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THE INFANCY STUDY: THE IMPACT OF CAREGIVING ARRANGEMENTS ON EARLY CHILDHOOD DEVELOPMENT

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FOREWORD

In past generations, many preschool children were cared for at home by their parents and grandparents who lived together in the same household, attended preschool for a few hours per day when they were old enough, returned home for lunch and continued to play and interact with their parents, grandparents, siblings and neighbours. The changing times have given our preschool children a very different experience. At 4 months, while almost two thirds were still cared for by their parents, a third was in home-based care by other caregivers. By 18 months, less than a third was cared for by parents and two thirds were in home-based care by other caregivers. By 3 years of age, the picture had changed again. A third was in centre- based care and almost half in home-based non-parental care, while parental care had dropped to less than a fifth. While these decisions about non-parental childcare are usually made for practical reasons, parents often have a quiet but lingering sense of guilt and of doubt. This monograph is really for them – the parents with challenging dual roles – parenting and the contribution to family income. It truly brings a great sense of reassurance that their caregiving choices, usually made in the best interests of the whole family, had not adversely affected the later mother-child attachment, temperament, and development of their child. What made this outcome possible were likely the fact that non-parental home-based care was usually provided by experienced caregivers, namely grandparents and nannies and that the quality of the programs, staff, and environment of childcare centres in Singapore is well regulated. Changing caregivers was also common; this too did not have adverse effects on the child.

This study also provides reassurance that even though the traditional three generation family living together in one household may be far less common now than before, it actually does still exist, albeit in a different form. Three quarters of young married couples live in close proximity with their parents. The grandparents are trusted caregivers who provide childcare for at least half the children at 18 months and a third at 3 years, thus they continue to

support new mothers and are available to share their values, culture, and knowledge. Three important outcomes were studied – mother-child attachment, child temperament, and child development. All three make huge differences to the future outcome of children. Through their extensive literature review, the authors have shown the effect of early secure attachment on emotional regulation, social emotional competence, mental health, and cognitive functioning, of temperament on later developmental outcome, social skills, aggression, and other behaviours, and of child development on school readiness and later academic achievement. Thus, the childcare choices that parents made when they returned to work did not jeopardise the possible positive long-term outcome of their children.

The ages 4 months, 18 months and 3 years that the investigators chose to focus on, provide snapshots of the key first 1000 days of life. This is the time when the brain has the greatest neuro-plasticity, where the growth of the neural connections is exponential and where developmental input and the quality of the caregiving can have the greatest long-term effect. It is well established that in these young children, development occurs in the context of relationships with their caregivers. Parents intuitively understand this, as the majority of them in this study reported that being caring, loving, and patient were qualities they felt were most important in a caregiver. The study provides insight into possible areas of future collaborative effort in the first 1000 days. Although the provision of knowledge about early childhood development is usually targeted at parents, this study clearly showed the significant involvement of grandparents and foreign domestic helpers in childcare. These caregivers also need to be engaged to ensure the provision of relationship-based developmental care for young children. While parents feel emotionally close to their children, as shown in this study, parent-child bonding can be further enhanced. By identifying children with difficult temperaments, their caregivers can be supported to provide sensitive and responsive interactions that may help to buffer the temperament. Parents and other home-based caregivers can be supported to better utilise their one-to-one time with the children and the resources available to them (e.g., toys, books) in an interactive

manner that can help to provide the same cognitive stimulation that parents value as a reason for choosing centre-based childcare.

I congratulate the Singapore Children's Society for conducting this very important study, for producing this monograph and for reassuring our parents and our nation that early childcare choices, made in the best interests of families, within the context of multiple parental roles, have not in any way jeopardised the key early outcomes of their children. As a country, we can work together to look at other specific areas of need, including the support of parents and children from low income families and providing enhanced support to caregivers of these young children and the older preschoolers.

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EXECUTIVE SUMMARY

Background

The trend for families in Singapore to have a dual income has given rise to the need for infant care arrangements when mothers return to work after 4 months of maternity leave. The impact of such caregiving arrangements on child developmental outcomes has yet to be studied in the local context. In collaboration with the KK Women's and Children's Hospital (KKH), we address this gap in the longitudinal study reported here. In addition to examining the impact of caregiving arrangements on mother-child attachment in Singapore, we investigate the relationships between caregiving arrangements, child temperament, mother-child attachment, and child developmental outcomes, in the areas of communication, gross and fine motor skills, problem solving, personal-social relations, and social-emotional development.

Method

Mother-child dyads were recruited for the study in three cohorts. A total of 439 mother-child dyads participated in the study. Mothers in our study are Singapore citizens or Permanent Residents who delivered healthy firstborn infants at KKH. Mothers were recruited after infants were delivered, and interviewed when infants were 4 months, 18 months, and 3 years of age.

Key Findings

1. Most children were primarily cared for by their mother before 4 months of age and by their grandmother from 4 to 18 months of

age, and in the care of a grandparent or childcare centre by 3 years of age.

2. Mothers placed their child with a caregiver whom they perceived to be trustworthy, but they also chose a caregiving arrangement for their 3-year-old which would nurture their child's cognitive and social skills.
3. Having their mother as their main caregiver was not associated with children being more securely attached to their mother, or having better developmental outcomes at 3 years of age.
4. The number of times a child's main caregiver was changed between birth and 3 years of age, did not predict child temperament, mother-child attachment, or developmental outcomes at 3 years of age.
5. Having an easy temperament at 18 months and a secure mother-child attachment at 3 years, being close to one's mother, and being in home-based non-parental rather than parental care at 4 months, predicted an easy temperament at 3 years of age.
6. Secure attachment at 18 months and an easy temperament at 3 years predicted secure attachment at 3 years of age.
7. Secure attachment at 18 months and 3 years of age, higher maternal education, and full-time maternal employment, predicted better social-emotional skills at 3 years of age.
8. Higher maternal education predicted better problem solving skills at 3 years of age, while maternal closeness at 4 months predicted better fine motor skills at 3 years of age. Gender predicted fine motor and personal-social skills at that age: girls were more advanced than boys.

Conclusion

Our findings suggest that there is no single ideal caregiving arrangement. At least to some extent, it may be more important for parents to decide on caregiving arrangements which best fit their child's needs, while taking into account family circumstances and available resources. Our findings indicate that working mothers need not be anxious about the impact of non-parental care on their child's development. Instead, mothers can enhance their children's social-emotional development by focusing on strengthening their emotional bond with their child. Encouraging parent-child closeness in infancy is one way to modulate infant temperament towards the easy end of the easy-difficult temperament continuum, thereby benefitting the parent-child relationship. Equipping parents with skills to raise parent responsiveness will further enhance the parent-child bond, which in turn facilitates young children's social-emotional development.

CHAPTER 1 – INTRODUCTION

In this monograph, we report the findings of a research study conducted by the Singapore Children's Society, in collaboration with KK Women's and Children's Hospital (KKH), from 2007 to 2014. Our study is one of the few studies to track infants from birth in Singapore. The primary aim of our study is to examine, for the first time, the impact of caregiving arrangements on mother-child attachment, infant temperament, and child developmental outcomes.

In this chapter, we provide an overview of children's caregiving arrangements in Singapore. We explain the main concepts in our study – a mother-child attachment, maternal closeness, child temperament, and early developmental outcomes – and briefly review the literature concerning these variables.

1.1 Background

Traditionally, in Singapore as elsewhere, mothers have been the full-time caregivers of their infants. However, in more recent years, many mothers in Singapore hold full-time jobs. This is reflected in the rise of local dual income families, from 26% and 30% in 1970 and 1980, to 47% and 54% in 2000 and 2015 respectively (National Archives of Singapore, 1981; Singapore Department of Statistics, 2015a), and in the rise of female labour force participation, which was 28% and 35% in 1970 and 1980, but 50% and 60% in 2000 and 2015 respectively (National Archives of Singapore, 1981; Singapore Department of Statistics, 2015b). These increases are linked to monetary support (tax rebates) and government policies which encourage mothers to remain in employment (Institute of Policy Studies, 2009; Manpower Research and Statistics

Department, 2014). One such policy was the lengthening of paid maternity leave from 12 weeks in 2004 to 16 weeks in 2009 (National Talent and Population Division, 2008).

As the result of higher levels of education among women (Singapore Department of Statistics, 2015a), and the subsequent trend for women to hold formal, full-time positions (Singapore Department of Statistics, 2017), mothers in Singapore face the challenge of balancing full-time work and caregiving responsibilities (Lee & Choo, 2001; Wattis, Standing, & Yerkes, 2013). With both parents in full-time employment, which typically does not offer flexible working hours, infants are often placed in the care of grandparents or childcare teachers during the day. Such caregiving arrangements are not unique to Singapore (Cheung & Hawkins, 2014), but also observed in other countries (e.g., Brooks-Gunn, Han, & Waldfogel, 2002).

1.2 Rationale for the Study

Concern that placing infants in full-time day care could adversely affect their social and cognitive development (Booth, 1992; Fox & Fein, 1990) has led to extensive research on the impact of non-parental care on infant development, in countries like the United States (e.g., National Institute of Child Health and Human Development Early Child Care Research Network [NICHD ECCRN], 2001) and Australia (e.g., Harrison et al., 2009). The NICHD ECCRN (2001) study found longer hours in childcare to be associated with lower social competence at 24 months, and more behavioural problems at 54 months of age. Harrison et al. (2009) found longer hours in childcare to be associated with poorer infant communication at the mean age of 9 months. However, caregiving arrangements in Singapore may differ substantially from those in these countries.

As with Western countries, working parents in Singapore often place their children in the care of grandparents or childcare centres. These caregiving arrangements have been documented in local studies (Cheung & Hawkins, 2014; Chong et al., 2016; Shum-Cheung, Hawkins, & Lim, 2006). Two of these studies named parents and grandparents to be among children's caregivers for children below 3 years of age (Cheung & Hawkins, 2014; Shum-Cheung et al., 2006). The most recent study, for which the focus was infant temperament, identified parents, grandparents, domestic helpers, and childcare centres as caregivers, when infants were 3 months of age (Chong et al., 2016). The question of whether domestic helpers, as well as grandparents and childcare centre teachers, were children's *main* caregivers, was however not examined in depth in these studies.

The placing of young children up to 6 years of age in the care of grandparents and childcare centres has been observed in other Asian countries, such as China (Chen, Liu, & Mair, 2011). In particular, grandparents play an important caregiving role in Japan, Korea, and China (Zhang & Yeung, 2012). However, to date, no study has examined the impact of such caregiving arrangements on aspects of children's early development, be this in Singapore or other Asian countries where infants may experience similar caregiving arrangements to those in Singapore.

Rather than place children with grandparents or childcare centres, many families in Singapore engage foreign domestic helpers to take care of domestic chores and assist with caregiving (Quek, Knudson-Martin, Orpen, & Victor, 2011). Over the years, Singapore has seen an increase of foreign domestic helpers (Ministry of Manpower, 2017). Researchers also report anecdotal evidence of more children being cared for by domestic helpers in recent years (Huang & Yeoh, 1994; Lee

& Choo, 2001). It would appear that domestic helpers play a significant role in local caregiving. Consequently, findings regarding the impact of caregiving arrangements in the literature (e.g., Harrison et al., 2009; NICHD ECCRN, 2001) may not entirely apply to Singapore.

To our knowledge, the extent to which domestic helpers are children's main caregivers has yet to be documented. Among the existing studies on the impact of foreign domestic helpers on children's development, previous research has only investigated the impact of warmth and control of domestic helpers from the Philippines on children's social competence (Ip, Cheung, McBride-Chang, & Chang, 2008), and the impact of having a domestic helper as the main caregiver on children's risk for Specific Language Impairment (Cheuk & Wong, 2005). The impact of caregiving by domestic helpers on mother-child attachment and general development has not yet been studied, and certainly not yet been examined in Singapore. Our study, for which one of the aims is to identify young children's main caregivers, would address these issues. Importantly, we aim to examine the impact of local caregiving arrangements on aspects of early child development, including mother-child attachment, child temperament, and children's general and social-emotional development.

Previous studies on parenting and caregiving in Singapore were either retrospective studies using parents' recollections of caregiving (Cheung & Hawkins, 2014; Shum-Cheung et al, 2006), or cross-sectional studies measuring developmental outcomes at a specific point of time (Quah, 1999; Yeoh & Huang, 1995). Retrospective studies depend heavily on the integrity of memories, with no opportunity for measurements of relevant antecedent variables. Cross-sectional studies cannot test causal or cohort effects. In order to determine the impact of care arrangements over time, it is much preferable to conduct a

prospective longitudinal study tracking infants over time. With these considerations in mind, this study examines the impact of local caregiving arrangements on children's early development by following three cohorts of infants from birth to 3 years of age.

