfenbrenner and Morris, 2006). Parent–infant interactions serve many functions for the developing infant. Bornstein and Tamis-LeMonda (2010) have suggested that aside from meeting the basic needs of sustenance and protection, parent–child interactions serve four important functions: promotion of social understanding; acquisition of language; development of emotional regulation and the development of attachment. Parents differ considerably in their caregiving behaviours and individual parents seem to emphasize particular activities with their babies. Parenting behaviours also change over time and in response to children's development.

2.4 PARENTAL SENSITIVITY

An important component of parenting of infants is sensitivity and this has been observed across different parts of the world (Paavola *et al*, 2005; Valenzuela, 1997). Sensitivity refers to the parents' tendency to respond appropriately and promptly to their infants' cues. When this happens, infants learn that they can have an effect on their world. These early interactions are thought to lay the foundation for the infant's developing sense of self and others as intentional agents in the world (Bornstein and Tamis-LeMonda, 2010). Sensitivity can involve different behaviours depending on the context. Two parents may exhibit similar levels of sensitivity, but they may differ in the target activities to which they respond (e.g. one mother may respond to her infant's vocalisations, another may respond to her infant's exploratory behaviour) and in the manner in which they respond (e.g. one mother might affirm her infant's actions, another might describe her infant's actions) (Bornstein *et al*, 2008).

Ainsworth *et al* (1978) suggested that parental sensitivity is of key importance in understanding early caregiver–infant interactions and is central to the development of a secure attachment relationship. Parental sensitivity refers to a caregiver's ability to perceive the infant's signals, interpret them accurately and respond promptly and appropriately (even in the face of competing demands). Parental sensitivity also incorporates the caregiver's ability to think about the infant as a separate individual, to see things from the infant's perspective and to intervene in the infant's activities in a non-intrusive manner; the balance between the caregiver's positive and negative feelings about the restrictions placed on him or her as a result of the infant; and the ability of the caregiver to resolve any negative feelings about the infant so that they do not interfere with his or her interactions with the infant (Ainsworth *et al*, 1978; Posada and Kaloustian, 2010).



While parental sensitivity is only one component of parenting, it has emerged as an important correlate of positive developmental outcomes. There are a number of mechanisms through which parental sensitivity exerts an influence on development. Cummings and Cummings (2002) suggested that early adverse parenting experiences characterised by lack of parental sensitivity may foster negative mental models (e.g. a view that others are untrustworthy and that the self is unworthy of being cared for), which are subsequently used as a lens for processing peer relationships and friendships. Tendencies to evaluate peer interactions negatively have been shown to give rise to poor peer relationships, aggression and social isolation (Crick and Dodge, 1994). Other mechanisms linking the continuity that is observed between parental sensitivity, early attachment security and later developmental outcomes include having increased self-confidence through repeated experiences of support and comfort, learning about emotions and values within a secure attachment relationship, observing and modelling pro-social behaviour by a sensitive caregiver, and learning how to regulate one's own emotional experiences (Fearon *et al*, 2010).

The association between parental sensitivity and children's peer relationships demonstrates the significance of parental sensitivity and how the nature of early parent–infant interactions may represent a blueprint for future relationships. A number of studies have reported that young children with sensitive parents were more likely to display higher levels of social competence with their peers than children whose parents were rated as lower in terms of sensitivity (McDonald and Parke, 1984; Pettit and Harrist, 1993; Putallaz, 1987). In line with this, other studies have found that high levels of negativity in parent–child interactions predicted high levels of negativity in the child's peer relationships (Fagot, 1997; Youngblade and Belsky, 1992). Parental sensitivity has also been consistently linked with low levels of behaviour problems (Dodge *et al*, 2006). This may be because parental sensitivity has been linked to secure attachment (Egeland and Farber, 1984; Shaw and Vondra, 1995) and attachment security is believed to foster resources in children to deal with negative emotions and events (Cummings and Davies, 1996). Children with more secure attachments are better able to understand the emotions of others and are less prone to negative emotions than insecurely attached children, all of which could result in more positive interactions and lower levels of anti-social behaviour (Kochanska, 2001; Laible and Thompson, 1998).

Parental sensitivity that promotes secure attachment and positive relationships with peers that buffer against behavioural problems has also been found to be instrumental in developing the child's communication and cognitive abilities (Bornstein and Tamis-LeMonda, 1989; Dodici *et al*, 2003; Pianta *et al*, 1997). Parents who are warm and sensitive tend to provide an interactive environment that enables the child to engage in reciprocal verbal and non-verbal exchanges that are stimulating and rewarding (Pungello *et al*, 2009). In support of this, a number of studies have reported that early maternal sensitivity was significantly associated with expressive and comprehensive language skills at 3 years (Pungello *et al*, 2009; Mistry *et al*, 2004; Raviv *et al*, 2004; Tamis-LeMonda *et al*, 2001). Similarly in relation to cognitive development, school-readiness and literacy skills, research has consistently demonstrated the benefits of parenting quality, including parental sensitivity (Burchinal *et al*, 2006; Klebanov *et al*, 1998; Linver *et al*, 2002; Lugo-Gil and Tamis-LeMonda, 2008). Much of this research has also indicated that parental sensitivity mediates the associations between environmental risk (such as poverty) and cognitive developmental outcomes (Linver *et al*, 2002; Burchinal *et al*, 2008).

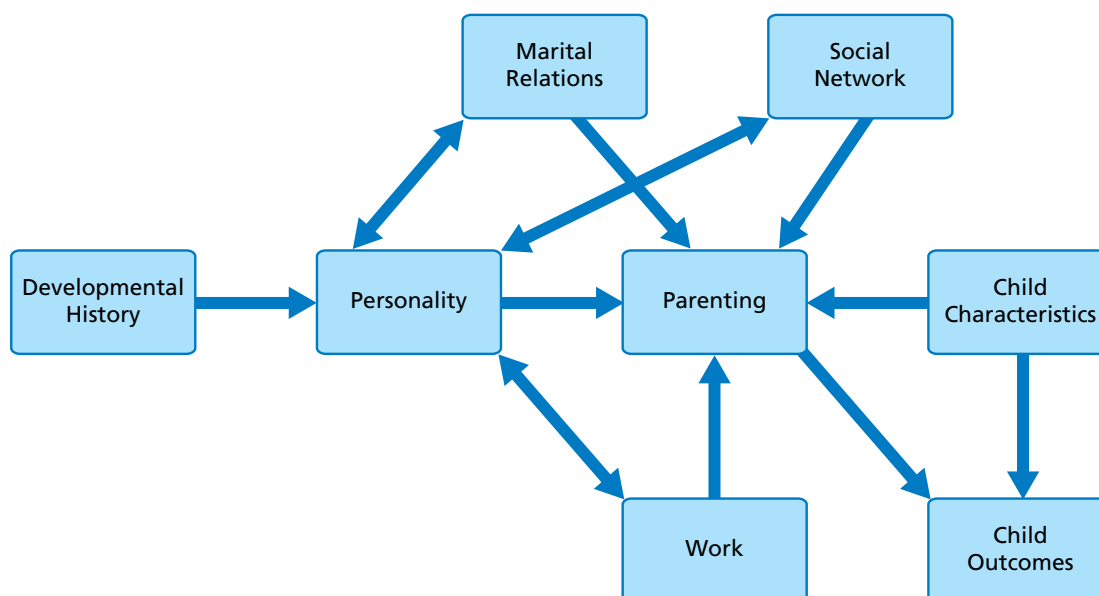
2.5 THE ECOLOGY OF PARENTING

Alongside the important question about how parental sensitivity is associated with infant development is the question about what influences how parents care for their infants. Parenting is a complex process, made challenging by the continuous demands it poses, the differences in children's characteristics and the complex nature of their development (Crnic and Low, 2002). While daily experiences of parenting can bring much joy and pleasure and provide parents with a sense of competence, the daily routine tasks of parenting and children's demanding behaviour can also be a source of frustration, irritation and stress

to parents. Parenting does not occur in a vacuum and a range of factors which together constitute the ecology of parenting need to be considered.

Bornstein (2001) suggested that there are three categories of influence on parenting: child characteristics, parent characteristics and characteristics of the context. Children themselves affect parenting, owing to their genetic make-up, temperamental characteristics, gender and emerging skills and competencies. Parenting draws on transient and enduring personality, intellectual, physical and emotional characteristics of the parent himself or herself. Finally, as highlighted by Bronfenbrenner's conceptual model, parenting and child development are nested within a range of contexts, from the household and broader family context and relationships, to support systems, economic class, community and work ties, as well as broader social, legal and educational institutions, natural ecology and culture (Bronfenbrenner, 1979). This contextual view of parenting was also proposed by Belsky (1984) in his process model of parenting, illustrated in Figure 2.1.

Figure 2.1: A process model of parenting (Belsky, 1984)



Within this model, the ecology of parenting incorporates contextual effects (marital relations, social network and work variables), parent effects (developmental history and personality) and child characteristics. In the following sections, research pertaining to the key child (infant), parent and contextual characteristics will be presented.

INFANT EFFECTS

Infant effects on parenting include their physical features, health status, age, gender and temperamental characteristics. Universally, infants' babyish features, including a large forehead and big eyes, and their inbuilt reflexes, such as the grasping reflex, elicit attention and nurturance from their caregivers (Lorenz, 1970). These characteristics are believed to have an evolutionary basis in that they provoke caregiving and thus enhance the likelihood of survival. Parents may respond differentially to their child or may provide different opportunities and experiences, depending on the child's gender. Research has indicated that mothers tend to be more talkative with daughters than with sons (Leaper *et al*, 1998). Also, mothers have been found to maintain a more consistent pattern of positive responding with infant sons than with infant daughters, possibly as a way to socialise their sons to remain calm and control their emotions (Weinberg *et*



al, 1999). However, there are few reported differences in parental sensitivity towards sons and daughters (Benenson, 1996) and variables other than child gender (such as temperament) may be more important predictors of parental sensitivity.

Infants who are born prematurely or with low birth-weight present parents with unique challenges. While low birth-weight often occurs as a result of prematurity, they do not necessarily co-occur and for some, low birth-weight may also reflect a slower rate of pre-natal growth, resulting in the child being small at full-term birth. Some research suggests that gestational age is a better indicator of biological maturation than birth-weight (Aylward, 2005). Pre-term infants typically have been shown to exhibit less consistent and clear cues to their caregivers and to have a lower tolerance for stimulation in comparison with full-term infants (Field, 1982; Goldberg, 1977). Pesonen *et al* (2006) reported that infants born small for their gestational age (where birth-weight is less than the 10th percentile for gestational age) were rated by mothers and fathers as significantly more fearful and negatively reactive when compared with infants who were an appropriate weight for their gestational age. Lester *et al* (1986) found that newborns who were small for their gestational age (SGA) exhibited sluggish responses to stimuli. Relative to infants who were an appropriate size for their gestational age, SGA infants were slow to enter states of high arousal, had difficulty orienting towards social stimuli, showed poor muscle tone and had lower activity levels. Watt (1990) also reported that full-term SGA infants demonstrated diminished responsiveness and activity.

Parental behaviour may be influenced by the fact that their child had a low birth-weight or was born prematurely. As a result of premature infants' behavioural tendencies, caregivers must maintain behaviour within a range that elicits response from the infants, without exceeding their tolerance levels. Thus, premature babies may be more challenging for caregivers to interact with (Goldberg and DiVitto, 2002). Stern and Karraker (1990) noted that adults considered babies who were labelled as premature to be less social, active and competent, and mothers behaved differentially towards these babies by touching them less. The authors suggested the existence of a 'prematurity stereotype', whereby lowered expectations may influence parents' behaviour towards their pre-term infants. Goldberg and DiVitto (2002) also highlighted that parents who experience the premature birth of their child may experience depression and anxiety since they may not feel adequately prepared for the birth, their expectations for a normal delivery and a healthy infant are violated, and they may feel isolated from social support, particularly if their baby is maintained in a neonatal intensive care unit.

A review of studies on patterns of pre-term infant–parent interaction by Goldberg and DiVitto (2002) concluded that mothers tended to stay closer to their pre-term infants and provided more tactile stimulation to them, directed more attention towards them, but were judged to be less sensitive to their infants' cues. The infants were described as being less responsive, more irritable, less initiating and less attentive. However, the majority of studies of pre-term infant attachment have indicated that pre-term infants develop attachment relationships by twelve-eighteen months that are similar to those of term infants. Thus, observed differences in early patterns of pre-term infant–mother interactions may be adaptive and mothers may be treating their babies in ways that appropriately support normal development (Goldberg and DiVitto, 2002). In support of this, Candelaria *et al* (2011) recently reported that infant health risk, including low birth-weight, did not relate directly to attachment security.

Being born pre-term or with a low birth-weight represents an important risk factor for development. Based on a meta-analysis, Aarnoudse-Moens *et al* (2009) reported that very premature (less than 33 weeks) and very low birth-weight (less than 1,500g) children displayed poorer academic achievement, higher levels of externalising, internalising and attention problems, and poorer executive functioning. These effects were found to persist, so that these children continued to lag behind term-born peers throughout middle childhood and adolescence. However, other research suggested that prematurity interacted with and was compounded by a variety of other risk factors, such as socio-economic disadvantage, poor nutrition in

pregnancy and maternal stress (Ashtown-Lambert, 2005). Candelaria *et al* (2006) found that premature infants living in socio-economic disadvantage fared worse than premature infants not living in these conditions. These and other findings suggested that socio-demographic risk factors (such as poverty, single-parent family structure, early school-leaving) and psycho-social risk factors (such as maternal stress, depression and low self-efficacy) may be stronger predictors of children's development than infant health risk per se, and that poorer outcomes for pre-term infants cannot simply be ascribed to possible differences in the quality of parenting that these infants receive (Candelaria *et al*, 2011).