1.3 Caregiving Arrangements in Singapore

In Singapore, working mothers often rely on grandparents, childcare centres, and domestic helpers as substitute caregivers (Zhang, 2015). Such caregiving arrangements reflect not only family circumstances and preferences, but broader socio-cultural and contextual factors as well (Liu, 2013).

Grandparents as Caregivers

Extant literature indicates that while mothers in Singapore are usually the main caregivers of infants, grandparents play an important role in caregiving as well. A recent study of 609 Singaporean mothers found that although mothers were the main caregivers of their 3-month-old infants, grandparents also assisted substantially as caregivers for a median of 19 hours per week (Chong et al., 2016). A 2014 population-wide Housing Development Board (HDB) survey indicated that over a quarter of children aged 12 years and below were cared for primarily by their grandparents.

Grandparents provide support to their children by helping to care for their grandchildren, but it is no coincidence that grandparents are the main caregivers of young children. Nuclear families comprising parents and children are the dominant household structure, with nuclear families making up nearly half the resident households in Singapore in 2014 (Ministry of Social and Family Development, 2015). Thus, although many local children live in separate households from their grandparents, they

nevertheless live near their grandparents. As many as three-quarters of young married couples live in close proximity to their parents (HDB, 2014). As Lee (2013) reports in a newspaper article, housing policies, such as the three-generational public housing and proximity housing grants, encourage working parents to depend on their extended family for childcare support.

Cultural and societal norms are another reason why grandparents play an important role in caregiving (Lou & Chi, 2012; van Willigen & Lewis, 2006). In Western cultures, where individual autonomy is emphasised, grandparents may not play a significant role in their grandchildren's lives (Bengtson, 2001). Grandparents in Singapore and Hong Kong in contrast play an instrumental role. They provide support and advice to parents, assist directly with childcare, and transmit values and cultural practices to their grandchildren (Lou, 2011; Low & Goh, 2015; Mehta & Thang, 2006; Tam, 2001). Such highly involved caregiving by grandparents is not a unique situation that applies only to Asian societies like Singapore and Hong Kong. In fact, at least one recent study has shown that in a Western society like Australia, about 18% of grandparents assume the role of the child's primary main caregiver (Baxter & Warren, 2016).

Grandparents' care for their grandchildren can be considered a form of intergenerational, in-kind resource exchange with their adult children. In Asian families, for example, these intergenerational exchanges are based on the concept of reciprocity and mutual interdependence (Hwang, 1999; Lou, 2011), whereby adult children repay their parents' help with caregiving by providing for them in their old age (Low & Goh, 2015).

Most Singaporeans prefer grandparents to be involved in raising their grandchildren (National Family Council, 2011). Grandparents' love

for their grandchildren makes grandparents trustworthy caregivers (Zhang, 2015). Grandparents can influence the children in positive ways; they also provide parents with instrumental and emotional support (Mehta & Thang, 2006). Furthermore, grandparents can provide care in a home-based setting, and working parents may prefer this arrangement for peace of mind (Mehta, 2007). However, when grandparents are unable to assist with caregiving, parents may need to rely on other caregivers.

Childcare Centres and Domestic Helpers as Caregivers

Instead of grandparents as caregivers, other parents may place their infants with childcare centres (e.g., Cheung & Hawkins, 2014). A local newspaper reports the number of younger children, from infants to four-year-olds, enrolled in childcare centres to have risen in recent years ("Childcare enrolment", 2016). According to the article, total childcare enrolment has more than doubled from 44,224 in 2005 to 95,414 in 2015. As mentioned in newspaper reports (Almenoar, 2013; Spykerman, 2013), moves by the government to improve the capacity and quality of care at childcare centres may be one reason for the rise. Parents' positive attitude towards centre-based childcare may be another. Parents may hold the belief that preschool is beneficial for early development, resulting in families being more willing to place their children in childcare centres at a younger age.

Aside from childcare centres, parents in Singapore also rely on foreign domestic helpers to assist with caregiving (Quek et al., 2011). The increasing demand for domestic support can be inferred from the rise in the number of foreign domestic helpers hired, from 40,000 in 1988 to 239,700 in 2016 (Kayoko, 2008; Ministry of Manpower, 2017). The 2014 HDB survey which found over a quarter of children under 12 years

of age to be in the care of grandparents, also reported close to 12% of children below 12 years of age to be in the primary care of foreign domestic workers.

The decision to rely on paid caregivers such as childcare and foreign domestic helpers may be influenced not only by parents' preferences, but by practical constraints, such as the availability of other caregivers and the family's financial considerations. According to two newspaper reports (Lee, 2015; Tan, 2015), placing an infant with a childcare centre in Singapore can cost up to double that of hiring a foreign domestic helper. Caregiving arrangements made for such practical reasons are observed by Cheung and Hawkins (2014). In their study of 530 mothers, the authors observed that although 18% to 28% of parents relied on paid caregivers, only 5% expressed a preference for this arrangement.

Given that studies have not previously explored local caregiving arrangements for infants in depth, we address this issue in our present study. In Chapter 3, we explore the various caregiving arrangements which local parents make for their infants, and the rationale for these arrangements.

As mentioned previously, the aim of our study is to examine the impact of caregiving arrangements in Singapore on various aspects of child development, including mother-child attachment, child temperament, and child developmental outcomes. In the following sections of this chapter, we introduce these key concepts. The literature regarding the impact of caregiving arrangements on these aspects of child development are however reviewed in subsequent individual chapters. Specifically, past research regarding the impact of caregiving arrangements on child temperament, mother-child attachment, and

developmental outcomes is examined in Chapters 4, 5, and 6 respectively.

1.4 Maternal Closeness

Previous work has explored the maternal bond in terms of feelings that mothers have towards their child. Taylor, Atkins, Kumar, Adams, and Glover (2005), for example, tracked mothers' feelings towards their infant for a 12-week period starting from 3 days of age. The authors observed this measure of maternal bond to relate to maternal mood. Mothers who reported more positive feelings towards their infant showed more positive affect to their infant. It seems intuitive that mothers who report more positive feelings towards their infant, and who therefore feel closer to their infant, would have children who are more likely to be securely attached. However, to our knowledge, the impact of mothers feeling close to their infant on the mother-child bond has not been previously investigated in Singapore or other countries.

We thus explore in the present study the possibility that *maternal closeness* is associated with positive outcomes. Children whose mothers report themselves to be close to their child, may be more securely attached or have an easier temperament. They may also be more advanced in their cognitive, motor, or social-emotional development.

1.5 Mother-Child Attachment

In the 1960s, the psychiatrist John Bowlby proposed that in order to increase their chances of survival, infants are born with a biological need to form relationships with their main caregivers, in order to feel safe and secure. Attachment, as defined by Bowlby's collaborator, Mary Ainsworth, is "an affectional tie that one person forms to another specific individual" (Ainsworth, 1969, p. 2). *Mother-child attachment* refers to the

emotional bond between the child and his or her mother, who is also known as the attachment figure. Early attachment relationships guide the development of internal working models, which are inner mental representations of relationships that determine one's beliefs and expectations about the world, the self, and others. Attachment theory posits that through internal working models, caregiver-child relationships impact children's subsequent social-emotional and cognitive development, as well as future relationships (Bohlin, Hagekull, & Rydell, 2000; Fraley, 2002; Ranson & Urichuk, 2008).

As early as four months of age, infants start showing a preference for their main caregiver (Schaffer & Emerson, 1964), but their preference for their mother, based on sound and appearance, emerges as early as a few days after birth (Sai, 2005). Infants tend to seek proximity or closeness to their main caregiver, who provides them with comfort, protection, and a sense of safety. The development of attachment involves caregivers being able to interpret and respond to infants' expression of needs. Caregivers who are available and responsive provide a secure base from which their infants can explore the world. From around the seventh month onwards, infants tend to form an attachment to their main caregiver, showing a preference for their caregiver over strangers. From around the ninth month onwards, infants also form attachments to people who are not their main caregiver. These ages may however vary from infant to infant.

Attachment Styles

Four main attachment styles have been identified. These are characterised as secure, insecure-avoidant, insecure-ambivalent/resistant, and disorganised attachment (Ainsworth & Bell, 1970; Main & Solomon, 1990). Research shows that when facing a

threatening or upsetting situation, securely attached infants seek proximity to (Bowlby, 1969), and are readily soothed by their attachment figure (Ainsworth & Bowlby, 1991). Secure infants exhibit secure-base behaviour; they use their caregiver as a secure base from which to explore their surroundings (Waters & Cummings, 2000). In contrast, insecure-avoidant infants do not actively seek proximity with their attachment figure. Insecure-resistant infants exhibit proximity seeking behaviours, yet at the same time, resist contact with their attachment figure; they are not easily soothed by their attachment figure when distressed (Ainsworth & Bell, 1970). Lastly, infants with disorganised attachment show contradictory, misdirected, or incoherent behaviours in stressful situations (Main & Solomon, 1990).

The Impact of Attachment on Developmental Outcomes

Secure attachment during the first two years of an infant's life has been associated with positive outcomes in early to middle childhood. In addition to a more positive view of self (Verschueren & Marcoen, 1999), positive outcomes include better emotional regulation abilities (Borelli et al., 2010), social-emotional competence (Bohlin et al., 2000), mental and physical health (Goossens, Braet, Van Durme, Decaluwé, & Bosmans, 2012; Kochanska & Kim, 2013), and cognitive functioning (Ranson & Urichuk, 2008).

Conversely, insecure attachment in early childhood is associated with externalising problems such as antisocial, aggressive, and disruptive behaviours at 3 years of age (Fearon & Belsky, 2011), greater anxiety in adolescence (Colonnesi et al., 2011), and poorer social competence below 12 years of age (Groh et al., 2014). Furthermore, disorganised attachment is more likely to be associated with internalising and externalising behaviours and low child compliance, compared to

other types of attachments at age 4.5 years (O'Connor, Bureau, McCartney, & Lyons-Ruth, 2011). The developmental outcomes associated with different attachment styles are summarised in Table 1.

Table 1

Attachment Styles and Developmental Outcomes

Attachment Styles	Caregiving Styles	Child's Behaviours Towards Caregiver	Developmental Outcomes
Secure	• Sensitive • Responsive	• Sensitive • Responsive	• Better social-emotional skills • Better mental and physical health • Emotional regulation abilities • Positive self-view • Positive cognitive functioning
Insecure-Avoidant	• Indifferent • Unresponsive • Unavailable	• Indifferent • Unresponsive • Unavailable	• Low self-esteem • Greater anxiety
Insecure-Resistant	• Inconsistent	• Inconsistent	• Increased risk of behavioural, emotional, and social problems • Greater anxiety
Disorganised	• Neglectful • Maltreatment	• Neglectful • Maltreatment	• Hostile / aggressive behaviours • Internalising behaviours

Early attachment styles from infancy can have lasting effects beyond childhood. Insecure attachment in infancy has been related to fewer positive emotions and more anxiety in adulthood (Moutsiana et al., 2014; Yi et al., 2012). Given the importance of secure attachment, we

thus explore the impact of caregiving arrangements on mother-child attachment in our study.

1.6 Child Temperament

First-time parents may wonder why their infant cries more loudly than other infants in the nursery, or why their infant is more wary of strangers than other infants. Chess and Thomas (1999) were among the first to observe that infants have different temperaments.

Temperament, which is characterised by biologically-based individual differences in behavioural and emotional responses to stimuli (Rothbart & Bates, 2006), influences the way infants interact with others and their surroundings, and how they express and regulate their emotions. Rothbart, Ahadi, Hershey, and Fisher (2001) suggest that temperament can be broken down into three broad dimensions – approach (also referred to as withdrawal), reactivity (also referred to as negative affectivity), and self-regulation. The three dimensions are as follows.

- Approach refers to adaptability to new stimuli.
- Reactivity refers to infants' emotional reactions to novelty.
- Self-regulation refers to effortful control of attention and emotions.

Based on caregiver ratings on these three broad dimensions, researchers have classified infants as having an *easy* or *difficult* temperament (Prior, Sanson, Smart, & Oberklaid, 2000). Infants with an easy temperament are outgoing, pleasant, easy to soothe, and able to focus their attention. Infants with a difficult temperament are less adaptable to changes, prone to negative emotional expression such as crying, and tend to have difficulties regulating their emotions (Chess & Thomas, 1999).

Is Temperament Stable Over Time?

Researchers hold differing views about whether temperament is stable over time (Goldsmith, Bradshaw, & Riesser-Danner, 1987). From a biological perspective, temperament is innate and relatively stable. Extensive research has confirmed this (Bornstein et al., 2015; Carranza, Pérez-López, González, & Martínez-Fuentes, 2000; Gartstein, Putnick, Kwak, Hahn, & Bornstein, 2015). At the same time, researchers have observed that temperament domains are only weakly to moderately correlated over time, suggesting that temperament is modifiable with age (Caspi et al., 2003).

Indeed, both hereditary and environmental factors contribute to the development of children's temperament. Adverse environmental events, such as child maltreatment in the context of a genetic predisposition for aggression, predispose children to show higher levels of irritability and more negative emotions (Belsky, Bakersmans-Kranenburg, & van IJzendoorn, 2007). Inconsistent maternal discipline is associated with greater fearfulness and irritability in middle childhood (Lengua & Kovacs, 2005), while harsh and hostile parenting behaviours are (understandably) associated with greater fearfulness in toddlers (van den Akker, Deković, Prinzie, & Asscher, 2010). Conversely, positive parenting behaviours in infancy can serve as a protective factor against externalising behaviour in childhood (Boeldt et al., 2011; Chronis et al., 2007; Danzig, Dyson, Olino, Laptook, & Klein, 2015), with more consistent, supportive, and responsive parenting being associated with less fearfulness in toddlers (van den Akker et al., 2010).

The Impact of Temperament on Attachment

Given that positive developmental outcomes are associated with secure attachment, researchers have long been interested in factors

which predict attachment. One such factor is infant temperament (e.g., Szewczyk-Sokolowski, Bost, & Wainwright, 2005). Infants with an easy temperament are more likely to be securely attached (Frodi, 1983; Putnam, Sanson, & Rothbart, 2002), while those with a difficult temperament are more likely to be insecurely attached (McKim, Cramer, Stuart, and O'Connor, 1999). These findings have also been demonstrated in the Asian context. A Shanghai study of 160 infant-mother dyads found approachability (a dimension of easy temperament) to be associated with secure attachment (Ding, Xu, Wang, Li, & Wang, 2012).

Unlike infants with easy temperaments, infants with difficult temperaments display high levels of negative affect, and are less adept at regulating their emotions (Chess & Thomas, 1999). It is likely easier to understand the needs of infants with an easy temperament, and parents have been observed to be more responsive to such infants (Mehall, Spinrad, Eisenberg, & Gaertner, 2009). In comparison, it may be challenging to be as responsive to infants who are often in distress, and unable to manage their negative emotions. Research has shown that the demands on parents to help these infants manage their emotions, negatively impact parent-child interactions, leaving such infants vulnerable to negative caregiving experiences (Belsky et al., 2007), which in turn deters the development of secure attachment (Rothbart, 1986).

Parenting style may however buffer the impact of difficult temperament on attachment. Having caregivers who are responsive and attuned to infants' needs increases the likelihood that infants will develop secure attachments (Mangelsdorf, Gunnar, Kestenbaum, Lang, & Andreas, 1990; Wong, Mangelsdorf, Brown, Neff, & Schoppe-Sullivan, 2009). Caregiver responsiveness increases the fit between infant

temperament and the caregiving environment, which according to Thomas and Chess's (1977) goodness-of-fit model, is essential for the development of attachment security (Putnam et al., 2002; Hong & Park, 2012). Parents' ability to respond to children's cues and distress is recognised as an important factor which contributes to the development of secure attachment (e.g., van den Boom, 1994). Caregiver responsiveness, also termed caregiver sensitivity, promotes positive caregiver-child interactions, and encourages children in distress to seek emotional support from their caregiver, thereby strengthening the emotional bond between caregiver and child.

The Impact of Temperament on Developmental Outcomes

In addition to predicting attachment, child temperament is also predictive of children's developmental outcomes. Difficult temperament has been associated with negative outcomes, and easy temperament with positive outcomes. Specifically, difficult temperament in infancy has been associated with poor social skills (Rubin, Burgess, & Hastings, 2002), aggression (Vitaro, Barker, Boivin, Brendgen & Tremblay, 2006), behavioural difficulties (Pérez-Edgar, Schmidt, Henderson, Schulkin, & Fox, 2008), and psychiatric disorders (Sayal, Heron, Maughan, Rowe, & Ramchandani, 2014). Difficult infant temperament, relating to a specific trait such as fussiness, has also been shown to predict antisocial and delinquent behaviours in adolescence (Goodnight et al., 2016). In contrast, easy temperament in infancy has been associated with fewer conduct problems (Lahey et al., 2008) and better social competence (Liew, Eisenberg, & Reiser, 2004). Easy temperament serves as a protective factor for infants exposed to risk factors such as poverty and family violence (Derauf et al., 2011). For example, infants with an easy temperament display fewer externalising behaviours, in spite of adverse experiences, such as in utero drug exposure (Derauf et al., 2011).

Child temperament has been observed to moderate the relationship between parenting and subsequent developmental outcomes. Infants whose parents respond sensitively to their needs are more likely to have positive outcomes, whereas those whose parents react harshly or inconsistently to their needs tend to have negative outcomes. This finding is only true however for infants with a difficult temperament. Stright, Gallagher, and Kelley (2008) showed high quality maternal parenting to be associated with better school adjustment, academic performance, and social competence among first graders with a difficult temperament at 6 months of age. Similarly, Poehlmann et al. (2012) found negative maternal parenting styles to be associated with more externalising problems at 3 years of age for children with difficult temperaments.

Child temperament may also moderate the impact of non-maternal care on developmental outcomes. Children with difficult temperaments may respond negatively to non-maternal care, unlike infants with easy temperaments. Crockenberg and Leerkes (2003) found that infants with difficult temperaments displayed more difficult behaviours if placed at a childcare centre than in other types of care. In contrast, infants with easy temperaments behaved similarly across care settings. These findings may however be explained by the observation that infants with difficult temperaments are more susceptible to the negative effects of low quality care. Pluess and Belsky (2009) found that toddlers in low quality childcare displayed more problem behaviours if they had difficult rather than easy temperaments. Alternatively, findings may be explained by the observation that infants with difficult temperaments are less adaptable to flexible caregiving arrangements. De Schipper, Tavecchio, van IJzendoorn, and van Zeijl (2004) found that infants with a difficult temperament who experienced more changes in

caregivers and peers within the day, and less predictable schedules, displayed more problem behaviours and poorer well-being. By these accounts, infants with difficult temperaments appear susceptible to the impact of low care quality and caregiver instability. We thus explore in the current study whether different caregiving arrangements affect child temperament.

1.7 Developmental Outcomes

Infants develop rapidly from birth to 2 years of age, and this rapid growth is viewed to be critical in determining children's subsequent quality of learning, behaviour, well-being, and health (World Health Organization, n.d.). Various studies have shown *developmental outcomes* in the preschool years, which include language and communication, gross and fine motor skills, problem solving, and social skills, to be predictive of subsequent outcomes. Cognitive and attention processing impacts school readiness (Konold & Pianta, 2005) and subsequent academic achievement (McClelland, Acock, Piccinin, Rhea, & Stallings, 2013), while social-emotional competencies, particularly self-regulation, predict not only school adjustment (Shields et al., 2000), but life outcomes including education attainment, substance use, and criminal offending (Moffitt et al., 2011). Given that early development has consequences for outcomes in the longer term, we explore in the current study whether different caregiving arrangements affect early developmental outcomes, including social-emotional and problem solving skills.

1.8 Overview

The main aim of our study is to investigate the impact of caregiving arrangements on mother-child attachment, child temperament,

and child developmental outcomes. We review the literature relevant to these issues in individual chapters, as set out below.

- In **Chapter 2: Methods**, we describe the methodology of our study, including the design, measures, and data collection methods used.
- In **Chapter 3: Caregiving Arrangements**, we investigate local caregiving arrangements in infancy and early childhood, and mothers' rationale for their child's caregiving arrangements, and report the demographic characteristics of our sample.
- In **Chapter 4: Child Temperament**, we investigate the stability of temperament from infancy to early childhood, and the impact of caregiving arrangements on child temperament at 3 years of age.
- In **Chapter 5: Mother-Child Attachment**, we investigate the impact of caregiving arrangements on mother-child attachment and maternal closeness at 3 years of age.
- In **Chapter 6: Developmental Outcomes**, we investigate the impact of caregiving arrangements on children's general and social-emotional development at 3 years of age.
- In **Chapter 7: Conclusion**, we discuss the implications of our findings.

CHAPTER 2 – METHODS

2.1 Participants

Mother-infant dyads were recruited from KKH, the largest public hospital in Singapore to specialise in obstetrics and gynaecology, neonatology, and paediatrics (Thulaja, 2008). We recruited participants from KKH in order to include a range of socio-economic status and maternal education in our sample. We recruited three cohorts from February 2007 to February 2008, from August 2008 to September 2009, and from June 2010 to August 2011. We recruited mothers who, at the time of recruitment, were:

- married;
- Singapore citizens or Permanent Residents (PR);
- first-time mothers to a healthy singleton baby (Apgar score of ≥ 9 and gestational age >37 weeks); and
- able to speak and understand English.

Mothers were given a $10 shopping voucher for the first interview, and a $20 shopping voucher for each of the subsequent two interviews as tokens of appreciation. To retain participation, we also gave mothers:

- a yearly birthday card for their child,
- quarterly newsletters highlighting the work done by Children's Society, including updates about our research studies,
- feedback about their child's developmental outcomes, and
- parenting publications by the Singapore Children's Society.

Participant Attrition

A total of 631 dyads completed the first interview. Of these, 143 (23%) dropped out of the study before the second interview. Of the remaining 488 dyads, we faced a further attrition of 49 (10%) at the third interview. In total, 439 dyads (49% boys) completed all three interviews. The retention rate of the entire study was 70%.

Figure 1 provides a summary of participant retention. A large proportion of mothers who dropped out of the study were uncontactable by phone after the initial recruitment at the hospital. Of these, several mothers had changed their contact number; others did not answer their phone despite several attempts to contact them. These mothers also did not respond to correspondence by email or post. In summary, a total of 192 mothers dropped out of the study for the following reasons.

- 157 (82%) could not be contacted.
- 29 (15%) were no longer interested in participating.
- Six (3%) no longer qualified for the study as their children had developmental delays.

Compared to mothers who completed the study, mothers who did not complete the study were i) younger, and more likely ii) to be not working, iii) to be of Malay or Indian ethnicity, iv) to have an educational level no higher than General Certificate of Education Ordinary Level (GCE O-level), and v) to live in a 3-, 2-, or 1- HDB flat (housing type is described in Section 2.5 of this chapter; Appendix A).

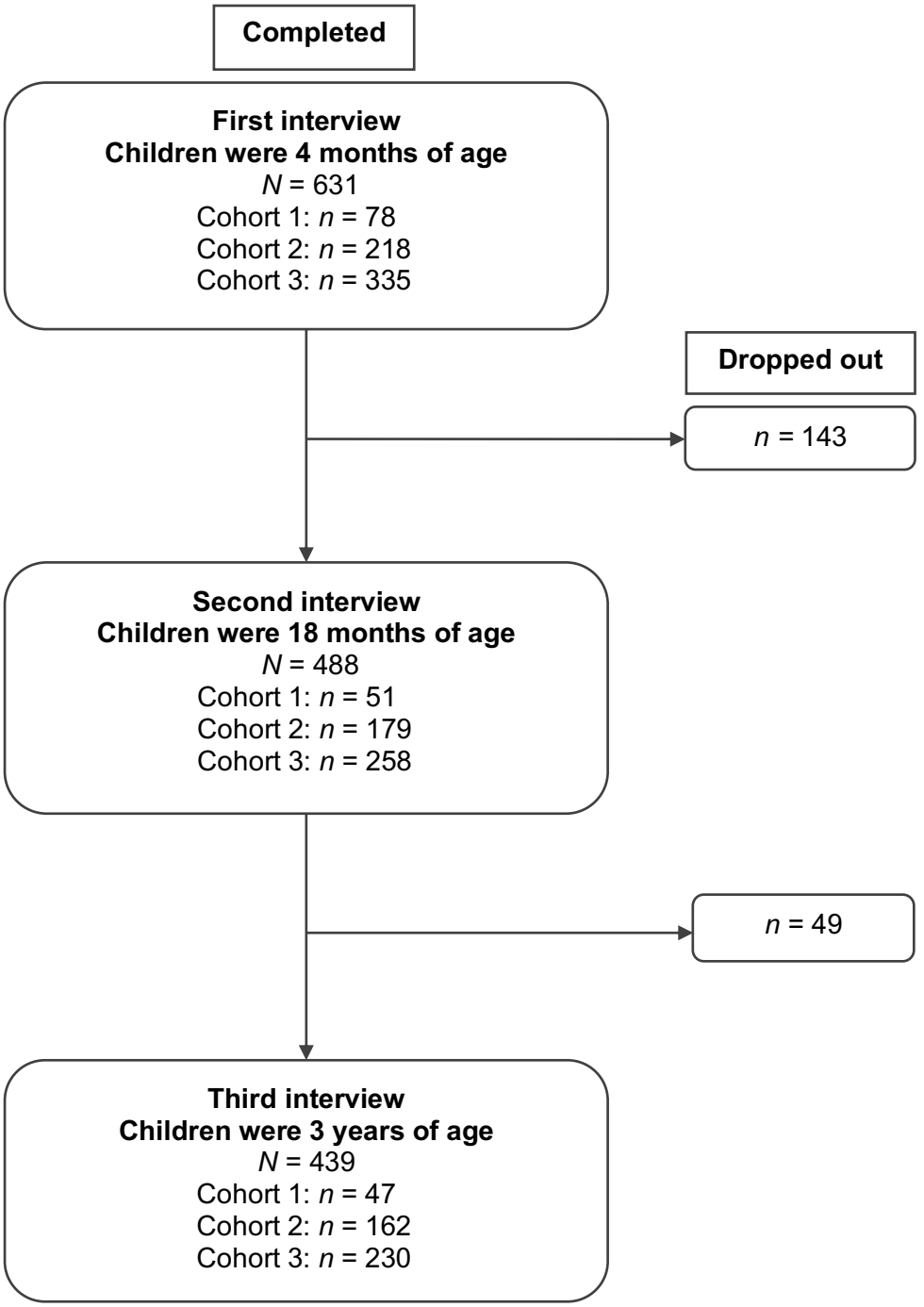

Figure 1. Number of participants retained

The average age of mothers who dropped out of the study and those who completed the study was 28.0 (*SD* = 4.94) and 30.0 (*SD* = 4.54) years respectively. Mothers who dropped out were younger than those who completed the study, t (629) = 5.03, $p < .001$. As a result, all subsequent results in our monograph are limited, first by participant attrition, which included more low-income families dropping out of the study over time, and secondly by relatively fewer middle to high income families choosing to have their infants delivered at KKH.