In terms of infant effects on parenting, the characteristic that has received the most attention is temperament. Temperament refers to typical behavioural style and is believed to be relatively stable and evident from early in life. While temperament has biological roots, it is also believed to be influenced by variations in the environment (Wachs and Bates, 2010). Rothbart and Bates (2006) proposed two major dimensions of temperament: *reactivity*, referring to how quickly and intensely infants react to stimuli and to the tendency to react positively or negatively to them; and *self-regulation*, referring to the child's ability to control their emotional or approach/withdrawal responses.

The relationship between parenting and temperament has been the subject of much research. Several studies have found direct associations between parenting and temperament, although other studies have found no such associations (Putnam *et al*, 2002). According to Putnam *et al* (2002), expected associations between parenting and temperament have been found – for example, easy-to-soothe, adaptable children appear to elicit warm and responsive caregiving, whereas more irritable, inhibited or demanding children elicit less sensitive parenting. Van den Boom (1989) found that highly irritable newborns were less positive and more negative in their interactions with their mothers over the first few months and this irritability was associated with a perception among mothers that infants were difficult, which, in turn, was associated with less maternal responsiveness to the positive cues of the infants.

However, disentangling the nature of the causal relationship between temperament and parenting is difficult, especially when data are collected at the same point in time. Utilising longitudinal data, Belsky *et al* (1991) reported that increases in infants' negative emotionality over time were associated with lower parental involvement, while decreases in negative emotionality were related to responsive caregiving. Park *et al* (1997) found that infants who were initially highly inhibited over time became less inhibited when parents established firm age-appropriate limits and were less responsive to infants' distress. In contrast, infants' behavioural inhibition increased over time if mothers were overprotective or negative (Rubin *et al*, 2002). These findings, based on longitudinal studies, support the idea that infant temperament also develops partly in response to their childrearing environment.

Together, these studies reinforce the notion that parenting and child temperament are reciprocally related. Moreover, significant research demonstrates that the relationship between parenting and child temperament can be influenced by a variety of other factors. As noted by Wachs and Bates (2010), having a particular temperament may increase the likelihood of evoking certain responses from caregivers, but it does not guarantee that this will be the case because a variety of other factors can influence parental behaviour. For example, parents may vary in their ability to cope with a temperamentally difficult child due to their personality, their own attachment style or the level of support or stress in the home. These parental characteristics will be considered in the next section.

PARENT EFFECTS

Among the significant parental characteristics that influence parenting are the personality characteristics of the parents, their own experience of being parented and their psychological well-being (Belsky, 1984). It has been proposed that parents' individual psychological characteristics significantly influence child development: in order for parents to be sensitive and responsive, they must be psychologically mature,



feel secure in themselves, be able to regulate their emotions (especially negative emotions) and consider the world from their child's perspective (Belsky and Barends, 2002). Parents' experiential history may also affect their parenting, which in turn may affect their children (Bowlby, 1973).

Substantial evidence attests to the significance of parental psychological well-being for the provision of sensitive and responsive care (Vondra and Belsky, 1993; Zahn-Waxler *et al*, 2002). Particular attention has been paid to the impact of maternal depression on children. This research has demonstrated that children of depressed mothers are disadvantaged on a range of developmental outcomes in comparison with peers with non-depressed mothers (Goodman and Gotlib, 1999 and 2002). Maternal depression has been associated with both internalising and externalising behaviour problems (Cummings and Davies, 1994) and a number of mechanisms have been proposed to underpin this association. Maternal depression may give rise to a stressful family environment, conflict with partners or economic instability (Downey and Coyne, 1990; Heflin and Iceland, 2009). Another primary mechanism is through impaired parenting. Based on a meta-analysis of 46 studies examining parenting behaviour and depression, Lovejoy *et al* (2000) found that harsh and disengaged parenting behaviours were strongly associated with maternal depression. Since this meta-analysis, other studies have demonstrated that depressed parents were more likely to be negative towards, and be more easily irritated by, their children and were less likely to engage with them (Lyons-Ruth *et al*, 2002; Pelaez *et al*, 2008).

The transition to parenthood can be a period of vulnerability for depression, which can occur during pregnancy (ante-natal depression), after birth (post-natal depression) or both (O'Hara and Swain, 1996). Depression during the pre-natal period may affect the woman's ability to take care of herself during the pregnancy, including taking inadequate nutrition, consuming drugs and alcohol, and not attending medical appointments, all of which may compromise the developing foetus and the woman's well-being (Austin, 2003). Post-natal depression may negatively affect the interactional relationship between the mother and infant, which may impact on the quality of the attachment relationship (Milgrom *et al*, 2004). Among higher risk samples (characterised by low socio-economic status and single parenthood), depressed mothers, when compared with non-depressed mothers, have been found to display generally insensitive behaviour, including some who tended to be hostile and intrusive, and others who tended to be withdrawn and disengaged (Field *et al*, 1990 and 1985).

Among samples not characterised by socio-economic disadvantage, the differences in parental sensitivity between depressed and non-depressed mothers appeared to be less marked, although some distinctions remained (Murray *et al*, 2010). Murray and colleagues reported reductions in depressed mothers' behavioural responses and sensitivity to infant cues and slower and less responsive speech directed towards infants (Murray *et al*, 1993; Stanley *et al*, 2004). Patterns of interaction between depressed mothers and their infants may also directly impact on the child's developing biological systems, particularly their stress response systems (Murray *et al*, 2010).

A final parental effect to be considered relates to the gender of the parent, i.e. whether mothering or fathering is being considered. The majority of parenting research is based solely on mothers and parenting among fathers is less well studied. Father involvement is both directly related to children's outcomes and indirectly related via support provided to mothers and provision of financial and social capital (Pleck, 2010). Fathers are both competent and interested in infant caregiving (Bornstein, 2002) and research has suggested that, similar to mothers, fathers experience changes in hormonal levels around the birth of their infants (Storey *et al*, 2000). Some researchers have found no differences between mothers' and fathers' sensitivity to their newborn infants (Notaro and Volling, 1999) and fathers adjust their speech patterns when interacting with infants in the same way that mothers do (Kokkinaki and Kugiumutzakis, 2000; Lewis *et al*, 1996). Other research, however, has found fathers to be less sensitive than mothers (Donate-Bartfield and Passman, 1985; Harrison and Magill-Evans, 1996), perhaps because most men tend to interact less with

their young children than mothers do. Indeed, paternal responsiveness seems to vary depending on the degree to which men assume responsibility for the care of their infants (Lamb and Lewis, 2010).

The characteristics of fathers' interactions with their infants seem to differ from mothers' interactions. Borke *et al* (2007) suggested that fathers engage in more 'distal' forms of interaction, holding their babies 'out' towards the world, whereas mothers tend to be more 'proximal', using more bodily contact. Fathers also tend to use more physically stimulating play with infants than mothers (Dickson *et al*, 1997), which may help to make fathers especially salient to their children and may increase fathers' influence beyond what would be expected on the basis of the amount of time spent together (Lamb, 1997). Research has also suggested that there may be an interaction between the sex of the parent and of the child, such that mothers and fathers may have different relationships with sons and daughters. However, based on a comprehensive review of the available literature, Russell and Saebel (1997) concluded that the research evidence did not substantiate the proposition of four distinct parent-child relationships, depending on the sex of the parent and of the child (mother/daughter, mother/son, father/daughter, father/son).

Men's interactions with their infants need to be understood within the context of a network of family relationships. Of particular significance is the role of the marital relationship in the father-child relationship. The evidence suggests that spousal support is a stronger correlate of fathers' parenting competence than of mothers' competence (Lamb and Lewis, 2010). Fathers engaged in more interaction with their infants when they engaged in high levels of interaction with their partners (Belsky *et al*, 1984) and when both partners held positive attitudes towards paternal involvement (Beitel and Parke, 1998). Other contextual variables that shape parenting will be considered in the next section.

CONTEXTUAL EFFECTS

Beyond parent and child effects, a range of contextual influences on parenting also need to be considered. The parent-infant relationship is embedded within a network of other relationships, both within and beyond the immediate family setting. Of key significance to the parent-infant relationship is the parent's relationship with the child's other parent. A considerable number of studies has indicated that high levels of support within the marital relationship and marital satisfaction are associated with more responsive parenting (Belsky, 1984; Erel and Burman, 1995; Simons *et al*, 1993; Van Bakel and Riksen-Walraven, 2002). One proposed pathway through which the interparental relationship is considered to affect children is through undermining or supporting the parent-child relationship and the consistency of parenting behaviour (Fincham *et al*, 1994). Specifically, Belsky (1984) proposed that discord in the interparental relationship can be a source of subjective distress to the child, which depletes the parent's resources and interferes with his or her ability to be responsive towards the child. However, it may also be that the link between the quality of the marriage and the quality of the parent-child relationship reflects something about the parents' style of relating or an attribute of one or both parents' personality. This is known as the common factor hypothesis and has received some empirical support (Grych, 2002; Caspi and Elder, 1988).

On the other hand, good quality interparental relationships may have indirect positive effects on children. Support within the marriage may reduce the impact of other stresses on the parent, which in turn enables him or her to be more responsive in the parenting role. Cox *et al* (1989) found that greater marital closeness for fathers was associated with more positive attitudes towards their infants (three months of age) and their parenting role, but was not associated with their parenting behaviour. The authors suggested that this may be because early infancy may be a period in which most fathers are not as active in the care of the baby as the mother, although formation of attitudes about the parenting role may be an important predictor of subsequent fathering behaviour. For mothers, greater marital closeness was related to greater warmth and sensitivity in their parenting role. Cox *et al* concluded that supportive marital relationships enable parents' emotional needs to be met, which facilitates responsive and sensitive parenting with their infants.



In addition to the presence of a supportive interparental relationship, access to a broader support network can also benefit the parenting system. According to Cochran and Niego (2002), members of parents' social networks provide instrumental assistance (such as direct child care), emotional support, child-rearing advice and informational support to parents. Crockenberg (1988) noted that support can either directly reduce the stress experienced by the parent or it can buffer the parent from stress, preventing them from being adversely affected by stress. Access to a social network can depend on broader social and economic systems within which the family is embedded, while characteristics such as poverty, unemployment and lack of educational opportunities can limit the networks available to families (Cochran and Niego, 2002). Thus, stress and support within families frequently interact with characteristics of families, such as family structure and socio-economic status.

The association between poverty and socio-economic disadvantage and developmental outcomes has been well documented. These associations are strong in relation to cognitive and educational outcomes. Bradley and Corwyn (2002) documented associations between IQ and poverty from as young as two years of age, while McCulloch and Joshi (2001) found lower cognitive test scores for children who lived in poverty during infancy. Based on the Panel Study of Income Dynamics in the USA, Duncan *et al* (1998) found that family income was associated with school attainment and school leaving age, and experiences of poverty early in life was a stronger predictor of graduating from high school than later experiences of poverty. The association between poverty and social and emotional outcomes is less consistent and often the association becomes non-significant after controlling for variables such as maternal education, single parenthood, maternal depression and family stress (Yeung *et al*, 2002).

A variety of pathways by which poverty may impact on child development has been examined. McLoyd (1998) argued that economic disadvantage and poverty affect children's development through their impact on the child's physical health (such as low birth-weight, prematurity, inadequate nutrition), on home-based language and cognitive stimulation, and on parenting behaviour (such as expectations of parents for achievement, parents' discipline and control strategies). The Family Stress Model, which has received widespread empirical support, predicts that economic hardship primarily influences children's development through its impact on parents' functioning (Conger *et al*, 2010). Poverty and economic stress may contribute to increased social and emotional problems among children by diminishing parents' capacity to engage in supportive, consistent and involved parenting, and by increasing parents' tendencies to discipline children in a punitive and inconsistent manner. These parenting behaviours may arise partly from the diminution of parents' psychological resources, which makes them more susceptible to anxiety, depression, irritability and the effects of negative life events (Elder, 1999; McLoyd, 1998; Smith *et al*, 2001).

Another model that has been proposed to explain the link between socio-economic status and children's development is the Investment Model. According to this model, families with greater economic resources are in a position to make significant investments in their children's development, such as parent stimulation of learning, both directly and indirectly, through the provision of support or specialised training, provision of adequate food, housing and medical care, and residing in a neighbourhood that is more economically advantaged (Conger *et al*, 2010).

Similar processes may be operating in relation to family structure. Single parenthood represents an additional stress factor for families since one parent can usually provide fewer resources than two parents (Amato, 1995). Much research has indicated that growing up in a family structure headed by a single parent has negative implications for children's development (Pryor and Rodgers, 2001; McLanahan and Sandefur, 1994). While some of these associations can be accounted for by the lower socio-economic status that tends to accompany single parenthood, family structure effects still persisted, even after controlling for socio-economic status of these families (McLanahan, 1997). Some of these differences have been accounted for by the nature of family processes within single-parent families, such as less parental time, attention and

supervision (Hofferth and Anderson, 2003) and by the elevated levels of stress experienced within these families. Such stress may have indirect effects on children by reducing parental warmth and nurturance, leading to poorer quality parent–child relationships (Cavanagh, 2008).

A final contextual variable that is included in Belsky's process model of parenting is parental work status. Parents' employment status is confounded with a host of other variables that may directly relate to sensitive parenting and child developmental outcomes, such as education and income levels, parental stress and attending child care. Based on attachment theory, Belsky (1988) proposed that regular separations from the mother may inhibit the infant's ability to form a secure attachment to the mother, and maternal employment early in the child's life may be particularly likely to disrupt the formation of a secure attachment (Belsky, 1999). Given the significance of secure attachment for development, this may represent one mechanism by which maternal employment might impact on a child's subsequent development.

The *role strain* perspective suggests that employment leads to role conflict that makes it difficult for mothers to maintain stimulating and responsive interactions with their children (Crouter *et al*, 1999), while the *role enhancement perspective* suggests that employment does not impact on the quality of mothers' interactions with their infants because mothers are flexible and may attempt to compensate for being absent while they are at work (Marks *et al*, 2001). Repetti and Wood (1997) found that on days when mothers experience a heavy workload and stress, they speak less and show less affection to their pre-school children. Similar findings about less positive mother–child interactions have been reported elsewhere (Sayer *et al*, 2004; Nomaguchi, 2006).

However, the evidence of the effects of maternal employment on quality of parenting is far from conclusive and may depend on the context of the mother's employment. For example, Brooks-Gunn *et al* (2010) and Horwood and Fergusson (1999) found that mothers of infants employed part time had higher scores on sensitivity than mothers who were not employed, while Buelher and O'Brien (2011) found that mothers employed part time were rated as more responsive than those not employed or employed full time.

2.6 RESEARCH QUESTIONS

The research reviewed highlights the significant functions of positive parent–child interactions and parental sensitivity for infant developmental outcomes. In addition, Belsky's process model of parenting proposes that parental, child and contextual factors shape parenting, which in turn influences children's development. More specifically, the model suggests that sources of contextual stress and support can directly affect parenting behaviour and can indirectly affect parenting by influencing parental psychological well-being. Parents' personal psychological resources are viewed as the most significant determinants of sensitive parenting behaviour (Belsky, 1984).

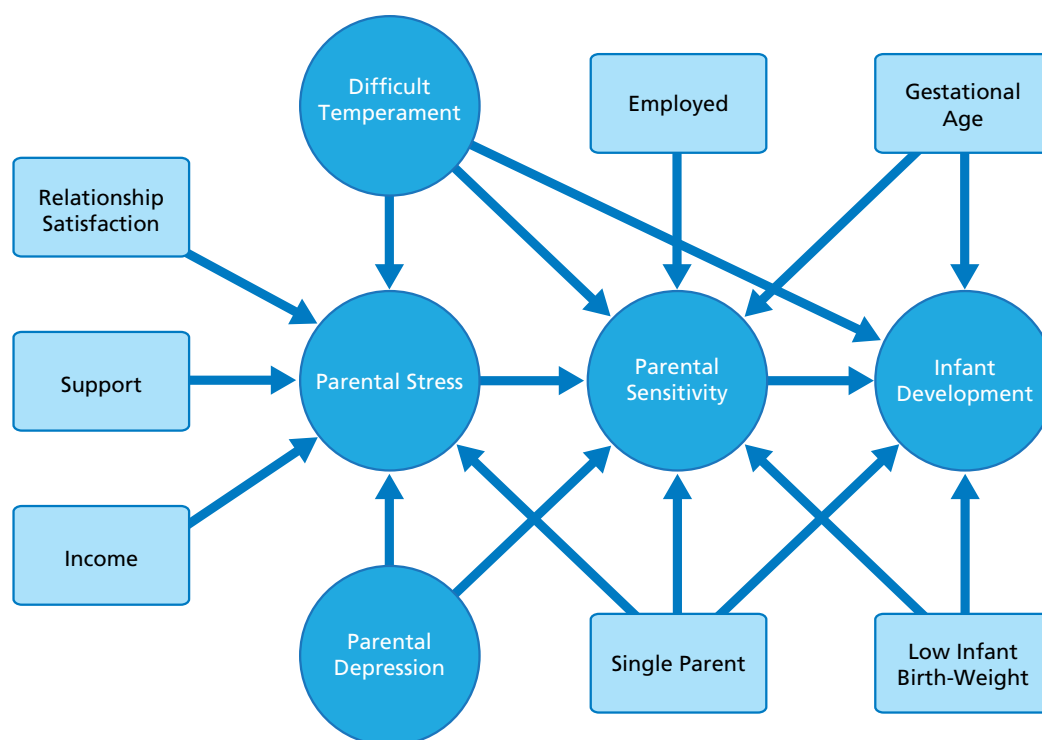
Based on this model and existing research, the aim of the current analysis was to examine associations among selected parental, child and contextual characteristics in order to explain variance in parenting and infant developmental outcomes, using data from Wave 1 of the Infant Cohort of *Growing Up in Ireland*. Broadly, the focus was on what factors were associated with parenting stress, parental sensitivity and infant developmental outcomes. The following research questions were addressed:

- Do parental sensitivity and infant characteristics (gestational age, birth-weight and temperament) predict infant developmental outcomes?
- Do infant characteristics (difficult temperament, gestational age, birth-weight), parental characteristics (depression, stress) and contextual characteristics (work status, family structure, income and support) predict parental sensitivity?
- Does support/quality of the interparental relationship, parental depression, family type and difficult child temperament predict parental stress?



The model in Figure 2.2, based on Belsky's (1984) conceptual framework, summarises the pathways tested regarding how various parental, infant and contextual characteristics relate to parental sensitivity and to infant development. In contrast to Belsky's originally proposed model, Figure 2.2 does not include parents' developmental history or personality since these data were not available in *Growing Up in Ireland*. The additional contextual variable of income has been included in light of the research evidence about the significance of socio-economic status on children's development.

Figure 2.2: Model summarising hypothesised patterns of relationships among parental, contextual and infant characteristics, and parental sensitivity and infant developmental outcomes*



* Infant characteristics in the model are gestational age, low infant birth weight and difficult temperament. **Parent characteristics** in the model are parental stress and depression. **Contextual characteristics** in the model include income, support, relationship satisfaction, single parenthood and employment status.

'Income' was subsequently removed from the models that are presented in Chapter 4. It did not relate to parenting stress for fathers, and although there was a significant relationship between income and mothers' stress, effect sizes were negligible to small and its inclusion in the model considerably reduced the model fit indices.

The 'Support' variable is only relevant to the model for mothers, while the 'Relationship Satisfaction' variable is only relevant to the model for fathers because mothers in single-parent households did not complete the measure on relationship satisfaction. The 'Single Parent' variable is only relevant for the mothers' model.

In terms of *contextual characteristics*, work status, income, support and marital satisfaction were included. It was hypothesised that income, support and marital satisfaction would be related to parenting stress, which in turn would be related to parental sensitivity. It was also predicted that work status would directly relate to parental sensitivity, although it is noted that previous research has identified that the relationship between parental employment status and parenting is complex (Buehler and O'Brien, 2011). These contextual variables were not hypothesised to directly predict infant developmental outcomes.

In terms of *parent characteristics*, psychological well-being (depression) and stress were included. It was predicted that parental depression would directly predict parenting stress and parental sensitivity, such that higher levels of depression would be associated with higher levels of parental stress and lower levels

of parental sensitivity. It was also predicted that higher levels of parental stress would be associated with lower levels of parental sensitivity.

In terms of *child characteristics*, temperament, birth-weight and gestational age were included. It was hypothesised that birth-weight/gestational age would be directly related to infant development outcomes, such that low birth-weight and younger gestational age would be associated with poorer developmental outcomes. It was also hypothesised that low birth-weight and younger gestational age would be associated with lower parental sensitivity, although it is noted that the literature is inconclusive on the nature of this association (Goldberg and DiVitto, 2002).

It was also hypothesised that higher levels of difficult temperament would be related to less parental sensitivity and poorer infant development outcomes. Finally, it was hypothesised that parental sensitivity would be significantly related to infant developmental outcomes, and specifically that higher levels of parental sensitivity would be associated with better developmental outcomes.

Stoltz *et al* (2005) suggested that parenting frameworks must be tested on fathers as well as mothers in order to evaluate the extent to which the theories hold true for both parents. Thus, in the analysis, separate models for mothers and fathers were examined. Mothers in one- and two-parent households were included in the mothers' model and family structure was included as a predictor variable. The fathers' model included fathers from two-parent families only since limited data were collected from non-resident fathers.

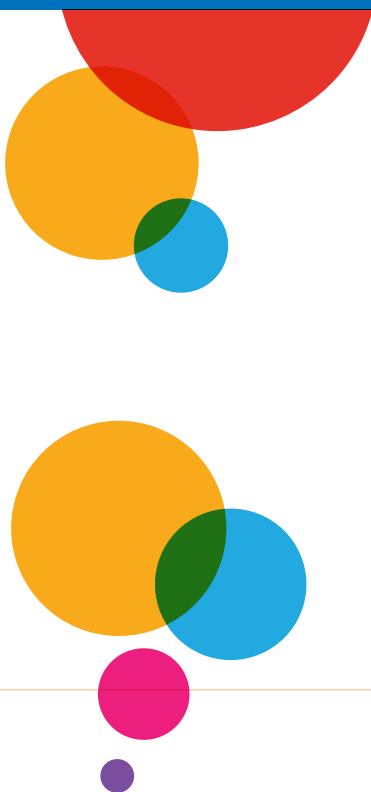
2.7 SUMMARY

In this chapter, an overview of relevant theory and related research which underpins this analysis of ***Growing Up in Ireland*** data has been provided. It is proposed that parental sensitivity to infant cues is a significant predictor of infant developmental outcomes. In addition, the ecological model of parenting (Belsky, 1984) proposed that infant characteristics, parent characteristics and broader contextual factors together predict parental sensitivity. Thus, the analysis using ***Growing Up in Ireland*** data addresses how infant, parent and contextual characteristics predict parental sensitivity among parents of nine-month-olds in Ireland and how parental sensitivity is associated with infant developmental outcomes.



Chapter 3

METHODOLOGY



3.1 INTRODUCTION

This chapter outlines the methodology of *Growing Up in Ireland*, with particular attention given to the main elements of the study relevant to the present report. Information is first provided on the sampling and data collection procedures used. A brief description of the Infant Cohort sample is then provided. This is followed by details on the measures used in the current analyses and how they were administered during home visits with the infants and their families. The chapter concludes with a brief outline of the data analyses procedures employed for this study.

3.2 OVERVIEW OF SAMPLING AND DATA COLLECTION PROCEDURES

The Child Benefit Register was used as the sampling frame for *Growing Up in Ireland*. A total of 41,185 infants were registered on the Child Benefit Register as having been born between 1st December 2007 and 30th June 2008. Children were sampled over this 7-month reference period with a view to conducting fieldwork when they were nine months of age, between September 2008 and March/April 2009 (see Quail *et al.*, 2011, for further details on the sampling frame, sampling strategy and process of recruiting families). A total of 11,134 families completed interviews for the Infant Cohort of *Growing Up in Ireland*. This represents an overall response rate of 58.2 per cent from the original sample selection and a response rate of 64.3 per cent when invalid addresses are excluded.

A trained field interviewer visited the infants and their families in their homes. In each household, one adult was required to self-identify as the 'Primary Caregiver' – the person who provides most care to the infant and who knows him or her best. If the Primary Caregiver had a spouse or partner living in the household, this person was assigned to be the 'Secondary Caregiver'. Almost all Primary Caregivers were women (99.6 per cent) and almost all of these were the infant's biological parent (99.9 per cent). For this reason, Primary Caregivers will be referred to hereafter as 'mothers'. Almost all Secondary Caregivers were male and the father of the child, and hence they are referred to hereafter as 'fathers'.

The field interviewer administered the main questionnaires to the mother and father, who responded to questions about themselves (e.g. pregnancy, health, education). Mothers were also the chief informant on the infant (e.g. infant health and temperament) and the household (e.g. income). Responses from both mothers and fathers were recorded by the interviewer on an encrypted, password-protected laptop computer. Separate questionnaires on more sensitive topics were self-completed by mothers and fathers on the laptop computer. Included on these sensitive questionnaires were scales pertaining to marital satisfaction and parental depression. The interviewer also took the physical measurements of the infants in the presence of one of the caregivers, using medically approved equipment.

3.3 SAMPLE CHARACTERISTICS

A detailed account of the characteristics of the infants and their families can be found in Williams *et al.* (2010); only key background characteristics of the sample are highlighted here. The sample size is 11,134 throughout this section, unless otherwise stated.