2.2 Design

We employed a longitudinal design in our study which had three time points – when children were 4 months, 18 months, and 3 years of age. Table 2 summarises the variables measured at each time point.

Table 2

Variables Measured at Each Time Point

	At 4 months	At 18 months	At 3 years
Type of Main Caregiver	√	√	√
Main Caregiver Changes	√	√	√
Maternal Closeness	√	√	√
Child Temperament	√	√	√
Mother-Child Attachment		√	√
General Development			√
Social-Emotional Development			√

We interviewed mothers at each time point and analysed their responses qualitatively to ascertain children's caregiving arrangements, and mothers' rationales for their caregiving arrangements. These results are reported in Chapter 3. We also analysed the data quantitatively to

investigate the impact of caregiving arrangements on children's development. These results are reported in Chapters 4, 5, and 6, with *child temperament*, *mother-child attachment*, and *developmental outcomes* as the dependent variables in the respective chapters.

As shown in Table 2, *maternal closeness, child temperament*, and caregiving arrangements variables — *type of main caregiver* and *main caregiver changes* — were assessed at all three time points, at 4 months, 18 months, and 3 years of age. *Mother-child attachment* was measured at 18 months and 3 years of age, while *general* and *social-emotional developmental outcomes* were measured only at the last time point, at 3 years of age.

Table 3 summarises the independent and dependent variables for the quantitative data analysis of our study. In addition to *child temperament* and *mother-child attachment* at 18 months of age, the *Type of Main Caregiver*, *main caregiver changes*, and *maternal closeness* at all three time points were included as independent variables in all of our analyses. Measured at 3 years of age, *child temperament* and *developmental outcomes* were the dependent variables in Chapters 4 and 6 respectively, while *mother-child attachment* and *maternal closeness* were the dependent variables in Chapter 5. *Mother-child attachment* and *maternal closeness* at 3 years of age were independent variables in Chapter 4, while *child temperament* at 3 years of age was an independent variable in Chapter 5.

Table 3

Independent and Dependent Variables

	Dependent Variables at 3 years of Age			
Independent Variables	Child Temperament Chapter 4	Mother-Child Attachment Chapter 5	Maternal Closeness Chapter 5	General and Social-Emotional Development Chapter 6
Type of Main Caregiver				
At 4 months	√	√	√	√
At 18 months	√	√	√	√
At 3 years	√	√	√	√
Main Caregiver Changes				
Birth to 3 years	√	√	√	√
Maternal Closeness				
At 4 months	√	√	√	√
At 18 months	√	√	√	√
At 3 years	√	√	-	√
Child Temperament				
At 4 months	√	√	√	√
At 18 months	√	√	√	√
At 3 years	-	√	√	√
Mother-Child Attachment				
At 4 months	√	√	√	√
At 18 months	√	√	√	√
At 3 years	√	-	√	√

2.3 Qualitative Analysis

Children's caregiving arrangements were ascertained asking mothers open-ended questions in a face-to-face semi-structured interview (see Appendix B for interview details). Mothers were asked questions about:

- their child's caregiving arrangement,
- their reasons for making those arrangements,
- the positive and negative aspects of the arrangements,
- the number of times the arrangements were changed,
- the qualities of an ideal caregiver, and
- the characteristics of an ideal care environment.

2.4 Pilot Studies

Prior to the main study, a 3-year longitudinal pilot study was conducted in 2005, with a sample of 23 mother-child dyads recruited from KKH. The pilot study was conducted to evaluate the length of interview sessions, establish ways to minimise attrition, and assess the suitability of measures used. The pilot study found mothers reluctant to travel to the researcher's office for the Ainsworth Strange Situation, which was used to measure attachment (Ainsworth, Blehar, Waters, & Wall, 1978), even when provided travel reimbursements. As a result, attachment was assessed using a parent-report measure, the Attachment Q-Sort (Waters & Deane, 1985).

The same pilot study revealed the Carey Temperament Scales (Carey & McDevitt, 1995), a parent-report measure of child temperament, to be too lengthy for participants. Many mothers left questions in the second half of the scale uncompleted. A separate pilot study was subsequently conducted with 61 mother-child dyads recruited

from three local childcare centres, to check the suitability of a shorter version of the scales known as the Short Temperament Scales (Prior et al., 2000). The latter pilot study showed that mothers needed only 15 minutes to complete the scales. The Short Temperament Scales (Prior et al., 2000) were thus used in the main study.

2.5 Measures

Independent Variables

Type of Main Caregiver. Children's main caregiver was defined as the person who spent the most amount of time caring for the child during a typical week. Main caregivers were identified from maternal interviews using methods of previous studies (e.g., Harrison & Ungerer, 2002), and were one of four mutually exclusive categories.

- Parental care — care by the child's mother or father
- Home-based (non-parental) care — care by a grandparent, domestic helper, nanny, or relative in a home setting
- Centre-based (non-parental) care — care at a childcare centre
- Combination care — care by two or more main caregivers

The details of how these categories were derived are described in Section 3.2 of Chapter 3.

Main caregiver changes. At each interview, mothers reported if there had been any changes in their child's main caregiver between the last interview and the current one. From this we computed the number of times the main caregiver was changed from birth to 3 years of age. For example, children whose main caregiver was initially their mother, followed by their grandmother, followed by a relative, and finally a childcare centre, would have experienced three changes to their main

caregiver. Children with the same main caregiver from birth would have experienced no changes to their main caregiver.

Maternal closeness. Mothers reported how close they felt to their child, using a 5-point Likert scale, with 1 being “not close at all” and 5 being “very close”.

Child temperament. Child temperament was measured using a 30-item parent-report instrument, the Short Temperament Scales (STS). The scales were designed as abbreviated versions of the Carey Temperament Scales, as part of the Australian Temperament Project (Prior et al., 2000).

Child temperament at 4 months, 18 months, and 3 years of age was assessed using the scale that was age-appropriate at each time point. In other words, we used the STS for Infants (Sanson, Prior, Garino, Oberklaid, & Sewell, 1987) when our sample was 4 months of age, the STS for Toddlers (Prior, Sanson, Oberklaid & Northam, 1987) when they were 18 months of age, and the STS for Children (Prior et al., 2000) when they were 3 years of age. Child temperament scores were based on a composite easy-difficult temperament score, which was derived by computing only the easy-difficult temperament dimensions within the STS.

Table 4 lists the dimensions in the scales, and the relevant dimensions used to compute each child’s easy-difficult temperament score. For example, the STS for Infants has five dimensions, namely *approach*, *cooperation* (or *manageability*), *reactability*, *irritability*, and *rhythmicity*, but we obtained easy-different temperament scores for our sample at 4 months of age using only the easy-difficult dimensions, namely *approach*, *cooperation* (or *manageability*), and *irritability*. The easy-difficult temperament scores of our sample at 4, 18, and 36 months of age were thus obtained from 18 of the 30 items in the scale

for infants, 18 of the 30 items in the scale for toddlers, and 23 of the 30 items in the scale for children respectively.

Table 4

Temperament Dimensions in the STS

	At 4 months STS for Infants (Sanson et al., 1987)	At 18 months STS for Toddlers (Prior et al., 1987)	At 36 months STS for Children (Prior et al., 2000)
Easy-Difficult Dimensions	• Approach • Cooperation (or Manageability) • Irritability	• Approach • Cooperation (or Manageability) • Reactivity	• Approach • Inflexibility • Persistence
Other Dimensions	• Reactivity • Rhythmicity	• Distractibility • Persistence • Rhythmicity	• Rhythmicity

Table 5

Easy-Difficult Dimensions in the STS

Temperament Dimensions	Descriptions
Approach (Sociability)	Shyness or sociability in new situations and with new people
Cooperation (Manageability)	Able to adapt to everyday events such as diaper changing
Irritability	Extent of crying and fussing
Reactivity	Strong or mild reaction to experiences including everyday events
Inflexibility	Able to deal with anger and frustration, and adjust to challenges
Persistence	Focused or easily distracted in an activity or difficult task; easily or not easily comforted when needed

Table 5 provides a description for each of the easy-difficult temperament dimensions in the STS (Vassallo, & Sanson, 2013). For each item in each scale, mothers responded using a 6-point Likert scale; neutral responses were not available to respondents. High scores indicated a difficult temperament, and low scores an easy temperament.

Cronbach's alpha obtained for our sample for the easy-difficult temperament dimensions at the ages of 4 months, 18 months, and 3 years, was .56, .63, and .73 respectively. Our temperament data at 4 and 18 months achieved relatively low internal reliability, suggesting that local mothers may have interpreted the temperament items differently for cultural reasons. A local study on infant temperament, which found the Carey Temperament Scales (Carey & McDevitt, 1995) to have low internal reliability and re-classified the items using factor analysis, reported temperament dimensions which were culture-specific, and which differed from the original scale (Chong et al., 2016). As a result, we included all of our temperament data in our analyses, on the grounds of face validity.

Preliminary analysis showed our results with and without the 4-month temperament data to be similar, except when predicting child temperament at 3 years of age. Thus, we conducted our analyses with and without child temperament at 4 months as a predictor of temperament at 3 years of age, and reported the results of both regression models in Chapter 4. In all other analyses (i.e., Chapters 5 and 6), we reported only the results without the 4-month temperament data, for reasons mentioned above.

Mother-child attachment. Mother-child attachment was assessed using the Attachment Q-Sort (Waters & Deane, 1985), using Vaughn and Waters' (1990) methodology. The instrument is commonly referred to as a *Q-set* and its methodology a *Q-sort*. In this report, we refer to

both the measure and procedure as a *Q-Sort.* The Attachment Q-Sort contains 90 cards with statements describing children's behaviours, in the context of interactions with their mothers. Examples of these behaviours are provided below.

- The child keeps track of his or her mother's location when he or she plays around the house.
- If the mother reassures the child by saying, "It's OK' or "It won't hurt you", the child will approach or play with things that initially made him or her cautious or afraid.
- The child quickly greets his or her mother with a big smile when she enters the room (shows her a toy, gestures, or says, "Hi, Mummy").
- If held in his or her mother's arms, the child stops crying and quickly recovers after being frightened or upset.

To obtain a Q-sort score, mothers first sorted the cards into three piles, with behaviours uncharacteristic and characteristic of their child in an "unlike my child" pile and a "like my child" pile respectively, and all other behaviours in a third "depends, maybe, or not sure" pile. Mothers then sorted each pile into three further piles, so as to have exhaustively sorted all 90 cards into nine equal piles, with the first and last pile containing behaviours least and most characteristic of the child respectively, and with each pile containing 10 cards. Each card received a score, with cards in Pile 1 each receiving a score of 1 and the cards in Pile 9 each receiving a sore of 9. Figure 2 illustrates this process.