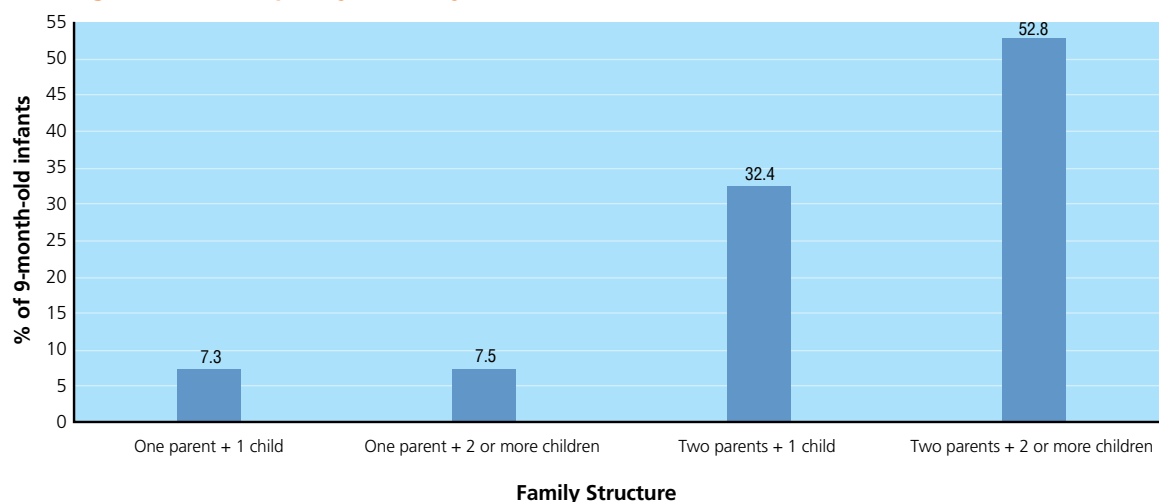
In terms of infant gender, 48.7 per cent of the sample were girls and 51.3 per cent were boys. The mean age of mothers was 31.6 years ($SD = 5.5$ years). More than one-fifth of mothers were born outside Ireland (22.2 per cent). Almost 84 per cent (83.6 per cent) described their ethnicity as 'Irish', with 10.8 per cent describing themselves as 'White Non-Irish', 2.7 per cent as 'African/Black', 2.5 per cent as 'Chinese/Asian' and 0.5 per cent as 'Other/Mixed' ($N=11,099$). One-third of mothers had completed upper secondary level education, with a further 19.8 per cent having a 'non-Degree'-level qualification (e.g. diploma, HETAC, etc) and an

additional 29.2 per cent having a qualification at Degree level or above. Fewer than one-fifth of mothers (17.6 per cent) had not proceeded beyond the lower level of secondary school (i.e. the Junior/Intermediate Certificate) (N=11,123).

The mean age of fathers was 33.4 years (SD = 9.7 years). The majority described their ethnic status as 'Irish' (82.7 per cent), with the remainder comprising 11.7 per cent 'White Non-Irish', 2.3 per cent 'African/Black', 2.8 per cent 'Chinese/Asian' and 0.5 per cent 'Other/Mixed' (N=8,416). Educational attainment was similar to that of mothers: 29.8 per cent had a qualification at Degree level or higher, 16.5 per cent had 'non-Degree' level, 35.2 per cent had upper secondary level qualifications and 18.5 per cent had not continued their education beyond lower secondary level (N=8,418).

Approximately 15 per cent of infants were living with a single parent and the remainder lived with two parents. Approximately 40 per cent of infants were the only child younger than 18 years in the household. Figure 3.1 illustrates the frequency of family structures within the sample.

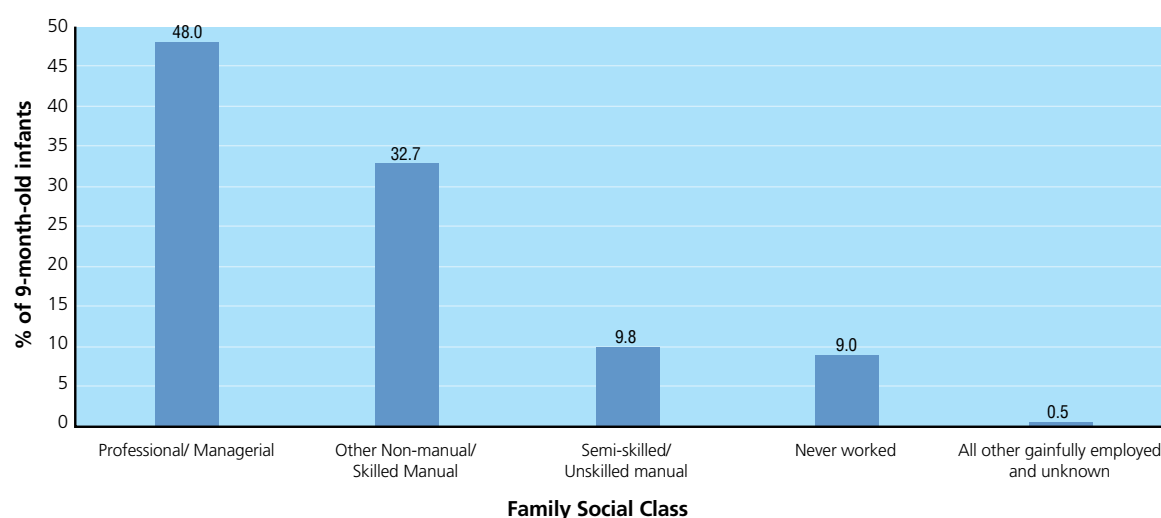
Figure 3.1: Frequency of family structures in the nine-month-old Infant Cohort



In total, 54.4 per cent of families lived in rural areas and 45.6 per cent lived in an urban area (N=11,095). Family social class categorisation was based on current occupation, or previous occupation if a caregiver was unemployed or retired (if that person had ever had a job). Previous occupation was not used to categorise social class for individuals who described themselves as currently 'on home duties', rather than 'unemployed' or 'retired'. Within the two-parent households, social class categorisation was taken as the higher of the mother or father, while it was based solely on the mother within one-parent households.¹ As depicted in Figure 3.2, the modal family social class in the sample was professional/managerial (48 per cent), while 9 per cent of infants lived in households where there was no currently or previously employed caregiver.

¹ It is acknowledged that it may be problematic to base household social class on the occupation of one parent and not a composite of income, occupation and education of both parents.

Figure 3.2: Frequency of family social class in the nine-month-old Infant Cohort



3.4 MEASURES USED IN CURRENT ANALYSES

Infant developmental outcomes

The Ages and Stages Questionnaire, 2nd Edition (ASQ-2; Squires *et al*, 1999) was used in *Growing Up in Ireland* with the nine-month-old cohort as a measure of their developmental progress. It is intended as a screening tool rather than a diagnostic tool. It is comprised of five subscales in the following developmental domains: communication (e.g. 'makes two similar sounds like ba-ba'); gross motor (e.g. 'sits upright without using hands for support'); fine motor (e.g. 'picks up small toys with only one hand'); problem-solving (e.g. 'tries to get at a crumb in a clear plastic bottle'); and personal/social (e.g. 'drinks from a cup while you hold it').

The ASQ-2 is organised as separate questionnaires for 19 age intervals, ranging between 4 and 60 months. Each questionnaire is appropriate for a two-month age 'window'. The questionnaires are divided into sections reflecting the different developmental domains and there is considerable overlap from one age interval to the next in the infant range. For example, the later items at one age interval are typically the earlier items on the next (older) age interval. There are 6 questions in each domain and 30 questions per age-specific questionnaire. Each question has 3 possible responses ('Yes', 'Sometimes' and 'No'), which earn 10, 5 and 0 points respectively. These points are then added together to form a domain score for each age interval.

In this report, the continuous scores from the ten-month interval questionnaire are used since this was deemed to be the most appropriate interval questionnaire for a nine-month-old infant. The mean and standard deviation scores for the *Growing Up in Ireland* Infant Cohort are given in Table 3.1. Overall, the highest mean scores were achieved within the fine motor domain (52.4) and the lowest within gross motor skills (32.5). Within each of the five domains, the minimum (0) and maximum scores (60) were achieved, denoting the fact that some infants scored the maximum on the 10-month items, while other infants did not pass any of the items on the 10-month questionnaire.

Table 3.1 also provides reliability measures (Cronbach's alpha – Cronbach, 1951) for each domain of the ten-month interval questionnaire based on *Growing Up in Ireland* data. This indicates that while Cronbach's alpha is very good for the gross motor domain (0.80), it is more moderate for the fine motor and problem-

solving domains (0.66 and 0.65, respectively) and lower for communication (0.53) and personal/social (0.53) domains.

Table 3.1: Descriptive and reliability statistics for the ASQ-2 (10-month interval questionnaire)

Descriptive statistics	Communication	Gross Motor	Fine Motor	Problem Solving	Personal/Social
N	11,070	11,100	10,817	10,514	11,002
Mean	44.67	32.47	52.35	46.08	43.56
Range	0-60	0-60	0-60	0-60	0-60
Standard deviation	11.46	16.91	11.01	13.24	11.96
Cronbach's alpha	0.53	0.80	0.66	0.65	0.53

Parental sensitivity

Parental sensitivity is typically assessed by directly observing episodes of mother–infant interaction and coding various components of sensitivity in the mothers' behaviour, such as promptness of response, alertness to infant signals, appropriate interpretation and response (Ainsworth *et al*, 1978; Seifer *et al*, 1996). However, assessment of parental sensitivity by observing and coding infant–parent interaction was not feasible within *Growing Up in Ireland*. In this study, parental attachment – referring to the emotional bond or tie of affection experienced by the parent towards the infant (Condon and Corkindale, 1998) – was used as a proxy for parental sensitivity. Parental attachment was measured using the Quality of Attachment Subscale from the Maternal Postnatal Attachment Scale (Condon and Corkindale, 1998) for mothers and the Paternal Postnatal Attachment Scale (Condon *et al*, 2008) for fathers. Authors of the parental attachment scale have proposed that the strength of the parent's attachment can be indicated by the parent's pleasure in proximity to and interaction with the infant; tolerance for behaviour that in the absence of attachment might be perceived as being irritating or frustrating; desire to satisfy the emotional and physical needs of the infant, and prioritise the infant's needs above one's own; and desire to understand the infant and the ability to derive a sense of competency from this. This latter experience, according to Condon and Corkindale (1998), is an extrapolation of Ainsworth's concept of maternal sensitivity.

The Quality of Attachment subscales incorporate items that capture pleasure in proximity, tolerance and competence. For mothers, this scale comprises nine items and reflects maternal feelings for the infant and their interactions with him or her in a parenting role (e.g. 'When I am with my baby, I feel tense and anxious'; 'I trust my own judgement in deciding what my baby needs'). The father's scale is a five-item version of this subscale. Responses are on Likert-type scales, but these vary according to the item. For example, the number of options varies between 3 and 5, but each is recoded so that the lowest score is 1 and the highest is 5. Condon and Corkindale (1998) reported that positive scores on the full maternal measure were negatively correlated with measures of parental depression, anxiety and with difficult infant temperament. They reported an internal consistency of 0.78 for the whole instrument when infants were eight months old. Feldstein *et al* (2004) also reported that scores on the Postnatal Attachment Scale for both mothers and fathers were moderately related to the Attachment Q-Set, a measure of infant security based on observation of parent–infant interactions (Waters and Deane, 1985).

Mothers and fathers completed the Quality of Attachment Subscale items as part of the main interview. The range of possible scores on the mothers' scale was 9–45 and the achieved range was 12.9–45, with a mean of 42.6 (SD = 2.6, N=11,099). Internal consistency was relatively modest, with Cronbach's alpha of 0.52. The possible range on the fathers' scale was 5–25 and the achieved range was 11.6–25, with a mean score of 24.1 (SD = 1.4, N=8,418) and a modest Cronbach's alpha of 0.45. Mothers' and fathers' scores were not strongly correlated ($r = 0.158$). The mean scores indicate that the data are highly skewed with the

majority of mothers and fathers rating themselves as 'very sensitive' in their interactions with their infants.

Infant temperament

Infant temperament was measured using the 'fussy-difficult' subscale of the Infant Characteristics Questionnaire Six-Month Version (ICQ – Bates *et al*, 1979). The 'fussy-difficult' subscale is a 6-item subscale providing parents' ratings of their infants' fussiness (e.g. 'how difficult is it to calm or soothe your baby when he/she is upset'). Responses are rated on a 7-point Likert scale, where a value of 1 describes an optimal temperamental trait and a value of 7 indicates a more difficult temperamental trait. The range of possible scores from 6–42 was achieved in the sample, with a mean of 14.8 (SD = 5). Internal consistency was good (Cronbach's alpha = 0.73).

Parental stress

The measure of parental stress used in these analyses was the Parental Stressors Subscale of the Parental Stress Scale (Berry and Jones, 1995). Sample items include 'the major source of stress in my life is my child' and 'having a child leaves little time and flexibility in my life'. Six items on this subscale are rated on a 5-point Likert scale, from 'strongly disagree' (1) to 'strongly agree' (5), yielding a range of possible scores from 6–30, with higher scores relating to higher levels of stress. In ***Growing Up in Ireland***, mothers and fathers completed the scale with the interviewer. For mothers, scores ranged from 6–30, with a mean of 14.6 (SD = 4.2). For fathers, scores ranged from 6–29, with a mean of 13.4 (SD = 3.9). Values for Cronbach's alpha were good (0.74 for mothers and 0.72 for fathers).

Parental depression

Parents' depressive symptoms were assessed using a shortened, 8-item version of the Centre for Epidemiological Studies Depression Scale (CES-D – Radloff, 1977). The CES-D is a widely used self-report measure that was developed specifically as a screening instrument for depression in the general population, as opposed to being a diagnostic tool that measures the presence of clinical depression. The short (8 item) version of the CES-D (Melchior *et al*, 1993), which correlates highly with the full 20-item version ($r = 0.93$), was used in ***Growing Up in Ireland***. Sample items include 'I felt that I could not shake off the blues even with help from my family and friends' and 'I thought my life had been a failure', which were answered on a 4-point Likert scale, ranging from 0 (<1 day) to 3 (5–7 days) with reference to the previous 7-day period. A composite score is calculated by summing item responses (range: 0–24). A cut-off score of 7 or above is taken to indicate that the respondent is depressed.

Both mothers and fathers self-completed the CES-D Scale individually on a laptop as part of the sensitive questionnaire during the home visit. CES-D scores from mothers in ***Growing Up in Ireland*** ranged between 0–24, with a mean score of 2.5 (SD = 3.7, N=10,943); Cronbach's alpha for the scale was 0.87. The corresponding scores for fathers were a range of 0–24 and a mean of 1.3 (SD = 2.4, N=8,268); Cronbach's alpha was 0.81. For both mothers and fathers, the data are strongly positively skewed, which means that the majority of parents do not score highly on depression.

Relationship satisfaction

Interparental relationship satisfaction was measured using the 7-item version of the Dyadic Adjustment Scale (DAS – Sharpley and Rogers, 1984). The scale comprises items assessing *dyadic consensus*, where participants rate the degree to which they agree with their partner on several issues including 'philosophy of life' and 'amount of time spent together'; items assessing *dyadic cohesion*, where participants indicate how often specific dyadic activities occur, such as 'a stimulating exchange of ideas' and 'calmly discussing something together'; and an item assessing *global marital satisfaction*, where participants rate their general satisfaction with their 'real life' relationship. Six of the items are rated on a 6-point Likert-type scale (with endpoints of 'always agree' and 'always disagree', or 'all the time' and 'never'), while the seventh item is rated on a 7-point scale ranging from 'extremely unhappy' to 'perfect'. A general satisfaction score is



calculated as a sum of the scores on all seven items. This scale was completed independently by mothers and fathers living with each other as a couple as part of the self-complete sensitive questionnaire.

In these analyses, data on relationship satisfaction are only included for fathers (single mothers did not complete this scale) and so this variable could not be included in the mothers' model. Out of a possible range of 0–36, fathers' scores in *Growing Up in Ireland* ranged from 1–36, with a mean of 25.7 (SD = 4.8). Internal consistency (Cronbach's alpha) was 0.65 for fathers.

3.5 RE-WEIGHTING THE DATA

Prior to analysis, the data were re-weighted according to a proportional weight prepared by the *Growing Up in Ireland* study team, with the assistance of the Central Statistics Office (Quail *et al*, 2011). Among the population variables used to statistically adjust the Infant Cohort data were: family structure, mother's age, mother's and father's principal economic status, family's social class, mother's education, household tenure, region, child's gender, mother's marital status, mother's nationality, and mother's residency status. Further details on this process are documented in Quail *et al* (2011).

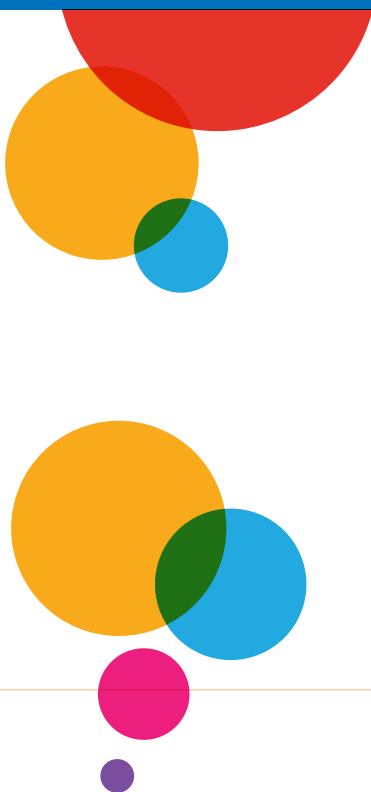
3.6 DATA ANALYSIS

The statistical analyses performed with the data included t-tests and ANOVAs (with post-hoc tests) to examine variability in key outcomes variables by family structure and income quintile; and structural equation modelling to test predictors of parental sensitivity and infant developmental outcomes. The results of the analyses are presented in Chapter 4.



Chapter 4

MODELS OF PARENTING AND INFANT DEVELOPMENTAL OUTCOMES



4.1 INTRODUCTION

This chapter reports on factors associated with mothers' and fathers' parental sensitivity and infants' developmental outcomes. Previous research and Belsky's (1984) process model of parenting have provided the framework to guide an understanding of relationships among proposed predictor factors and outcome variables, while structural equation modelling (SEM)² techniques were used with *Growing Up in Ireland* data to test these models. Previous research has supported the idea that parental sensitivity is associated with children's developmental outcomes, while Belsky's theory proposes that parental sensitivity and child outcomes are influenced by parental characteristics (e.g. depression), infant characteristics (e.g. temperament), family relationships (e.g. parents' relationship satisfaction) and wider social networks and circumstances (e.g. social support and employment).

Prior to testing two models of predictors of parenting stress, parental sensitivity and infant developmental outcomes using SEM, preliminary analyses were conducted to explore variations in parenting stress, sensitivity and infant developmental outcomes according to two key contextual variables: family structure (one-parent or two-parent households) and income quintile (as an indicator of socio-economic status).

4.2 FAMILY STRUCTURE AND INCOME VARIATIONS IN PARENTAL STRESS, SENSITIVITY AND INFANT DEVELOPMENTAL OUTCOMES

Variations in mothers' parenting stress and sensitivity³ and infant developmental outcomes by family structure are illustrated in Table 4.1. Mothers in two-parent households had slightly, but statistically significantly higher sensitivity scores than mothers in one-parent households, although the magnitude of the difference was negligible. Mothers in one-parent households had slightly, but significantly higher stress scores than mothers in two-parent households, but this difference had a small effect size. No differences emerged in infants' outcomes measured by personal/social, gross motor or problem-solving scores, according to household structure. Infants in one-parent households had higher communication scores and infants in two-parent households had slightly higher fine motor scores. However, effect sizes in both cases were small in magnitude.

Table 4.1: Means (with 95% confidence intervals) of mothers' stress and sensitivity scores, and child outcomes measured by ASQ domain scores, within one-parent and two-parent households

	One-parent household (N=1,569–1,642)	Two-parent household (N=8,949–9,459)	Effect size (Cohen's <i>d</i>)
Mother's sensitivity	42.39 (42.25–42.52)	42.58 (42.52–42.63)	0.07 (negligible)
Mother's stress	15.74 (15.52–15.96)	14.45 (14.37–14.53)	0.31 (small)
Child's ASQ Communication	46.93 (46.37–47.48)	44.28 (44.05–44.50)	0.23 (small)
Child's ASQ Personal/Social	43.57 (43.01–44.14)	43.56 (43.31–43.80)	
Child's ASQ Fine motor	50.52 (49.92–51.12)	52.67 (52.45–52.89)	0.20 (small)
Child's ASQ Gross motor	33.04 (32.34–33.84)	32.38 (32.03–32.72)	
Child's ASQ Problem-solving	45.79 (45.12–46.46)	46.13 (45.86–46.41)	

² SEM analyses were conducted using IBM SPSS Amos 19 computer software.

³ Family structure associations with fathers' stress and sensitivity could not be examined because data on fathers' stress and sensitivity within single-parent households were not collected.



Associations between income quintiles and parental sensitivity and stress were investigated next. No differences emerged in fathers' stress scores according to income quintile. Table 4.2 illustrates how mothers' stress scores varied by income quintile – stress tended to be higher at lower income quintiles.

Table 4.2: Means (95% confidence intervals) of mothers' stress scores, by income quintile (n=10,256)

Income quintile	Stress	Significant group differences ($p < 0.05$) (based on ANOVA and Scheffé tests)
Lowest (1st)	15.35 (15.16-15.55)	Higher scores than 2nd, 3rd, 4th, 5th groups
2nd	14.74 (14.56-14.92)	Higher scores than 4th, 5th groups
3rd	14.64 (14.46-14.82)	Higher scores than 4th, 5th groups
4th	14.21 (14.05-14.38)	
Highest (5th)	14.11 (13.94-14.29)	

No differences emerged in fathers' sensitivity scores according to income quintile, with one exception: fathers in the 2nd income quintile had higher sensitivity scores only in comparison with fathers in the highest income quintile. However, the magnitude of this statistically significant difference was negligible ($d = 0.12$). Similarly, as illustrated in Table 4.3, mothers in the lowest and 2nd income quintile groups had slightly, but significantly higher sensitivity scores than mothers in the highest income group, although both effect sizes were of negligible magnitude ($d = 0.12$).

Table 4.3: Means (95% confidence intervals) of mothers' sensitivity scores, by income quintile (N=10,281)

Income quintile	Sensitivity	Significant group differences ($p < 0.05$) (based on ANOVA and Scheffé tests)
Lowest (1st)	42.65 (42.53-42.77)	Higher scores than 5th group
2nd	42.65 (42.53-42.76)	Higher scores than 5th group
3rd	42.56 (42.45-42.67)	
4th	42.52 (42.41-42.62)	
Highest (5th)	42.34 (42.22-42.46)	

Together, the findings suggest that there may be some small variations in parenting stress and sensitivity according to family structure and income level. No differentiations emerged in fathers' stress scores by income group. However, mothers' stress scores were related to income quintile and family structure, with those in the lowest income groups and in one-parent households having higher scores than those in the highest income groups and in two-parent households, respectively. Mothers in two-parent households also displayed higher levels of sensitivity than mothers in one-parent households.

In contrast, mothers' sensitivity was inversely related to income quintile and this was also the case for fathers. However, it was only those in the lowest income groups who differed significantly from those in the highest income group. In all cases where differences emerged, they were of negligible to small magnitude.

Finally, child developmental outcomes by income quintile are shown in Table 4.4. In the communication domain, the lowest income quintile groups had significantly higher scores than the higher income quintile groups. Inversely, those in the higher income quintile groups had children with lower communication

scores. All effect sizes ranged from negligible to small in magnitude ($d = 0.10$ – 0.33). In the gross motor domain, the lowest income quintile group had significantly higher scores than all the other groups, but the other groups did not differ from each other. Effect sizes ranged from negligible to small in magnitude ($d = 0.10$ – 0.16). In fine motor skills, there was a steady gradient in which the lower income group had significantly lower scores than the higher income groups. Effect sizes ranged from negligible to small in magnitude ($d = 0.11$ – 0.18). There were no differences in problem-solving scores by income quintiles. In the personal/social domain, the lowest and second income quintile groups had significantly lower scores than the highest income quintile group (both negligible effect sizes).

Table 4.4: Means (95% confidence intervals) of ASQ domain scores, by income quintile (N=9,792–10,282)

ASQ domain	Income quintile	Mean (95% CI)	Significant group differences ($p < 0.05$) (based on ANOVA and Scheffé tests)
Communication	Lowest (1st)	46.62 (46.12–47.12)	Higher scores than 2nd, 3rd, 4th, 5th groups
	2nd	45.42 (44.93–45.90)	Higher scores than 3rd, 4th, 5th groups
	3rd	44.23 (43.72–44.74)	Higher scores than the 5th group
	4th	43.85 (43.38–44.32)	
	Highest (5th)	42.91 (42.40–43.42)	
Gross motor	Lowest (1st)	34.28 (33.52–35.04)	Higher scores than 2nd, 3rd, 4th, 5th groups
	2nd	32.20 (31.46–32.93)	
	3rd	31.93 (31.20–32.65)	
	4th	31.60 (30.90–32.30)	
	Highest (5th)	32.52 (31.78–33.26)	
Fine motor	Lowest(1st)	51.39 (50.88–51.90)	Lower scores than 3rd, 4th, 5th groups
	2nd	52.17 (51.68–52.66)	Lower scores than 5th group
	3rd	52.56 (52.09–53.02)	
	4th	52.58 (52.13–53.94)	
	Highest (5th)	53.39 (52.93–53.85)	
Problem-solving	Lowest (1st)	46.25 (45.66–46.83)	
	2nd	45.55 (44.94–46.17)	
	3rd	46.17 (45.60–46.73)	
	4th	45.71 (45.14–46.28)	
	Highest (5th)	46.73 (46.14–47.31)	
Personal/Social	Lowest (1st)	42.87 (42.32–43.42)	Lower scores than 5th group
	2nd	43.03 (42.51–43.56)	Lower scores than 5th group
	3rd	43.87 (43.36–44.38)	
	4th	43.79 (43.30–44.27)	
	Highest (5th)	44.36 (43.85–44.86)	

These findings indicate a possible emergence of social class differentiations in infants' developmental outcomes. In most cases, it was the infants in the lowest and second income quintile groups who were doing significantly differently from infants in the highest income group, but there was a lack of consistency in the direction of those differences. In addition, in all cases where differences emerged, the size of the differences was negligible to small.



4.3 DESCRIPTION OF VARIABLES USED IN THE MODEL TESTING ANALYSES

In order to test models of predictors of mothers' and fathers' parental stress, sensitivity and infants' developmental outcomes, structural equation modelling (SEM) was conducted. Infant development was the main outcome (dependent) variable in the models tested. Parental sensitivity represented a second outcome variable, although it was also conceptualised as a predictor of infant development. Parental stress represented a third outcome variable in the models, while at the same time being a predictor variable for parental sensitivity. Table 4.5 presents descriptive statistics, including means (M), standard deviations (SD) and ranges for each of the continuous variables used in the SEM analyses and Cronbach's alpha (α) reliability scores for all scales. These figures are presented separately for the model for mothers and for fathers.⁴

Table 4.5: Descriptive statistics and scale reliability of the measures included in models

Model	Variable	M	SD	Range	α
Mother (n=11,134)	Child's ASQ Communication	44.67	11.46	0-60	.53
	Child's ASQ Gross motor	32.47	16.91	0-60	.80
	Child's ASQ Fine motor	52.35	11.01	0-60	.66
	Child's ASQ Problem-solving	46.08	13.24	0-60	.65
	Child's ASQ Personal/Social	43.56	11.96	0-60	.53
	Child's Difficult Temperament	14.83	5.00	6-42	.73
	Parental Sensitivity	42.55	2.61	13-45	.52
	Parent's Depression	2.48	3.66	0-24	.87
	Parenting Stress	14.64	4.20	6-30	.74
Father (n=9,775)	Child's ASQ Communication	44.28	11.42	0-60	.53
	Child's ASQ Gross motor	32.38	16.96	0-60	.80
	Child's ASQ Fine motor	52.67	10.78	0-60	.65
	Child's ASQ Problem-solving	46.13	13.20	0-60	.56
	Child's ASQ Personal/Social	43.56	12.02	0-60	.53
	Child's Difficult Temperament	14.72	4.89	6-42	.73
	Parental Sensitivity	24.12	1.44	12-25	.45
	Parent's Depression	1.30	2.41	0-24	.81
	Parenting Stress	13.41	3.87	6-29	.72
	Relationship Satisfaction*	25.73	4.76	1-36	.65

* Data on Relationship Satisfaction were only included for fathers, all of whom were from two-parent households. Data could not be included in the mothers' model due to the inclusion of single mothers, who did not complete the Dyadic Adjustment Scale.