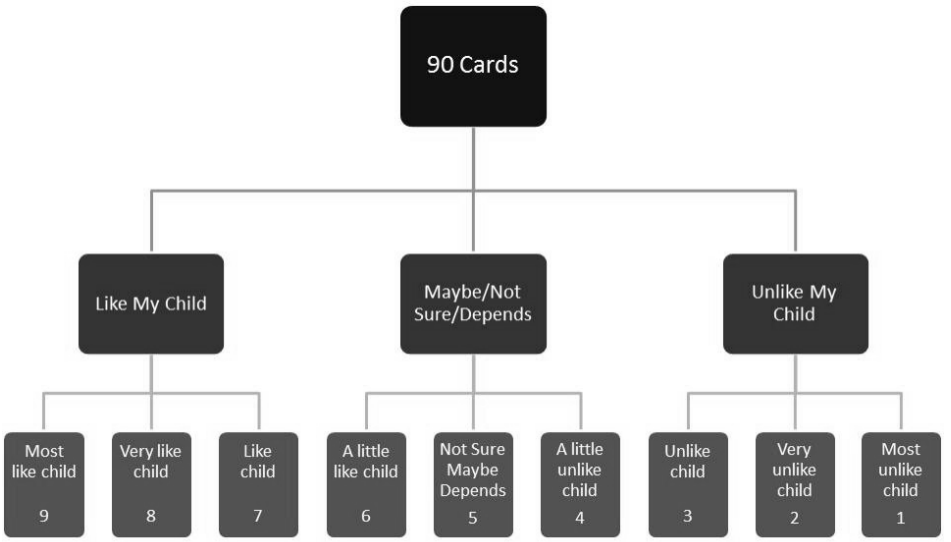

Figure 2. Attachment Q-Sort process

In order to obtain a locally valid measure of attachment, a panel of local experts in child development were formed to provide local benchmarks for what would constitute behaviours associated with secure and insecure attachment. The panel consisted of child psychologists, paediatricians, and academic researchers, some of whom were parents. Eight experts sorted the 90 statements using the criterion sorting method described above. A single criterion sort was obtained after gaining consensus within the panel. This consensus provided a benchmark agreed sort reflecting a hypothetical securely attached child. The local expert criterion sort was highly correlated with the expert criterion sort derived by the developers (Waters, 2008), $r = .76$, $n = 90$, $p < .001$.

Mother-child attachment scores were thus obtained by correlating each child's Q-sort card scores with the criterion sort card scores. Correlation scores closer to 1 indicated a more secure attachment; scores closer to -1 indicated a less secure attachment.

In the interests of limiting subject burden in our longitudinal study, we used maternal-report measures in place of laboratory-based methods of assessing child temperament (e.g., Lab-TAB: Goldsmith & Rothbart, 1996), and observation-based methods of assessing attachment style (e.g., Attachment Q-Sort: Waters & Deane, 1985; the Strange Situation: Ainsworth et al., 1978). It is worth noting that maternal-report measures using the Attachment Q-Sort have both external validity and test-retest reliability (Moss, Cyr, Bureau, Tarabulsy, & Dubois-Comtois, 2005; Posada, Waters, Crowell, & Lay, 1995).

Dependent Variables

As mentioned earlier, child temperament at 3 years of age was included as a dependent variable in Chapter 4 while mother-child attachment and maternal closeness at 3 years of age were included as dependent variables in Chapter 5. General and social-emotional developmental outcomes at 3 years of age were included as dependent variables in Chapter 6.

General developmental and social-emotional outcomes. Children's general and social-emotional development was assessed using the Ages and Stages Questionnaire 3 (ASQ-3; Squires & Bricker, 2009) and the Ages and Stages Questionnaires: Social-Emotional (ASQ-SE; Squires, Bricker, & Twombly, 2002) respectively. Written in clear and simple English, both are parent-report instruments, which can be easily understood by caregivers with primary school education, and have been designed for use with 3-year-olds.

Used worldwide as a parental screening tool, the ASQ-3 has shown to be a valid and reliable measure (Bedford, Walton & Ahn, 2013; Gollenberg, Lynch, Jackson, McGuiness, & Msall, 2009; Kerstjens et al., 2009), with adequate internal consistency, a Cronbach's alpha of .66

to .81 (Squires, Twombly, Bricker, & Potter, 2009). It covers five key developmental domains – communication, gross and fine motor skills, problem solving, and personal-social skills, with each domain comprising six questions. For each question, mothers responded using one of three options, i) not yet, ii) sometimes, or iii) yes, for which the child obtained a score of 0, 5, or 10 points respectively. The maximum score children could achieve in each domain was thus 60 points. Table 6 presents examples of ASQ-3 items.

Table 6

Examples of ASQ-3 Items

Domains	Descriptions	Sample Items
Communication	Receptive and expressive language skills, including following 1-step instructions	When you ask, "What is your name?" does your child say both his/her first and last names?
Gross Motor Skills	Coordination of arm, leg, and body movements	Does your child jump forward at least 6 inches with both feet leaving the ground at the same time?
Fine Motor Skills	Coordination of hand and finger movement	Can your child string small items such as beads, macaroni, or pasta "wagon wheels" onto a string or shoelace?
Problem Solving	Children's ability to solve daily problems	Show your child how to make a bridge with blocks, boxes, or cans. Does your child copy you by making one like it?
Personal-Social Skills	Children's ability to help themselves in daily routines and to interact with others	Does your child take turns by waiting while another child or adult takes a turn?

Table 7

Examples of ASQ-SE Items

Domains	Descriptions	Sample Items
Self-Regulation	Children's ability to adjust to stimulation	Does your child cry, scream, or have tantrums for long period of time?
Compliance	Children's willingness to follow rules	Does your child do what you ask him/her to do?
Communication	Children's ability to respond to or indicate their wants and needs	Does your child use words to tell you what he/she wants or needs?
Adaptive Functioning	Children's ability to cope with their physiological needs	Does your child sleep at least 8 hours in a 24-hour period?
Autonomy	Whether children self-initiate or respond without guidance	Does your child cling to you more than you expect?
Affect	Whether children show their feelings and empathy for others	Is your child interested in things around him/her, such as people, toys, and food?
Interaction with People	Whether children respond to or initiate social responses to peers and others	Does your child talk and/or play with adults he/she knows well?

The ASQ-SE has also been shown to have good internal consistency, Cronbach's α = .89 (Squires et al., 2002). It comprises 31 items, covering seven domains. For each item, mothers indicated whether their child displayed the described behaviour using one of three responses, i) most of the time, ii) sometimes, or iii) rarely or never, for which the child obtained a score of 0, 5, or 10 points respectively. If a parent indicated concern about a described behaviour, the child would

obtain an additional 5 points. The maximum score children could achieve was thus 465 points. Higher ASQ-SE scores indicated a higher risk of social-emotional problems. Table 7 presents examples of ASQ-SE items.

Demographic Variables

Maternal employment, maternal education, and housing type were measured at each time point.

Maternal employment. Mothers' employment status was categorised as i) not working, ii) working part-time, or iii) working full-time. This categorical variable was subsequently dummy coded in all quantitative analyses, with working full-time as the reference category. In other words, working full-time was always coded as 0, and the comparison category (e.g., working part-time, not working) as 1. Mothers with an ad hoc or flexible working arrangement were regarded as working part-time.

Maternal education. Mothers were categorised according to their highest level of education, which was then converted into an ordinal variable comprising five levels, i) primary school, ii) secondary school, iii) post-secondary, iv) diploma, and v) degree and above. The first three levels referred to mothers with at least some primary school, secondary school, or post-secondary education respectively. Mothers in the first or second group may not have attained their Primary School Leaving Certificate or GCE O-level respectively. Mothers in the third group may not have attained their General Certificate of Education Advanced Level (GCE A-level) or completed their polytechnic or Institute of Technical Education (ITE) education. Mothers in fourth group had at least a post-secondary diploma, while those in the last group had at least a basic university degree.

Housing type. Housing type, which provided an approximate measure of participants' socio-economic status, was transposed into an ordinal variable comprising four levels, i) 3-room HDB flat or smaller, ii) 4-room HDB flat, iii) 5-room HDB flat, and iv) private housing. Families in the first three levels live in public housing flats. HDB flats with 2, 3, and 4 rooms have 1, 2, and 3 bedrooms respectively, as well as a living room, a kitchen, and one or two bathrooms. A 5-room HDB flat is similar to a 4-room HDB flat with an additional dining room. A 1-room HDB flat has no bedroom. A typical 3-room HDB flat has a floor space of about 60 to 65 square metres. Married adults who are citizens or PRs can buy a HDB flat at subsidised cost.

In our sample, only one family was living in a 1-room HDB flat, and four families were living in a 2-room HDB flat. With such few families with these dwelling types, we grouped these five families with those in 3-room flats for all subsequent analyses. Families in private housing in our sample included families living in executive condominiums, private apartments and condominiums, and landed property (houses).

2.6 Procedure

Ethics approval was provided by the SingHealth Centralised Institutional Review Board. The study was explained verbally and in writing at the time of recruitment at the hospital the day after delivery; a letter reminding mothers of the voluntary nature of the study was mailed to them before the first interview. At the time of consent taking at the first interview, the study was verbally explained, and mothers were informed that they could withdraw from the study at any point without giving any reasons. The study team read aloud questions for caregivers

unable to read English proficiently, and translated items which caregivers expressed difficulty understanding.

2.7 Data Coding

To maintain participants' privacy and confidentiality of data, participants' data were de-linked from their personal information and identified by a numeric code. Only the study team had access to participants' personal information. Data, which was entered by the team and six trained volunteers instructed to keep the data confidential, were randomly checked to ensure the quality of the data entry process.

Qualitative analyses were conducted by two researchers. Specific words and phrases were retrieved from the interviews to derive common themes; a list of codes was then discussed and agreed upon to arrive at a final codebook comprising three themes – positive and negative caregiver factors, and care environment factors. Coding was based on qualitative responses with coders blind to all other participant information. In instances where mothers provided more detailed responses, several words were coded from a single participant. Vague or irrelevant responses were not coded. Inter-rater reliability was established for 10% of the sample, and was high for all three themes, as shown by the kappa statistic which was .82 to .91, $p < .001$ for positive caregiving factors, .85, $p < .001$ for negative caregiving factors, and .97, $p < .001$ for care environment factors.

In the qualitative analysis presented in Chapter 3, the total frequency count in Tables 12 to 19 does not tally with the total number of mothers interviewed. This is because some mothers did not provide responses in the interview, while others provided detailed responses which resulted in multiple codes. When giving reasons for their choice of main caregiver, some mothers also cited more than one reason. For

example, they may have reported that i) both parents were working, implying that they were unable to care for their child themselves, ii) the chosen caregiver lived nearby, and iii) the chosen caregiver was trustworthy. The data presented are therefore not exhaustive. Only the top three codes and prominent recurring themes are presented in Chapter 3 (a detailed list of codes is found in Appendix C).

With reference to both the qualities of an ideal caregiver and the qualities of an ideal care environment, preliminary analyses showed that responses were not specific to types of main caregivers. As such, the qualities of the ideal caregiver and care environment, which are presented in Chapter 3, are summed across children with different main caregivers.

CHAPTER 3 – CAREGIVING ARRANGEMENTS

3.1 Introduction

The aim of this chapter is to explore the caregiving arrangements of children in Singapore between birth and the age of 3 years. In the first section, we identify children's main caregivers at 4 months, 18 months, and 3 years of age, and report the number of times that the main caregiver is changed (e.g., from mother to grandmother) during the first three years of life. Children's main caregivers and the number of times the main caregivers changed are two key variables in our quantitative data analysis in subsequent chapters. In the second section, we use a qualitative approach to extract the reasons mothers give for placing their child with the chosen main caregiver. We also explore what mothers perceive to be the positive and negative aspects of their child's caregiving arrangements, and the qualities they seek in an ideal main caregiver and an ideal care environment.

3.2 Quantitative Analyses

Demographic Characteristics

Mothers in our study were 17 to 36 years of age (M = 30.02 years, SD = 4.54 years). Table 8 provides a profile comparison of participants and the Singapore population, according to the 2010 census (Singapore Department of Statistics, 2011). Gender distribution was based on census data for live births. Race and highest level of education was based on census data for women aged 25 to 34 years, an age range similar to that of mothers in our sample.

Table 8

Demographic Characteristics of Participants

	n	Percentage in Our Sample	Percentage in the National Population
Child's Gender	438		
Boys	214	48.9	51.7
Girls	224	51.1	48.3
Mother's Race*	439		
Chinese	306	69.7	64.4
Malay	81	18.5	12.7
Indian	35	8.0	16.0
Others	17	3.9	6.9
Maternal Employment	436		
Not Working	67	15.4	-
Working Part-time	33	7.6	-
Working Full-time	336	77.0	-
Maternal Education*	438		
Primary School	26	5.9	7.0
Secondary School	37	8.4	12.4
Post-secondary	41	9.4	8.7
Diploma	138	31.5	23.7
Degree and above	196	44.7	48.2
Housing Type	437		
Up to 3-room HDB Flat	55	12.6	17.9
4-room HDB Flat	192	43.9	33.5
5-room HDB Flat	161	36.9	29.7
Private Housing	29	6.6	18.3
Others (Shophouses)	-	-	0.6

Note: Percentages may not add up to 100% as they are rounded up nearest 1 decimal place.