Structural equation modelling (SEM) facilitates the evaluation of the strength of relationships among proposed variables. These variables can be either directly measured variables (e.g. infants' birth-weight) or latent variables, where measured variables are used as indicators of underlying latent constructs (e.g. items on a depression inventory can represent 'depression'). Statistically assessing relationships with latent variables is a more robust practice because the relationships are free from measurement error since the error has been estimated and removed.

The five subscales of the ASQ-2 were used to form a latent variable representing overall infant development. Statistical analysis using IBM SPSS Amos 19 computer software showed that each subscale factor loading was positive and statistically significant ($p < .001$) and model fit indices were strong (IFI = .96; CFI = .95;

⁴ The model for fathers only includes fathers from two-parent households because data were not available for fathers from one-parent households. The model for mothers includes mothers from one-parent and two-parent households.

RMSEA = .07 – see Box 4.1 for information about how to interpret these model fits). The overall reliability of the ASQ-2 latent variable comprising the five subscales was acceptable (Cronbach’s alpha = 0.65).

The conceptual model that was tested for mothers in two-parent and one-parent households and fathers in two-parent households was detailed in Chapter 2 and depicted in Figure 2.2. Latent variables are represented in the diagram by circular shapes and measured variables are represented by rectangles. These variables⁵ are defined in Table 4.6.

Table 4.6: Variables included in structural equation models

Key Outcomes	Infant development represents a variable comprising the five subscales assessing various aspects of development (personal/social, communication, fine motor, gross motor and problem-solving) from the Ages and Stages Questionnaire - 2 (Squires et al, 1999). Higher scores are reflective of more advanced age-appropriate development.
Parent characteristics	Parental sensitivity refers to the sensitivity reported by parents towards their infants. It is composed of the nine items on the Quality of Attachment Subscale from the Maternal Postnatal Attachment Scale (Condon and Corkindale, 1998) with respect to mothers and the five items on the Paternal Postnatal Attachment Scale (Condon et al, 2008 with respect to fathers. Higher scores are reflective of greater parental sensitivity.
	Parenting stress represents the 6-item stressors subscale of the Parental Stress Scale (Berry and Jones, 1995). Higher scores indicate more parenting stress.
	Parents’ depression represents parents’ scores on the 8-item version of the Centre for Epidemiological Studies Depression Scale (CES-D – Melchior et al, 1993). Higher scores reflect greater depressive symptoms.
Child characteristics	Difficult refers to infants’ temperament and is represented by the items that comprise the ‘fussy-difficult’ subscale of the Infant Characteristics Questionnaire (ICQ – Bates et al, 1979). Higher scores indicate more difficult temperament.
	Gestational age refers to the number of weeks of pregnancy at which infants were born. Higher scores indicate an older gestational age.
	Low infant birth-weight indicates a birth-weight of less than or equal to 2,500g.
Contextual factors	Relationship satisfaction is only relevant to the model for fathers. It represents scores on the 7-item Dyadic Adjustment Scale (DAS – Sharpley and Rogers, 1984). Higher scores reflect more relationship satisfaction.
	Single parent is only relevant to the model for mothers and refers to those from one-parent households.
	Support is a single-item measured variable assessed only for mothers that asks on a 4-point scale ‘Overall, how do you feel about the amount of support or help you get from family or friends living outside your household’. Higher scores indicate more perceived support.
	Employed refers to mothers and fathers who are in either part-time or full-time employment.

⁵ Standardised and unstandardised factor loadings (with standard errors) for each measured variable on its respective latent variable for the two models are available from the authors on request. All load positively and are statistically significant (p < 0.001).



4.4 MODEL TESTING

In this section, the results of analyses examining models of key variables and their associations with parental sensitivity and infant developmental outcomes are presented. Indications are that the models provide acceptable fit with the data. Box 4.1 provides some information on how these fit indices can be interpreted.

BOX 4.1: BRIEF EXPLANATION OF HOW TO INTERPRET GOODNESS OF FIT INDICES

Goodness of Fit statistics can be consulted to evaluate how successfully theoretically driven models reflect the collected data. Chi-square values (χ^2) should generally be non-significant. However, the χ^2 test is sensitive to the distribution of variables, the number of variables and the sample size, and so cannot be considered by itself (Bollen and Long, 1993; Hoe, 2008). Relative fit indices, such as the Incremental Fit Index (IFI – Bollen, 1989) and the Comparative Fit Index (CFI – Bentler, 1990), compare the χ^2 value from the model being tested with that from a 'null' or 'baseline' model. Values of 0.90 or larger are considered indicative of models that provide acceptable fit with the data. Finally, the Root Mean Square Error of Approximation (RMSEA – Steiger, 1990) is an absolute fit index that determines how well an a priori model fits the sample data (without comparison with a baseline model). Values of 0.08 or smaller are considered acceptable.

In both of the models, the chi-square (χ^2) value is statistically significant and large in relation to the degrees of freedom. However, this is the result of the very large sample size used in *Growing Up in Ireland* and thus the models should not be rejected on this basis. CFI and IFI values are at, or above 0.90 and RMSEA values, including 90% confidence intervals (CI), are below 0.05. Absolute and comparative fit indices for the models for mothers and fathers are presented in Table 4.7.

Table 4.7: Goodness of Fit indices for the two parenting process models*

Fit index	Model for mothers	Model for fathers
χ^2	7870.528	3330.738
df	670	503
p	<.0001	<.0001
CFI	.92	.95
IFI	.92	.95
RMSEA	.031	.024
90% CI RMSEA	.030 - .032	.023 - .025

* These statistical indices should be considered only as guidelines here. All models specified in this report were developed in light of research and theory in the field of study. However, in some respects the models are also data-driven, in that some variables that were considered to be theoretically relevant but did not perform well in the model (e.g. income) were omitted in order to present a picture of key associations that was more concise and robust.

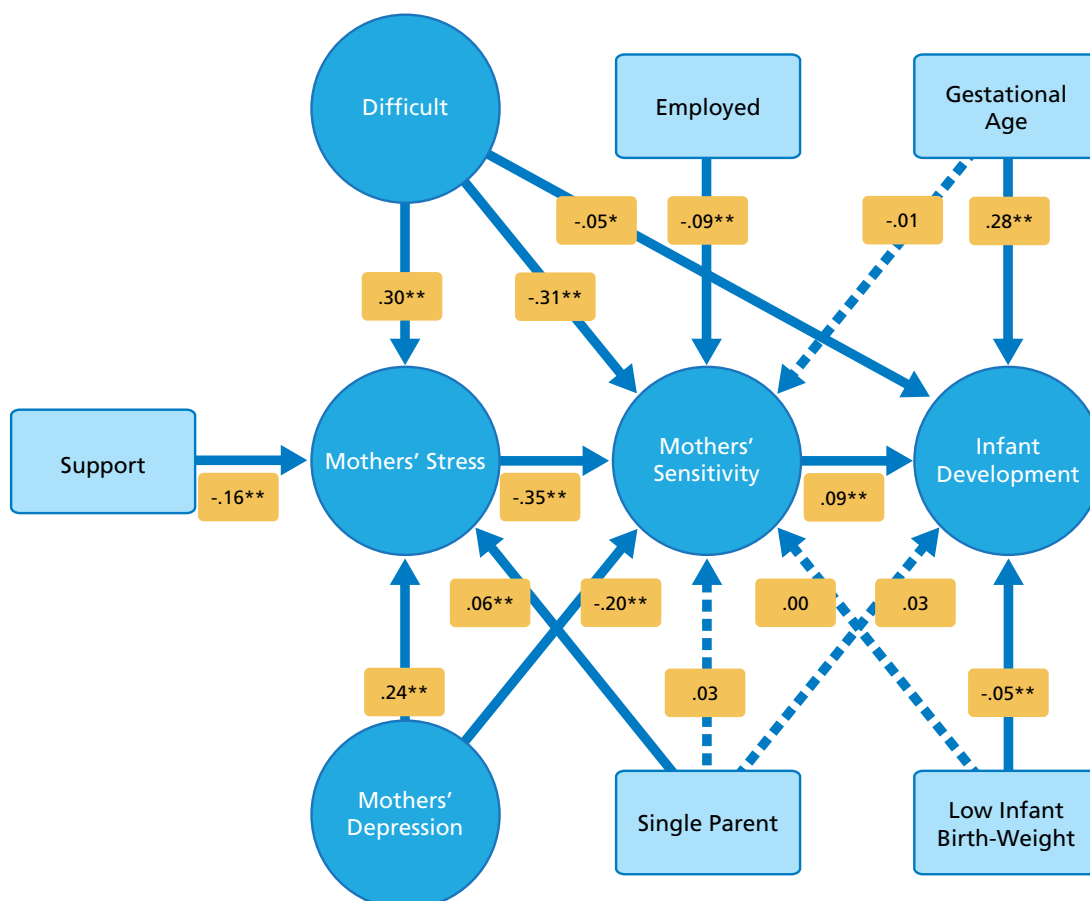
To aid interpretation of the models presented in the following sections, it is useful to note that relationships are represented by arrows pointing from explanatory (predictor) variables to dependent (outcome) variables, and the strength of each relationship is represented by standardised regression coefficients (non-significant associations are denoted by dashed arrows). Relationships can be positive, where high values on one variable are associated with high values on another, or negative (with a minus sign), where high values on one variable are associated with low values on another. Each coefficient measures the influence of a given explanatory variable, controlling for all others included in the model.⁶

⁶ In both models, all covariances between explanatory variables are omitted from the figures.

MODEL OF MOTHERS' SENSITIVITY AND INFANT DEVELOPMENTAL OUTCOMES

The results of the analysis for mothers are presented in Figure 4.1. This model explains 24 per cent of the variability in parenting stress, 40 per cent of the variability in parental sensitivity and 11 per cent of the variability in infant developmental outcomes.

Figure 4.1: Model of mothers' stress and sensitivity and infant developmental outcomes
[*p < .01; ** p < .001]



As can be seen in Figure 4.1, mothers' perceived support had a significant association with parenting stress, in that greater support from family and friends was related to less stress. Infants' difficult temperament, mothers' depressive symptoms and being a single parent were all associated with mothers' reports of higher degrees of parenting stress. Having an infant with a difficult temperament had the strongest association with stress, while the association with being a single parent was the weakest. As discussed in Chapter 2, the household's equivalised income was initially included in the model as a predictor of parenting stress, but was removed since it was not significantly related to stress and did not improve the fit of the model.

Mothers' parenting stress, in turn, had the strongest association with mothers' parenting sensitivity. This relationship was negative so that greater stress was associated with lower sensitivity. Infants' difficult temperament, mothers' depressive symptoms and being employed outside the home were each associated with lower reported levels of parental sensitivity, although the association with the latter factor was weak. Mothers' sensitive parenting was not significantly associated with being a single parent, having a low birth-weight infant or having an infant born after fewer weeks of gestation.



Greater maternal sensitivity had a direct positive relationship with infant developmental outcomes, in that mothers' sensitivity was associated with higher scores with regard to a composite of infants' cognitive, motor, social and communication development, although it should be noted that this relationship was weak. The number of weeks in gestation had the strongest associations with infants' developmental outcomes, with a longer period of gestation being associated with better developmental outcomes. Infants' difficult temperament was associated with poorer outcomes, as was having an infant with a low birth-weight classification, but these relationships were weak. Being a single parent was not significantly associated with infant developmental outcomes.

Standardised and unstandardised regression coefficients and standard errors for all relationships in this model are presented in Table 4.8.

Table 4.8: Standardised (B), unstandardised factor loadings (B), standard errors (SE) and p-values for the structural equation model of mothers' stress and sensitivity and infant outcomes [Significant relationships are highlighted in bold; ns = non-significant relationships]

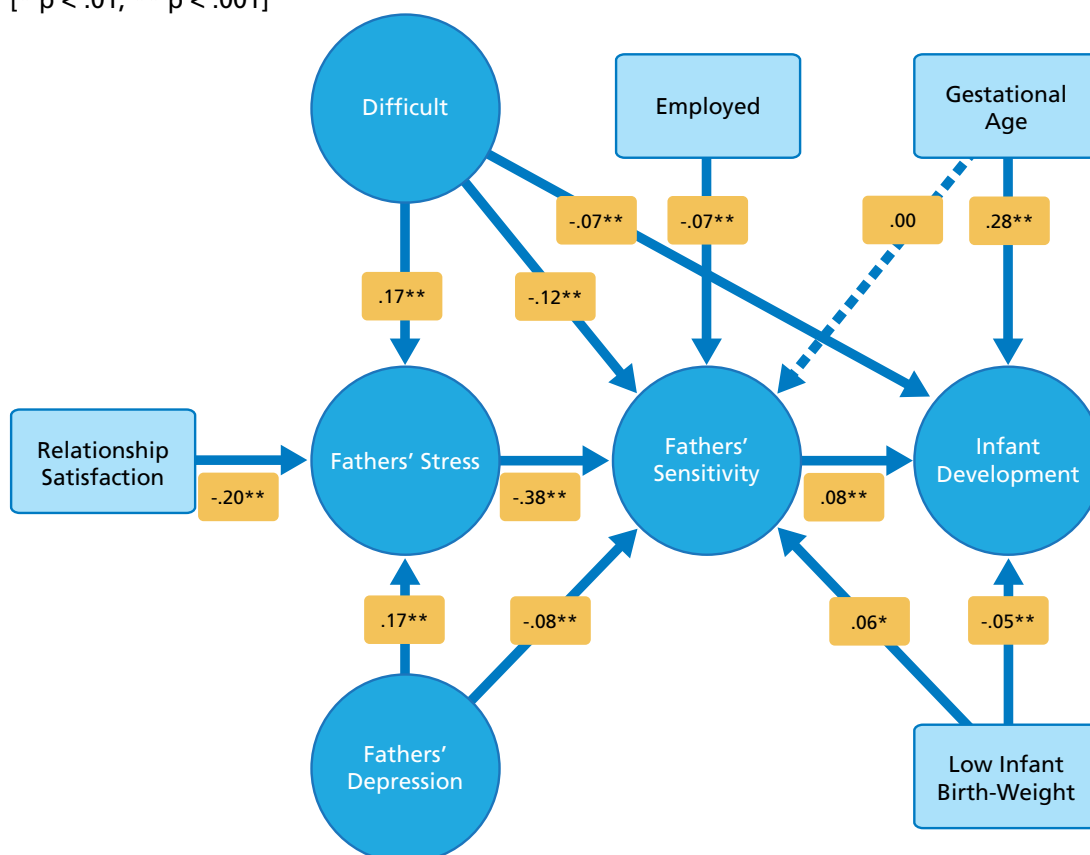
Variable	B	B	SE	p-value
Support on Parenting stress	-.164	-.218	.015	<0.001
Depression on Parenting stress	.242	.329	.016	<0.001
Difficult temperament on Parenting stress	.303	.276	.012	<0.001
Single parenting on Parenting stress	.064	.144	.023	<0.001
Parenting stress on Parental sensitivity	-.354	-.200	.010	<0.001
Depression on Parental sensitivity	-.195	-.150	.011	<0.001
Difficult temperament on Parental sensitivity	-.306	-.158	.008	<0.001
Gestational age on Parental sensitivity	-.013	-.003	.003	ns
Employment on Parental sensitivity	-.092	-.077	.010	<0.001
Low infant birth weight on Parental sensitivity	-.001	-.002	.024	ns
Single parenting on Parental sensitivity	.025	.025	.015	ns
Parental sensitivity on Infant development	.088	1.344	.265	<0.001
Difficult temperament on Infant development	-.045	-.357	.124	<0.01
Gestational age on Infant development	.277	.833	.043	<0.001
Low infant birth-weight on Infant development	-.051	-1.410	.368	<0.001
Single parenting on Infant development	.025	.474	.217	ns

MODEL OF FATHERS' SENSITIVITY AND INFANT DEVELOPMENTAL OUTCOMES

The results of the analysis for fathers are presented in the structural equation model in Figure 4.2. This model explains 12 per cent of the variability in parenting stress, 21 per cent of the variability in sensitivity and 11 per cent of the variability in infant outcomes.

Figure 4.2: Model of fathers' stress and sensitivity and infant developmental outcomes

[* $p < .01$; ** $p < .001$]



As seen in Figure 4.2, fathers' satisfaction with their relationship with their wives or partners had the strongest association with parenting stress, such that greater satisfaction was associated with less stress. As was the case in the model for mothers (see Figure 4.1), infants' difficult temperament and fathers' depressive symptoms were also associated with increased stress. As for the mothers' model, equivalised income was initially included in the model as a predictor of parenting stress, but was removed since it had no significant association with fathers' stress and did not improve the fit of the model.

Fathers' stress had a negative association with fathers' sensitivity towards their infants – the strongest of all associations with this variable – such that fathers who experienced more stress rated themselves as being less sensitive with their infants. Infants' difficult temperament, fathers' depressive symptoms and being employed were also significantly associated with reduced levels of parental sensitivity, although the latter two associations were weak in magnitude. Having a baby with low birth-weight was weakly, yet significantly associated with greater sensitivity. Gestational age was not significantly associated with fathers' sensitivity.

As was the case for mothers, greater sensitivity from fathers towards their infants was associated with better developmental outcomes, while low birth-weight and difficult infant temperament were associated



with less favourable development, although the strength of these associations was relatively weak. The factor with the strongest relationship with outcomes was infants' gestational age at birth, with longer gestation associated with better developmental outcomes. Standardised and unstandardised regression coefficients and standard errors for all relationships in this model are presented in Table 4.9.

Table 4.9: Standardised (β), unstandardised factor loadings (B), standard errors (SE) and p-values for the structural equation model of fathers' stress and sensitivity and infant outcomes
[Significant relationships are highlighted in bold; ns = non-significant relationships]

Variable	β	B	SE	p-value
Relationship satisfaction on Parenting stress	-.203	-.030	.002	<0.001
Depression on Parenting stress	.174	.387	.031	<0.001
Difficult temperament on Parenting stress	.170	.152	.013	<0.001
Parenting stress on Parental sensitivity	-.381	-.073	.005	<0.001
Depression on Parental sensitivity	-.084	-.036	.007	<0.001
Difficult temperament on Parental sensitivity	-.122	-.021	.003	<0.001
Gestational age on Parental sensitivity	.004	.000	.001	ns
Employment on Parental sensitivity	-.068	-.028	.006	<0.001
Low infant birth weight on Parental sensitivity	.055	.033	.010	<0.01
Parental sensitivity on Infant development	.084	3.877	.823	<0.001
Difficult temperament on Infant development	-.066	-.523	.112	<0.001
Gestational age on Infant development	.284	.857	.046	<0.001
Low infant birth-weight on Infant development	-.052	-1.429	.399	<0.001

4.5 SUMMARY

This chapter presented the results of structural equation modelling (SEM) to examine what factors were associated with mothers' and fathers' parental sensitivity and infants' developmental outcomes. Theory-driven models of these influences were developed and tested against the data.

Initial descriptive analyses suggested a small degree of patterning of parental stress, sensitivity and infant developmental outcomes according to family structure and income quintile, although any differences between one-parent and two-parent households or among the five income quintile groups were negligible to small in magnitude.

Based on the results of the model testing, parenting stress was found to have the strongest association with parental sensitivity towards their infants for both mothers and fathers. Parenting stress itself was significantly and positively associated with difficult infant temperament and parents' own depressive symptoms. For mothers, stress was negatively associated with perceived support, while for fathers stress was negatively associated with satisfaction in relationships with partners. Being a single parent was associated with greater stress for mothers.

In addition to the associations noted between stress and parenting, parental sensitivity was also significantly and negatively related to parents' depression and infants' difficult temperament, although the magnitude of these associations was stronger for mothers than for fathers. Both mothers' and fathers' sensitivity was also negatively associated with being employed, but not to the same extent. Mothers' sensitivity was unrelated to being a single parent or to infants' birth-weight. For fathers, however, a small, yet significant

association was noted between parental sensitivity and infants' low birth-weight. Gestational age was not found to be significantly related to sensitivity for either mothers or fathers.

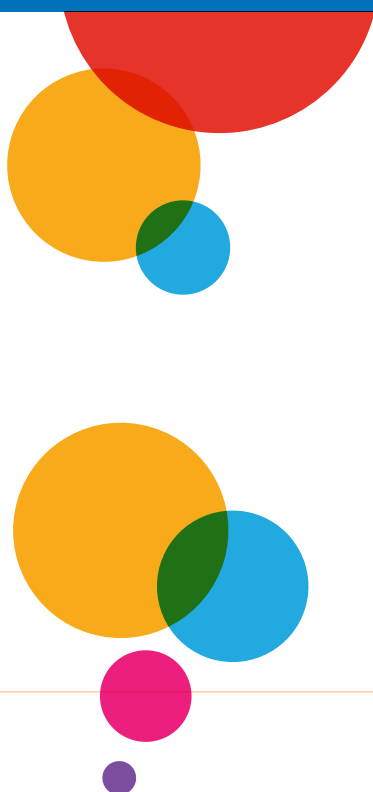
Finally, associations between infant characteristics and parental sensitivity, and infant developmental outcomes were examined. Across both models, older gestational age and higher levels of parental sensitivity were associated with better infant outcomes, and infants' difficult temperament and low birth-weight were associated with poorer outcomes. Being a single parent had no relationship with outcomes. The magnitude of the association between gestational age and outcomes was three times that of the association between parental sensitivity and infant outcomes for both mothers and fathers.

The models presented here explain a significant proportion of the variance in parental sensitivity (42 per cent of the variability for mothers and 22 per cent of the variability for fathers). Yet only 11 per cent of the variability in infant developmental outcomes was accounted for. These findings and their implications for policy will be discussed in Chapter 5.



Chapter 5

DISCUSSION AND POLICY IMPLICATIONS



5.1 INTRODUCTION

In this report, data from Wave 1 of the Infant Cohort of *Growing Up in Ireland* were analysed (1) to consider how parental sensitivity is associated with infant developmental outcomes and (2) to understand key predictors of parental sensitivity over the first year of the infant's life. Drawing on research that highlights the significance of parental sensitivity for infant's development and on Belsky's (1984) process model of parenting, it was hypothesised that parental sensitivity would be shaped by three sets of factors, namely: child characteristics (including temperament, birth-weight, gestational age); parent characteristics (including stress and depression) and characteristics beyond the infant–parent dyad (including marital satisfaction, support, employment status and family income). It was further hypothesised that parental sensitivity, in turn, would be associated with infant developmental outcomes. Separate models of predictors of parental sensitivity for mothers and fathers and their association with infant outcomes were considered. The findings have policy implications in terms of identifying children who may be at risk for delays in development, identifying parents who may be at risk of low levels of parental sensitivity and identifying elements of the infants' and parents' context that may be most amenable to intervention.

5.2 METHODOLOGICAL ISSUES

Prior to discussing the findings, caveats and methodological limitations need to be highlighted. First, while the relationships tested were theoretically driven and derived from previous research, the analyses were based on data collected at one point in time and no causal interpretations can be made. For example, because of possible interactions and reciprocal relationships, it is plausible that parenting stress could be a predictor of parental depression (rather than vice versa) or that a third unmeasured variable (such as a chronic health problem) predicts both stress and depression. Thus, caution needs to be exercised when interpreting findings in these respects.

Secondly, the models for mothers' sensitivity and infant outcomes were based on data derived from maternal report, so there is a possibility that there are inherent biases affecting the findings. This is termed source bias (Rothbart and Bates, 2008). When associations are observed between two constructs (such as infant temperament and infant developmental outcome) that have been measured via the same source (in this case, the mother), the association may be a function of bias in the mind of the informant, rather than the actual characteristics of the child. This problem has been addressed to some extent in the model for fathers' parenting and infant outcomes, where fathers provided some data (relating to depression, stress and quality of the marital relationship) and mothers provided other data (infant's temperament and developmental outcomes). However, caution should be exercised in interpreting the associations found in the mothers' model due to the potential for source bias.

The models presented in this report explain between 12–24 per cent of the variability in parenting stress, between 21–40 per cent of the variability in parental sensitivity and 11 per cent of the variability in infant developmental outcomes. This indicates that the variables considered in the models only partially explain what predicts parental stress, parental sensitivity and infant development. Other factors not considered here must be invoked to more fully understand parental sensitivity and infant outcomes. In relation to infant developmental outcomes, factors relating to birth complications, child health, maternal pre-natal health and exposure to teratogens are likely to be important, and some of these have been considered elsewhere (Layte and McCrory, in press). The influence of other key agents within the environment of the child and parents (including grandparents, childcare providers and neighbourhood/community resources and services) are also likely to be important.

There were some limitations with how key variables utilised in the present analyses were measured. The measure of parental sensitivity, which incorporated constructs such as pleasure in proximity to the infant,

tolerance for the infant and perceived competence as a parent, exhibited weak internal consistency and the distribution of scores on the scale were highly positively skewed, possibly reflecting a social desirability effect on the part of parents. This means that parents who scored lower on this scale relative to other parents could be still exhibiting high levels of sensitivity in absolute terms. However, that significant relationships still emerged between parental sensitivity and infant developmental outcomes highlights the significance of this construct, where even small variations may have an important role to play.

The issue of skewness also arose for the measure of parental depression, where the majority of parents did not report themselves to be experiencing depression, but it nevertheless emerged as an important predictor of parental sensitivity. In addition, some of the domain scores on the ASQ exhibited low internal consistency. However, the latent variable based on the separate domain scores for infant development exhibited better reliability and model fits indices were strong.

With these caveats in mind, findings relating to predictors of infants' developmental outcomes, predictors of parental sensitivity and predictors of parenting stress are considered below.

5.3 OVERVIEW OF KEY FINDINGS

Do parental sensitivity and infant characteristics (gestational age, birth weight and temperament) predict infant developmental outcomes?

The findings revealed that gestational age was the most significant direct predictor of infant developmental outcomes across both models relating to mothers and fathers, and the magnitude of the association was similar in both models. Children who were born at a younger gestational age displayed poorer developmental outcomes. Across both models, infant birth-weight and parental sensitivity were also positively associated with the overall development score, such that being classified as having a low birth-weight and having lower parental sensitivity was related to a lower total development score. The magnitude of these associations was also similar in both models, but they were weak relative to the magnitude of the associations between gestational age and developmental outcomes.