Chi-square analysis showed that our sample differed from the national population in terms of level of education, χ^2 (4, N = 438) = 343.22, p < .001, and housing type, χ^2 (3, N = 437) = 96.61, p < .001. Compared to the national population, our sample had more mothers with a diploma, fewer mothers with primary or secondary school education, and fewer mothers with a university degree. Although most participants, like the national population, live in 4- and 5-room flats, our sample had fewer families living in 3-room or smaller flats and fewer families living in private housing. This may be explained by our observation that many of the families in 3-room or smaller flats dropped out of our study, as reported in Chapter 2. Our sample also differs from the national population in terms of ethnicity, χ^2 (3, N = 438) = 10.8, p = .01. Our sample had relatively more Chinese and Malay families and fewer Indian families than the national population.

Analysis of the demographic data shows that maternal employment status, maternal education, and housing type remained relatively stable across all three time points. Demographic variables, which were included as control variables in our quantitative analyses in subsequent chapters, were thus based on measures obtained at the last time point of our study.

Children's Main Caregivers

In our study, the main caregiver is defined as the person who in a typical week spends the most amount of time caring for the child, in the period leading up to each interview. In other words, the main caregiver when children were 4 months, 18 months, and 3 years of age, was the person who spent the most time weekly caring for the child from birth to 4 months of age, from 4 to 18 months of age, and from 18 months to 3 years of age respectively. The main caregiver at each time point of our

study is therefore the main caregiver in the interval leading up to that time point.

We found children's main caregivers from birth to 3 years of age to comprise i) parents, ii) grandparents, iii) childcare centres, iv) domestic helpers, v) nannies, vi) other relatives, and vii) caregiver combinations. The number of children with these main caregivers is summarised in Table 9.

Table 9

Frequency of Main Caregivers

	At 4 months	At 18 months	At 3 years
Parents	252	92	76
Mothers	244	87	71
Fathers	3	4	4
Mothers and Fathers	5	1	1
Grandparents	87	214	131
Grandmothers	86	210	129
Grandfathers	1	1	1
Grandmothers and Grandfathers	0	3	1
Childcare Centres	5	35	162
Domestic Helpers	15	35	37
Nannies	14	32	14
Relatives	7	16	9
Other Caregiver Combinations	59	15	5
Mothers and Grandmothers	42	7	2
Mothers and Domestic Helpers	5	1	1
Grandmothers and Domestic Helpers	3	3	2
Mothers, Fathers, and Grandmothers	4	0	0
All Other Combinations	5	4	0
Missing Data	0	0	5
Total Count	439	439	439

As seen in Table 9, a number of children in our sample were in the care of two or more main caregivers. Given that having two main caregivers may impact children's development differently from having a main caregiver, we distinguish this group of children, whom we term as having *combination care*, from children with other types of main caregivers. In our study, we regarded children who were cared for by each of two main caregivers for exactly half the week, to be in combination care; all other children were categorised according to the caregiver who spent most of the week looking after them. Thus, children who are looked after by their mother and grandmother for 4 and 3 days respectively would be in *parental care*. For most children in combination care, their main caregivers were their mother and grandmother. The next most common arrangements were mother-domestic helper and grandmother-domestic helper combinations. Interview responses did not distinguish the proportion of children who were looked after by their main caregivers concurrently, and the proportion of those who were looked after by their main caregivers in consecutive periods of time.

Families in Singapore also put their child in the care of nannies, who are typically locals. The term *nanny* in the literature usually refers to hired helpers who look after the child in the child's own home, but in the local context, nannies are hired helpers who provide caregiving in the nanny's home. As such, we use the term *nanny* in our monograph to refer to the latter type of main caregiver. It is also not uncommon for families in Singapore to have domestic helpers, who are live-in hired help from neighbouring countries (e.g., the Philippines, Indonesia) to take care of domestic chores and child-rearing.

When children were 3 years of age, there were five mothers who were unable to give definitive answers regarding their child's caregiving arrangements. As a result, there were missing data for five children

regarding their main caregiver at 3 years of age. Consequently, we excluded the data of these children from all subsequent analyses.

As shown in Table 9, it can be observed that the three most common main caregivers were i) mothers, ii) grandmothers, and iii) childcare centres. Mothers were the modal main caregiver at 4 months of age, and grandmothers the modal main caregiver at 18 months of age. In contrast, very few children had their father or grandfather as their main caregiver. With all individual categories of main caregivers considered together, childcare centres were the modal main caregiver by 3 years of age.

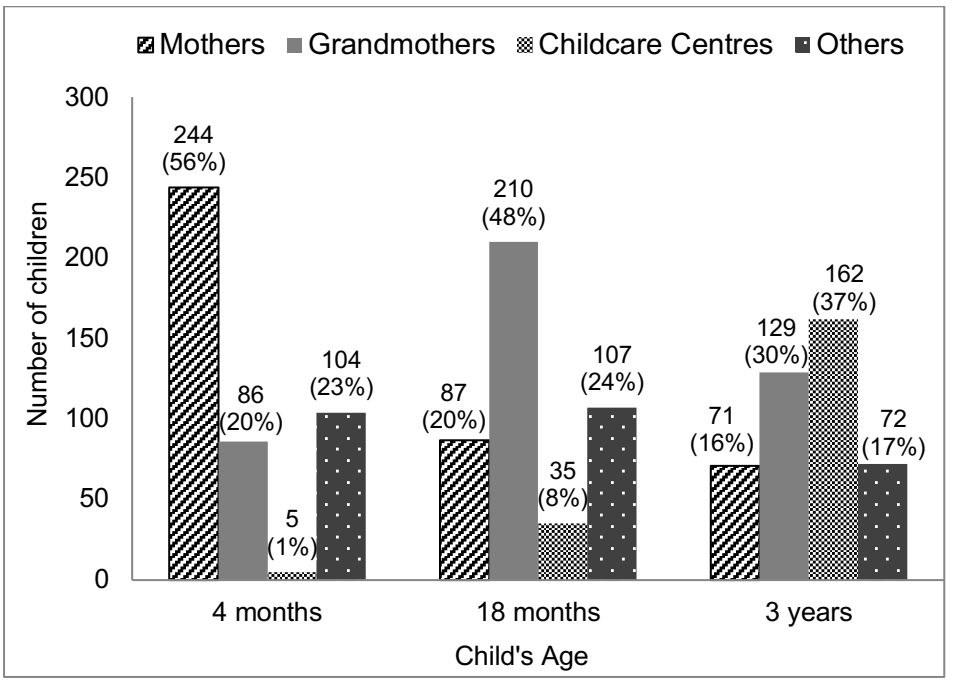

Figure 3. Frequency of the most common main caregivers

The three most common main caregivers across the three time points of the study are illustrated in Figure 3. As seen in Figure 3, mothers, grandmothers, and childcare centres are the main caregivers

for 76% of the sample up to 18 months of age, and 82% of the sample by age 3 years.

More than half of the children in our sample had mothers as their main caregiver at 4 months of age, but mothers were the main caregivers for only 20% and 16% of the sample by 18 months and 3 years of age respectively. There was therefore a general trend for fewer mothers to be the main caregiver with age.

After mothers, grandmothers were the second most common main caregiver at 4 months of age (20% of the sample), and were in fact, the modal main caregiver at 18 months of age (48% of the sample). However, by 3 years of age, the proportion of children with their grandmother as their main caregiver was reduced to 29% of the sample. Nonetheless, grandmothers remained the second most common main caregiver even at the last time point.

Although childcare centres were relatively uncommon at 4 and 18 months of age (1% and 8% of the sample respectively), they were the main caregiver for over a third of children by 3 years of age (37% of the sample). In contrast, mothers were the main caregiver for over half the sample at 4 months, but were the main caregiver for only 16% of the sample by 3 years of age.

As seen in Table 9, relatively fewer children had a domestic helper, nanny, or another relative as their main caregiver across all three time points. For example, domestic helpers, nannies, and other relatives together were the main caregivers for 19% of the sample at 18 months of age. Combination care was the main caregiver arrangement for 13% of the sample at 4 months of age, and for 1% and 3% of the sample at 18 months and 3 years of age respectively. The proportion of children with a caregiver combination appears substantial, but this category subsumes a number of permutations each with a low

frequency count. It follows that any analysis carried out with each main caregiver as a separate category may not yield meaningful results.

One of our main interests in this study is to determine whether specific outcomes would be associated with having parents as the main caregiver. As such, we chose to distinguish parents as the main caregiver from other types of main caregivers, and group all main caregivers providing non-parental care in a home-based setting together, although we note that the main caregiver for the vast majority in this group was the child's grandmother. Children in home-based (non-parental) care thus include children being cared for by grandparents, domestic helpers, relatives, and nannies, in their own home or their caregiver's home. Accordingly, we included in all our analyses the following four categories of main caregivers.

- Parental care — care by the child's mother or father;
- Home-based care — care by the child's grandparent, nanny, domestic helper, or relative in a home setting;
- Centre-based care — care at a childcare centre; and
- Combination care — care by two or more main caregivers.

Table 10 presents the four categories of main caregivers at each time point, when children were 4 months, 18 months, and 3 years of age. As seen in Table 10, children in centre-based care at 4 months of age (n = 5), and those with combination care at 3 years of age (n = 5), were few in number, making it difficult to compare the outcomes of these children to that of other groups. As a result, data from these 10 children, together with the five children whose main caregivers were not identified at 3 years of age, were excluded from quantitative analyses in subsequent chapters.

Table 10

Frequency of Types of Main Caregivers

Types of Main Caregiver	At 4 months	At 18 months	At 3 years
Parental Care	252	92	76
Home-based Care	123	297	191
Centre-based Care	5	35	162
Combination Care	59	15	5
Missing Data	0	0	5
Total Count	439	439	439

As seen in Table 10, when children's main caregivers were considered in these four categories, the caregiving arrangement of most children at 3 years of age was distributed between home-based care (which includes children with their grandmother as their main caregiver) and centre-based care. In other words, although childcare centres were the modal caregiving arrangement among individual categories of main caregivers at 3 years of age, as shown earlier in Table 9, there were almost as many children in centre-based care (i.e., a childcare centre) as there were children in home-based care (i.e., in the care of grandparents, domestic helpers, nannies, or relatives) at 3 years of age, when main caregivers were grouped in four categories comprising parental, home-based, centre-based, and combination care.

Main Caregiver Changes

The average number of changes to the main caregiver between birth and 3 years of age was 1.98 (SD = 1.31, N = 437). The median change was 2.00, with a range of 0 to 11 changes. However, almost 90% of our sample experienced no more than three changes to their main caregiver. More than half the sample experienced one or two changes,

with 123 children experiencing one change, and another 123 children experiencing two changes. Ninety-six children (22% of the sample) experienced three changes, 32 (7%) experienced four changes, and 13 (3%) experienced five changes. Only two children had more than five changes to their main caregivers; one experienced six changes and the other 11 changes. There were 48 children (11%) with the same main caregiver throughout the first three years of life.

Out of the total sample of 439, there were two children whose mothers did not report the number of times their child experienced a change in their main caregiver. Regarding the child with 11 changes, interview responses revealed the child to be a Chinese national who was being cared for by either of his grandmothers while his mother was at work. Because both grandmothers were on social visit passes and returned home every few months, they took turns to look after him over 3-month intervals. We felt that this experience was not characteristic of local children, and thus excluded him from all subsequent analyses.

Maternal Closeness

On average, maternal closeness ratings were 4.64 (*SD* = 0.58), 4.66 (*SD* = 0.56), and 4.74 (*SD* = 0.48) at 4, 18, and 36 months of age respectively. Table 11 summarises the number of mothers who gave a rating of 4 or 5, indicating that they felt close or very close to their child. As seen from Table 11, about 70% of mothers perceived themselves to be close to their child, and this pattern can be observed across all three time points.

Table 11

Frequency of Maternal Closeness Ratings

		Neutral		Close		Very Close	
Child's Age	*N*	n	%	n	%	n	%
At 4 months	438	21	5	117	27	300	68
At 18 months	436	19	4	111	25	306	70
At 3 years	435	8	2	95	22	332	76

Note: Percentages may not add up to 100% as they are rounded up nearest 1 decimal place.

3.3 Qualitative Analyses

Preliminary analysis showed that there were two main reasons for engaging domestic helpers, nannies, and relatives as main caregivers. The first reason applied mainly to domestic helpers. They were chosen because parents were working, and there were no other caregivers available. Choosing domestic helpers for their caregiving experience was reported by only two families, where the domestic helper was viewed as an experienced and/or trustworthy caregiver. The second reason applied to mainly relatives and nannies. These caregivers were chosen because they were experienced caregivers, similar to the reasons given for grandmothers. In comparison, mothers gave more varied reasons for choosing to be the main caregiver, and for putting their child in the care of grandmothers and childcare centres. For the qualitative analysis which follows, we thus focused on the reasons mothers gave for being the main caregiver, and for placing their child in the care of grandmothers and childcare centres. As mentioned in section 2.7, the total frequency count in Tables 12 to 19 does not tally with the total number of mothers interviewed because some mothers did not provide responses in the interview and others provided detailed responses which resulted in multiple codes.