Overall, these findings were consistent with other research, which has indicated that children of a younger gestational age and of a low birth-weight exhibit a range of poorer developmental outcomes across a number of domains (Aarnoudse-Moens *et al*, 2009). This is not surprising given that being born prematurely or with a low birth-weight may reflect a slower rate of biological maturation. However, it is still early days in the lives of these infants and the potential interacting effects of low birth-weight with socio-demographic and psychosocial risk factors need to be considered over longer periods of time, as other research has suggested (Ashtown-Lambert, 2005; Candelaria *et al*, 2006). Furthermore, while low birth-weight is often confounded with gestational age or prematurity, the analyses suggested that low birth-weight makes an independent, albeit small, contribution to variation in infant developmental outcomes.

The relationship between difficult/fussy temperament and infant developmental outcomes was significant in both models, although the magnitude of the associations was relatively small (similar to those for birth-weight, but much less than for gestational age). The relationship was negative in that a more difficult temperament was associated with a lower total development score. This finding was in line with previous research, which established connections between difficult temperament and poor developmental outcomes, in particular behaviour problems (Sanson *et al*, 2004). The nature and strength of the relationship between temperament and development may change over time and analyses of data from future waves of the *Growing Up in Ireland* study will provide further insight into this. As highlighted by Thomas and Chess (1977), temperament affects development primarily through its fit or match with the child's environment and it may take time before these interactions become established and exert their

influence on development. To some extent, the significant associations in the models may be explained in terms of source bias (Rothbart and Bates, 2008), where mothers who perceive their infants to be more temperamentally difficult may also be likely to perceive them as faring less well developmentally.

Parental sensitivity was positively associated with infant developmental outcomes, with higher levels of parental sensitivity being associated with better developmental outcomes, a finding that concurs with previous research (Bornstein and Tamis-LeMonda, 1989; Burchinal *et al*, 2006; Fearon *et al*, 2010; Pungello *et al*, 2009). One possible mechanism underpinning this association may be that parents who exhibit higher levels of sensitivity interact and engage more with their children, thus providing them with more stimulation and learning experiences (Posada and Kaloustian, 2010). In addition, infants who experience sensitive caregiving may feel more confident in exploring their environment, which might confer benefits in terms of their cognitive, language and social development (Van Ijzendoorn *et al*, 1995).

However, the magnitude of the associations between parental sensitivity and infant outcomes was relatively small in both models – a similar magnitude to that observed between birth-weight, difficult temperament and developmental outcomes. It may be that the magnitude of this relationship will strengthen since variations in parental sensitivity over longer periods of time may be necessary before differentiations in children's developmental outcomes could be observed. The collection and analyses of data on these children and their families in subsequent waves of the ***Growing Up in Ireland*** study will enable these associations to be further examined. In addition, the scale used as a proxy for parental sensitivity exhibited modest internal consistency and the scores were highly skewed, with the majority of mothers and fathers receiving a score near the maximum of the scale. Thus, parents who scored lower relative to other parents were still reporting a high level of sensitivity, in absolute terms. However, despite these difficulties with the scale, positive associations still emerged, highlighting the importance of this construct.

Do infant characteristics (difficult temperament, gestational age, birth-weight), parental characteristics (depression, stress) and contextual characteristics (work status, family structure, income and support) predict parental sensitivity?

The findings indicated that infant, parent and contextual characteristics emerged as predictors of parental sensitivity in both models. In terms of infant difficult temperament and its relation with parental sensitivity, both mothers and fathers reported less sensitivity with more temperamentally difficult children, with the magnitude of the association being slightly higher for mothers. This finding is in line with reports by other researchers, which show that temperamental attributes, such as fussiness, irritability and negative reactivity, tend to be associated with lower levels of positive parenting and unresponsiveness (Van den Boom, 1989; Hemphill and Sanson, 2001). However, disentangling the causal association between difficult temperament and parental sensitivity is not possible with concurrent data and given that the two are likely to be reciprocally related.

Neither gestational age nor infant birth-weight had a significant association with parental sensitivity for mothers. Gestational age was not associated with sensitivity for fathers. Being of low birth-weight was significantly, but only modestly associated with greater sensitivity for fathers. These findings broadly support the idea that parents are generally adept at interacting with their babies in ways that adequately support their development (Goldberg and DiVitto, 2002) and their sensitivity is not negatively affected by having a premature or low birth-weight baby. Subsequent analyses, when the ***Growing Up in Ireland*** infants are three years of age, will provide insight into whether the weak association between infant birth-weight and fathers' sensitivity persists over time and is associated with the quality of the father-child relationship in the longer term.

Both mothers' and fathers' stress and depression were directly negatively associated with parental sensitivity, suggesting that higher levels of stress and depression are linked with lower levels of sensitivity. Stress emerged as a stronger predictor of sensitivity than depression, and the strength of associations between stress and parental sensitivity was broadly similar for mothers and fathers. However, the relationship between depression and sensitivity was substantially higher for mothers than for fathers, although fathers' depression scores were significantly lower and exhibited less variation overall than mothers' scores. It is possible that because fathers tend to spend less time than mothers with their infants, their levels of depression are not associated with how sensitive they tend to be with their infants.

The association between parental depression and the provision of sensitive and responsive care has been well-documented in the literature (Zahn-Waxler *et al*, 2002; Lovejoy *et al*, 2000) and impaired parenting is deemed to be an important mechanism linking parental depression with child developmental outcomes. Similarly, high levels of parental stress are associated with lower levels of parental sensitivity and it may be that parental stress depletes the parents' physical, emotional and psychological resources and renders it more difficult for the parent to engage with their infant in a sensitive and responsive manner.

Parents' employment status had a negative weak association with parental sensitivity, such that being employed was associated with lower levels of parental sensitivity for both mothers and fathers. This supports previous literature, which suggests that being employed may be associated with less positive parent-child interactions (Nomaguchi, 2006; Sayer *et al*, 2004). However, as noted previously, the relationship between employment status and quality of parenting is complex and may depend on factors such as the nature of the parents' work and whether or not role strain is experienced. In addition, among employed mothers in the study, the majority had only recently returned to work (McGinnity *et al*, 2013) and so this association with parental sensitivity must be considered in terms of the timing of the transition that has occurred. Further analysis, when the *Growing Up in Ireland* infants are three years of age, will yield a better understanding of how return to work is associated with parental sensitivity and developmental outcomes.

Finally, in the model testing, family structure was not directly associated with lower levels of parental sensitivity. This finding runs counter to some research, which suggests that parenting processes are sometimes compromised within single-parent households (Deater-Deckard and Dunn, 1999; Hofferth and Anderson, 2003). It is possible that lack of resources and the additional stresses that single parents tend to experience do not directly relate to parenting behaviour or developmental outcome early in the child's life, but over time, such associations could become apparent.

Does support/quality of the interparental relationship, parental depression, family type and difficult child temperament predict parental stress?

The findings indicated that feeling supported was associated with lower levels of parental stress. As suggested by Crockenberg (1988), support can either directly reduce the stress experienced by parents (e.g. by providing practical assistance) or can buffer the parent from being adversely affected by stress (e.g. by providing emotional support in times of stress). For fathers, greater relationship satisfaction with their partners was also linked with lower levels of parenting stress. This finding supports other evidence that positive interparental relationships may buffer parents from the effects of stress, which in turn enables more sensitive parenting (Cox *et al*, 1989). These hypothesised mechanisms have been further supported in the current analyses. Unfortunately, the association between the quality of the interparental relationship and parental stress could not be examined in the model for mothers because only mothers in married/cohabiting relationships completed the measure of the quality of the interparental relationship.

Infant difficult temperament was positively associated with mothers' stress, with a slightly weaker association for fathers' stress. This positive association is plausible given that infants with a difficult temperament may be more stressful to deal with by demanding more tolerance and patience from parents in order to yield positive parent–infant interactions (Van den Boom, 1989). However, there may be some overlap in content between items on the parental stressor scale, which specifically allude to stress caused by the child (e.g. 'caring for my child sometimes takes more time and energy than I have to give'), and the temperament subscale, which taps into parents' ratings of their infants' fussiness (e.g. 'how difficult is it to calm or soothe your baby when he/she is upset?'), and such overlap could artificially influence the strength of the association.

A significant association was noted between parental depression and stress for both mothers and fathers. As discussed previously, depression may give rise to a stressful family environment (Downey and Coyne, 1990; Heflin and Iceland, 2009) and it may be through the association between depression and stress that depression is indirectly associated with sensitivity and developmental outcomes.

In support of other research (e.g. Amato, 1995), being a single parent was also associated with significantly higher levels of stress, although the strength of the relationship was relatively small. While income level was also found to be significantly associated with stress for mothers, but not for fathers, inclusion of income in the overall models did not significantly improve the ability of the models to explain key outcomes and so income was excluded as a predictor variable. Given that proposed mechanisms linking socio-economic disadvantage and stress include the independent impact of economic disadvantage on parental psychological well-being and on access to a support network (Conger *et al*, 2010; McLoyd, 1998), it may be that having controlled for these variables, the effect of socio-economic disadvantage was no longer apparent. These findings are a potent reminder that income per se is not a cause of poorer developmental outcomes or lower quality parenting. Rather, income as a proxy for socio-economic status can contribute to a set of circumstances that can generate stress, which in turn can be linked to parental sensitivity and developmental outcomes. Thus, the links between income and developmental outcomes are neither universal nor deterministic, but instead mediated and moderated by a host of intervening events and circumstances.

5.4 POLICY IMPLICATIONS

Across the models, infant gestational age was one of the most robust predictors of poorer developmental outcomes, with infant birth-weight also playing a significant (though much weaker) role. Although it is very important to follow these children over time to see if they 'catch up' over the years, the findings highlight the potential role that health-related policies and programmes could play in preventing pre-term births and in supporting the development of low birth-weight infants. Maternal behaviours during the pre-natal period known to heighten the risk of premature birth and low infant birth-weight should be targeted. Pregnant women at risk of these behaviours need to be identified in the early stages of pregnancy and interventions could be targeted at supporting them and their families to cease engaging in health-risk behaviours. During the post-natal period, premature and low birth weight infants may benefit from having additional home visits from public health nurses, during which practical advice can be dispensed to parents, infants' growth and development can be closely monitored, and parents can be supported in their interactions with their infants.

Having an infant with a difficult temperament was also a significant predictor of infant development and of parental sensitivity (especially for mothers). These findings indicate that some babies are harder to parent than others and parents may benefit from being helped to recognise each child's individuality and adapting their parenting to suit their children's dispositions. Parents whose children are more intense,

volatile and poorly regulated may need extra support to enable them to be sensitive in interacting with them.

Parental sensitivity had a significant, but relatively weak association with infant developmental outcomes, but should be monitored over time. Parents have been shown to benefit from receiving information about what to expect in terms of infant and child development, and how to engage in age-appropriate activities that may strengthen the quality of parent–child interaction and improve the home learning environment (McManus and Nugent, 2011). Such interactions may be particularly important when infants are temperamentally difficult or are premature or of low birth-weight.

Among the key predictors of parental sensitivity were parents' depression, parenting stress and infant difficult temperament, and among the key predictors of parental stress were parents' depression and infant difficult temperament. Thus, ameliorating parental stress and depression represent key targets for intervention. Given that the birth of a child is typically considered to be a time of joy in the life of parents, it must be recognised that this may not be the case for all parents and that some may experience this transition differently. Furthermore, the presumption that this is a happy time for new parents may act as a barrier for new parents to seek the support they need. Among parents who are depressed, screening for and diagnosing depression in a timely manner and providing access to social support and appropriate treatment (with medication or counselling or a combination of both) must be a key priority. Furthermore, while mothers in particular may be at increased risk of depression during the post-natal period, attention should also be paid to how fathers are managing the transition to parenthood.

Other targets for policy include ameliorating stress in the lives of these parents. While economic resources did not significantly improve the fit of the models presented in this report, economic policies play an important role in shaping the ecology of parenting. A lack of financial resources is likely to contribute to parental stress, and as demonstrated in these findings, parental stress is an important predictor of parental sensitivity. The results suggest that support and marital satisfaction are positively associated with reduced parental stress – thus maintaining access to support and a good quality marital relationship represent important mechanisms for buffering parents from stress. Policies and programmes that increase access to social networks and to counselling or therapy for parents who are experiencing difficulties in their marital relationship are likely to enhance parental sensitivity. Overall, policies aimed at alleviating stress and improving families' access to economic, social and health support, across all types of households, will no doubt contribute to improved parental well-being, enhanced parenting processes and better child developmental outcomes.

5.5 CONCLUSION

Overall, the findings suggest that being born prematurely is the most robust predictor of infant developmental outcomes, but difficult temperament, parental sensitivity and birth-weight are also important. Parental stress, parental depression (especially among mothers) and difficult infant temperament emerged as the strongest predictors of parental sensitivity, and lack of support/poor quality interparental relationship, depression and infant difficult temperament were significantly associated with parental stress. It must be noted that infants are still at an early stage on their life path and an important advantage of the longitudinal design of the *Growing Up in Ireland* study is the capacity to examine multiple variables related to the family and parenting and their associations with developmental outcomes over time. The families described in this study have already engaged in subsequent waves of data collection, when the children were three and five years of age. Examining these follow-up data and linking them with families' responses at Wave 1 will facilitate a more nuanced understanding of the influence of family and parent variables on many aspects of child development and how their influence may change over the course of the child's development.

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