Mothers' Reasons for their Child's Main Caregiver

In this section, we address the question of how mothers decided on their child's caregiving arrangements.

Mothers as the Main Caregiver. Table 12 summarises the reasons why mothers were their child's main caregiver. Their reasons were generally consistent across all three time points. Mothers preferred to be the main caregiver because they felt they understood their child the most, and felt they were the best person for the role. Some said that it was a natural thing to do, and it was their responsibility to care for their child. Mothers who chose to care for their child full-time also reported being the main caregiver for bonding reasons, although this reason declined in importance with age.

Across all three interviews, the most cited reason was that mothers wanted the role of the main caregiver. At the same time, not all mothers appeared to want this role. Some said that they were the main caregiver because there was no one else available, and they had no work or other commitments at the time.

Grandmothers as the Main Caregiver. Table 13 summarises the reasons for engaging grandmothers as the main caregiver. Up to 18 months of age, reasons for grandmothers being the main caregiver were on the whole roughly distributed across circumstantial and practical reasons, and the reason relating to the trustworthiness of grandmothers. In other words, children were in the care of their grandmothers because both parents were working, grandmothers were available, and it was convenient (because grandparents tended to live nearby), and because placing the child in the care of immediate family members provided mothers with greater assurance and peace of mind.

Table 12

Reasons for Mothers as the Main Caregiver

	At 4 months (*n* = 126)		At 18 months (*n* = 84)		At 3 years (*n* = 63)	
	No. of Responses	%	No. of Responses	%	No. of Responses	%
It was the mother's preference.	35	38	22	26	15	24
The mother was available.	26	21	9	11	10	16
The mother did not trust other caregivers.	20	16	16	19	9	14
No other caregivers were available.	18	14	19	23	9	14
The mother wanted to bond with the child.	14	11	8	10	4	6

Table 13

Reasons for Grandmothers as the Main Caregiver

	At 4 months (*n* = 182)		At 18 months (*n* = 183)		At 3 years (*n* = 92)	
	No. of Responses	%	No. of Responses	%	No. of Responses	%
The grandmother was available; others were not.	52	29	45	25	16	17
Parents were working.	51	28	54	30	15	16
The arrangement was convenient.	44	24	43	24	12	13
The grandmother was trustworthy.	44	24	40	22	24	26
The grandmother was experienced.	17	9	7	4	2	2

Table 14

Reasons for Childcare Centres as the Main Caregiver

	At 4 months (*n* = 15)		At 18 months (*n* = 50)		At 3 years (*n* = 215)	
	No. of Responses	%	No. of Responses	%	No. of Responses	%
No other caregivers were available.	11	73	21	42	45	21
Parents were working.	4	27	15	30	45	21
It was to enable the child to gain independence.	2	13	3	6	20	9
It was to enable the child to socialise with peers.	1	7	6	12	53	25
It was to facilitate the child's cognitive learning.	0	0	7	14	77	36
The caregiver was unable to cope.	0	0	5	10	42	20

Across all three interviews, a stable proportion of mothers reported the reason for placing their child in the care of grandmothers was that grandmothers were responsible and reliable. In contrast, practical reasons were relatively less common at 3 years of age. Consequently, the top reason for having grandmothers as the main caregiver at 3 years related to the trustworthiness of grandmothers.

Childcare Centres as the Main Caregiver. Table 14 summarises the reasons why children were looked after primarily at childcare centres. Mothers did so at the younger ages for practical reasons. The most commonly cited reasons at 4 and 18 months of age were that both parents were working, and there were no other caregiving options available. In contrast, by 3 years of age, the top reason for placing children in childcare centres related to school readiness. Mothers placed their children at childcare centre at 3 years of age to allow cognitive learning, socialisation, and children to gain independence.

Mothers who reported no other caregiving options available, often mentioned that grandparents were unable to assist with caregiving because they were themselves working, already caring for other grandchildren, and/or in poor health, among other reasons. Mothers often reported that the previous main caregiver of the child, usually the grandmother, was unable to cope, mainly because she was now tasked with the responsibility of caring for a younger sibling of the child. This reason was, to an extent, linked to the suggestion that this main caregiver would have difficulty coping with two young children. Twenty-seven mothers indicated that their 3-year-old was attending childcare so that the main caregiver, usually the grandmother, could now focus on the younger sibling. Eight mothers elaborated that the grandmothers found it difficult to handle their active toddler while caring for the

younger sibling. These are some reasons why “the caregiver was unable to cope”, as presented in Table 14.

Positive and Negative Aspects of Caregiving Arrangements

This section examines mothers’ perceptions of both the positive and negative aspects of their child’s caregiving arrangements. As most mothers were fairly satisfied with their caregiving arrangements, the frequency of responses for the negative aspects was comparably lower.

Mothers as the Main Caregiver. Table 15 presents the positive and negative aspects of having mothers as the main caregiver. The top three positive aspects remained unchanged over time. Mothers were satisfied that they could spend quality time with their child, be involved in their child’s formative years, and witness key milestones. Mothers attributed their satisfaction with the role of main caregiver to the following reasons – it was their preference to do so, and they believed that they were the most appropriate caregiver for their child.

One negative aspect mothers cited was that they found caregiving tedious. Mothers said they felt tired and frustrated at times, especially when their child was being difficult. Another negative aspect was that they felt that they lacked the freedom and time to rest and to attend to their own needs. Although most would presumably have to forgo full-time work to stay home with their child, the loss of additional income was not commonly cited as a negative aspect. Very few mothers, even those working part-time, mentioned working from home. It appears that this option may not have been available to them.

Grandmothers as the Main Caregiver. Table 16 presents the positive and negative aspects of having grandmothers as the main caregiver. The top two positive aspects reported over time were the trustworthiness of grandmothers as caregivers, and the ability of

grandmothers to provide properly supervised, attentive care. Apart from the benefit of their child being in the care of an experienced caregiver, a small proportion of mothers were also happy that grandmothers would keep them updated about their child. These reasons were more likely to be cited when the child was 4 or 18 months than 3 years of age. Positive aspects relating to convenience and time flexibility were reported by a small proportion of mothers across time.

Several mothers identified different parenting methods to be a negative aspect of care by grandmothers. Mothers observed that grandmothers tended to interfere with their own child-rearing and discipline methods, and over-pampered the child. Another negative aspect was that mothers had less quality time with their child, especially in situations where children stayed with grandparents on weekdays and only returned home on weekends. Some mothers were concerned that their child would be less cognitively stimulated, and would lack opportunities to develop social skills while in the care of grandmothers. These reasons were more likely reported at 18 months and 3 years of age than at 4 months of age.

Childcare Centres as the Main Caregiver. Table 17 lists the positive and negative aspects of putting children in the primary care of childcare centres. At 4 months, mothers reported being satisfied that childcare centres provided supervised care, and communicated openly with parents through regular updates. At 18 months and 3 years of age, mothers expressed satisfaction that their child was benefitting in terms of cognitive stimulation, social skills, and independence, with the relative ranking of these three responses remaining stable from 18 months to 3 years of age.

Table 15

Positive and Negative Aspects of Mothers as the Main Caregiver

	At 4 months (*n* = 126)		At 18 months (*n* = 84)		At 3 years (*n* = 63)	
Positive Aspects	No. of Responses	%	No. of Responses	%	No. of Responses	%
Mothers are involved in children's development.	71	56	46	55	33	52
It is In line with mothers' preferences.	27	21	25	30	12	19
Mothers can bond with their child.	25	20	10	12	7	11
Negative Aspects						
Mothers find caregiving tedious.	34	27	30	36	14	22
Mothers have no time flexibility.	19	15	10	12	7	11
The family has no additional income.	6	5	2	2	2	3

Table 16

Positive and Negative Aspects of Grandmothers as the Main Caregiver

	At 4 months (*n* = 182)		At 18 months (*n* = 183)		At 3 years (*n* = 92)	
Positive Aspects	No. of Responses	%	No. of Responses	%	No. of Responses	%
Grandmothers are trustworthy.	99	54	81	44	48	52
Grandmothers provide proper supervision.	46	25	46	25	22	24
Grandmothers are experienced.	28	15	9	5	1	1
The arrangement is convenient.	15	8	12	7	7	8
The arrangement offers time flexibility.	15	8	9	5	6	7
There is open communication with grandmothers.	14	8	10	5	1	1
Negative Aspects						
Grandmothers' parenting style is different.	38	21	48	26	18	20
Mothers have less quality time with their child.	26	14	18	10	14	15
The child receives less cognitive stimulation.	2	1	15	8	7	8
The child has few socialisation opportunities.	0	0	8	4	2	2

Table 17

Positive and Negative Aspects of Childcare Centres as the Main Caregiver

	At 4 months (*n* = 15)		At 18 months (*n* = 50)		At 3 years (*n* = 215)	
Positive Aspects	No. of Responses	%	No. of Responses	%	No. of Responses	%
There is open communication with childcare centres.	4	27	2	4	4	2
There is proper supervision at the childcare centre.	4	27	3	6	26	12
The child receives cognitive stimulation.	3	20	22	44	125	58
The arrangement offers time flexibility.	2	13	7	14	28	13
The child is able to gain independence.	2	13	6	12	27	13
The childcare educators are trustworthy.	1	7	6	12	20	9
The child has opportunities to socialise with peers.	0	0	14	28	57	27
Negative Aspects						
Mothers have less quality time with their child.	3	20	6	12	20	9
The childcare environment is unhygienic.	3	20	15	30	39	18
Childcare standards are unsatisfactory.	1	7	4	8	18	8
Childcare fees are costly.	0	0	3	6	6	3
The child acquires bad habits.	0	0	2	4	10	5

Mothers also reported that childcare gave them flexibility (i.e., time to work, rest, and pursue their own interests), and that childcare centre educators were generally trustworthy. Mothers were less likely to highlight open communication as a positive aspect with age.

Some mothers were dissatisfied with childcare, citing the lack of proper hygiene as a reason. They pointed out that their child fell sick more often after attending childcare, a concern which was specific to childcare. Mothers were also concerned about two other negative aspects which they termed i) unsatisfactory childcare standards and ii) exposure to negative influences. Regarding childcare standards, mothers felt that childcare centre standards were not to their expectations; they were dissatisfied with high teacher turnover rates, poor teacher-child ratios, and less than ideal teaching methods. Regarding negative influences, a few mothers also felt that childcare exposed their child to undesirable habits, such as the rejection of vegetables, and the throwing of temper tantrums. Childcare costs did not appear to be a point of dissatisfaction for most mothers across time.

Qualities of an Ideal Main Caregiver

Table 18 summarises mothers' responses regarding the qualities of an ideal main caregiver. Caregiver qualities emphasised remained consistent over time. Mothers reported that the main caregiver should be caring, loving, patient with children, and experienced in child-rearing. As seen in Table 18, these qualities are among the top two qualities mothers named across all three time points.

Table 18

Qualities of an Ideal Main Caregiver

	At 4 months (*n* = 439)		At 18 months (*n* = 439)		At 3 years (*n* = 439)	
	No. of Responses	%	No. of Responses	%	No. of Responses	%
The caregiver is caring.	360	82	343	78	344	78
The caregiver is experienced.	166	38	121	28	112	26
The caregiver provides proper supervision.	110	25	107	24	69	16
The caregiver practices good hygiene.	83	19	81	18	89	20
The caregiver is trustworthy.	80	18	70	16	76	17
The caregiver encourages cognitive learning.	33	8	66	15	55	13

Table 19

Qualities of an Ideal Care Environment

	At 4 months (*n* = 436)		At 18 months (*n* = 439)		At 3 years (*n* = 436)	
	No. of Responses	%	No. of Responses	%	No. of Responses	%
The environment is clean and hygienic.	305	70	287	65	308	71
The environment is safe.	206	47	255	58	205	47
The environment is comfortable.	219	50	145	33	170	39
Cognitive learning is encouraged.	76	17	93	21	104	24
There is space to explore.	47	11	71	16	69	16
There is a structured programme.	44	10	35	8	31	7

The ability of the caregiver to provide attentive and supervised care was another ideal quality, which was mentioned by a quarter of mothers when children were 4 and 18 months of age, although it was mentioned relatively less frequently by 3 years of age. Other ideal qualities included the practice of good hygiene and trustworthiness.

At no time point was the ability to impart cognitive knowledge among the most essential attributes that mothers looked for in an ideal main caregiver. As seen in Table 18, only 8% to 15% of the mothers in our study reported the ability of the caregiver to encourage cognitive learning to be an important caregiver quality.

Characteristics of an Ideal Care Environment

Table 19 summarises mothers' responses regarding the qualities of an ideal care environment. Similar to the qualities of an ideal caregiver, responses about the ideal care environment were stable over time. Mothers typically valued cleanliness and hygiene, with some mothers specifically stating that the care environment should be smoke-free or have no pets on its premises, or both these regulations. They felt that the environment should be safe for children. Many mothers also wanted the environment to be comfortable for their children, for example, in terms of having an appropriate level of noise, good ventilation and lighting, and an inviting, cosy, and warm (not in terms of temperature) atmosphere. A comfortable environment included being a place where children would feel happy, loved, and cared for.

Mothers also felt that the care environment should encourage learning and children be given the freedom to explore their environment. Children should be engaged in activities and have access to resources, such as storybooks and toys, to stimulate learning. There should be

sufficient space, including outdoor nature and play areas, for children to explore.

3.4 Discussion

Children's Main Caregivers

Mothers, grandmothers, and childcare centres were the most common main caregivers from birth to 3 years of age in our study. Mothers were the modal caregiver up to 4 months of age. This might be attributed to Singapore's maternity leave policy, where working mothers of Singaporean children are entitled to government-paid maternity leave until children are 4 months of age. It would explain the observation that the number of mothers who were main caregivers subsequently halved after 4 months of age.

Consistent with the literature, most children in our study were in the care of grandparents and childcare centres. Grandmothers were the modal main caregiver at 18 months of age, while childcare centres were the modal main caregiver at 3 years of age. However, domestic helpers were also the main caregivers of a number of children. When children were 18 months old, domestic helpers were the main caregiver for as many as 35 children (8% of the sample). This is in keeping with previous findings that local children tend to be cared for by a variety of different main caregivers, including parents, grandparents, domestic helpers, and childcare centres, below 3 years of age (e.g., Cheung & Hawkins, 2014; Chong et al., 2016; Shum-Cheung et al., 2006).

In addition to the types of main caregivers reported in earlier research, we observed in the current study that local children also had nannies or relatives as their main caregiver, or were in the care of two main caregivers, such as their mother and grandmother, or their mother and a domestic helper. There were a notable number of children with

this latter combination care arrangement, where the child was cared for by two people for an equal amount of time in the week.

We also observed other caregiving arrangements which differ from those previously observed in Singapore (e.g., Chong et al., 2016) and other countries (e.g., Harrison et al., 2009; Zhang & Yeung, 2012). For example, there were children in our sample who were not only in the primary care of their grandparent or a nanny, but were also living with their main caregiver during the work week or throughout the entire week.

These caregiving arrangements are in contrast to those reported in other countries, where parents may rely mainly on grandparents (during the day) or childcare centres. In the light of these local caregiving arrangements, the question of how care by these different main caregivers impacts local children's early development remains relevant, an issue which we address in subsequent chapters.

Main Caregiver Changes

Our findings revealed a somewhat wide variation in children's experiences regarding caregiver stability. Unlike other research where all children typically experienced no changes or only one change in their main caregiver up to 15 months of age (e.g., NICHD ECCRN, 1997, 2001), less than 40% of our sample experienced similar caregiving stability between birth and 3 years of age.

The above may arise because the main caregiver is more likely to change with age. Taking into account the longer time frame of our study, caregiver stability in our local sample appears comparative to that reported elsewhere. Pilarz and Hill (2014) reported an average of 1.9 changes for children between birth and 3 years of age. This is similar to that experienced by our sample, where the main caregiver changed an average of 1.98 times. Importantly, the main caregiver was changed

twice for over a quarter of our sample, and three times for over a fifth of our sample. Given that local children do experience caregiver instability to some extent, we have reason to investigate whether the number of main caregiver changes children experience impacts their early development, an issue which we examine in subsequent chapters.

Mothers' Reasons for Caregiving Arrangements

This chapter set out to report the subjective perceptions of mothers in deciding the caregiving arrangements of their child. Mothers' caregiving choices appeared to be guided by practical considerations, but also by their perceptions of their child's evolving needs.

Across all three interviews, caregiver availability was often a reason reported by mothers for choosing their child's caregiving arrangement, regardless of whether the child was in the primary care of their mother, grandmother, or a childcare centre. For example, the availability of the caregiver and the unavailability of other caregivers (including parents) were the most often reported reasons for placing children in the primary care of grandmothers or a childcare centre, especially at the younger ages.

Across all three interviews, mothers also prioritised the safety of their child, expressing the need for their vulnerable infant or toddler to be in the care of a trustworthy caregiver. This reason was cited by a stable proportion of mothers across all three interviews, for children whose main caregivers were their grandmothers. It was also the top reason for leaving children in the care of grandmothers at 3 years of age.

For children in a childcare centre, mothers were keen to provide their child with a caregiving arrangement which would nurture their child's cognitive and social skills, as their child grew older. For example, the opportunity to socialise and the opportunity to develop cognitive

skills were among the top reasons for placing children in childcare at 3 years of age. In sum, mothers appeared to take into account not only practical considerations but also their child's age and developmental needs, when making caregiving choices.

Rather than reasons relating to practical considerations, trustworthiness of the caregiver, and the opportunities for learning and socialisation, the reasons for mothers being their child's main caregiver related consistently across interviews to mothers' preferences to be their child's main caregiver. Maternal use of a coping strategy known as sequencing, which involves mothers giving up their career to be their infant's full-time caregiver and resuming employment subsequently when children are in school (Lai & Huang, 2004), may explain the reduction in mothers as main caregivers as children reach the age for preschool.

Understandably, mothers who were not their child's main caregiver were often concerned about the lack of quality time spent with their child. Feelings of not spending enough time with one's child can have negative consequences on parents. For example, parenting stress was found to be positively associated with hours of non-parental care, but this stress was significantly lower if the care was provided by family carers (Craig & Churchill, 2018). Given the importance of allowing parents to spend quality time with their young children, more incentives and guidance to employers for adjusting workplace mindsets about work-life balance, might help to support parents in their roles as main caregivers in Singapore.

Reasons for Entrusting Children to Grandmothers

Regarding grandmothers as the main caregiver specifically, we found convenience to be among the top reasons for enlisting

grandmothers as the main caregiver. This is in line with expectations that parents would rely on their parents for caregiving support. Interview responses, which related the convenience of the arrangement to living with or near grandparents, support our observations.

Beyond reasons of convenience and availability, mothers also perceived grandmothers to be trustworthy caregivers who would closely monitor their infant. Sun (2008) in her study of Taiwanese families, affirmed that parents were likely to view grandparent care as being better than impersonal, market-based care, because grandparents have an emotional connection to their grandchildren, which serves as a form of protection for young children. Owing to this emotional connection, and perhaps more tangibly to blood ties, grandparents are perceived to provide more trustworthy and affectionate care. Mothers in our sample who chose grandmothers to be the main caregiver because of their trustworthiness may have rationalised their choice in similar ways. Many mothers highlighted that they felt more assured leaving their child with reliable grandmothers who would provide attentive, one-to-one care.

Sun (2008) notes that gendered division of labour still continues at home, with women undertaking traditional caregiving roles to a greater extent than is commensurate with their current levels of education and employment. This may explain why more grandmothers than grandfathers were main caregivers in our sample. Although grandfathers may have contributed, it was grandmothers who took on a larger share of the caregiving responsibility. By facilitating parents' participation in the labour force, grandparents contribute "an indirect economic value to the family unit and society" (Low & Goh, 2015, p. 316). It may therefore be argued that more efforts could be made to support the invaluable contributions of grandparents as caregivers.

It is also prudent to note a matter relating to the characteristics of our sample. We chose to include only firstborns in our study to exclude the impact of birth order on outcome measures. However, it may be of no coincidence that grandmothers were often children's main caregivers, especially during infancy. Fergusson, Maughan, and Golding (2008) observed firstborn children in their United Kingdom (UK) longitudinal study to be more likely to receive grandparent care because their mothers, being relatively inexperienced, tended to rely on grandparents as experienced caregivers for caregiving support.

Reasons for Enrolling Children in Childcare Centres

Children were more likely to be in the care of a childcare centre at 3 years of age than at the younger ages, but it is worth noting that there were still more children were in home-based care with grandmothers, nannies, or domestic helpers as their main caregiver than in a childcare centre at 3 years of age. The time period from 18 months to 3 years of age appeared to be when most mothers felt that it was appropriate for their child to be cared for at a childcare centre. Mothers who opted for childcare generally believed that childcare would provide more opportunities for learning compared to home-based care. It is also possible that childcare centres became an attractive caregiving option for families with a second child. This account concurs with the reason cited for childcare enrolment at 3 years. The main caregiver (usually a grandmother) was to assume the role of main caregiver for the younger child, and would be unable to care for an infant and a preschooler at the same time.

Cognitive learning and peer socialisation, both of which would prepare toddlers for formal schooling, were common reasons for placing children in childcare. Childcare centres appeared to be a key avenue for

mothers to provide their child with an early head start in life. Gamble, Ewing, and Wilhlem (2009) explored how the underlying beliefs and values of parents in the United States affected children's caregiving arrangements. They found parents to possess a keen awareness of their children's developmental needs, and to place substantial emphasis on the school readiness aspects of a caregiving arrangement. Parents were concerned about whether the caregiving arrangement would prepare their child for formal schooling, for example, through the teaching of social skills and classroom behaviours associated with learning. Key parallels may be drawn with the mothers in our sample.

Even so, some mothers were concerned about the hygiene standards of childcare centres. At 3 years of age, 18% of the mothers who enrolled their child in full day childcare expressed dissatisfaction with the perceived lack of proper hygiene at the childcare centre, and with how their child fell ill often. Falling sick may be an inevitable consequence of childcare, considering that children are in close contact for a large part of the day. Nevertheless, 71% of the mothers, independent of which main caregiver their child had, listed cleanliness as an essential quality they looked for in a care environment. Regular and random inspections are likely the key to ensuring compliance with health and safety regulations at childcare centres. In fact, a stricter law was passed in Singapore, requiring preschools to meet new standards by early 2019. Kindergartens would need to renew their licences regularly rather than have a one-off license, while the authorities would have more investigative powers to ensure adherence to the standards (Goy, 2017).

Compared to cleanliness, safety, and comfort which were cited by most mothers as qualities of an ideal environment, the capacity of the environment to encourage learning was cited by relatively fewer

mothers. Nonetheless, mothers did want their child to receive some form of learning across ages, regardless of whether their child was enrolled in childcare or not. We observed that a number of mothers (e.g., 13% of the sample at 3 years of age) perceived the ability to encourage cognitive learning, to be a desirable quality of the ideal caregiver. Even more mothers (e.g., 24% of the sample when children were 3 years of age) felt that the caregiving environment should ideally encourage cognitive learning. It would thus appear that most mothers did not require the main caregiver to be able to impart cognitive knowledge, but they felt that the environment itself should stimulate learning in children through activities and resources such as books and toys.

Supporting Parents in Their Roles as Caregivers

Mothers in our sample were inclined to return to the workforce after their period of maternity leave, and to outsource their caregiving responsibilities during working hours. Quek (2014) had observed, from her study on parenthood in Singapore, that mothers who scaled back or dropped out from paid work typically did so because they felt they had little choice. When demands of the workplace and the home cannot be satisfactorily met, it is usually mothers rather than fathers who give up their jobs to be their child's caregiver. As such, it is important to frame mothers' caregiving choices in this context as well. A number of mothers in our sample were their child's main caregiver because there was no one else available and/or they had no other commitments at the time, work or otherwise.

Every mother should have the opportunity to decide on the care arrangement that she is most comfortable with, and that which would meet her child's needs, and the family's priorities and financial constraints. It is essential to bear in mind that family support is

inherently selective – not every mother who prefers grandmother care has access to a grandmother who is willing and able to provide care (Sun, 2008). It follows that childcare and other forms of non-parental home-based care can be practical solutions for working mothers. Taken together, the caregiver qualities and care environment characteristics which mothers value are areas for the government and preschool sector to pay attention to when it comes to establishing childcare centres and training child caregivers.

3.5 Conclusion

Choosing a caregiver for one's child is not necessarily an easy decision for families. Our study indicates that while mothers prioritise the safety of their children by appointing trustworthy and experienced caregivers, caregiving arrangements are often made for practical reasons. In our study, mothers were their child's main caregiver up to 4 months of age, but most children of working mothers were in the care of grandparents, childcare centres, domestic helpers, relatives, or nannies from 4 months to 3 years of age. Children in our study experienced a range of changes in their main caregiver with most experiencing up to three changes. Having established that local caregiving arrangements do differ from that reported in the literature, we investigate the impact of these arrangements on children's early development in the following chapters.

CHAPTER 4 – CHILD TEMPERAMENT

4.1 Introduction

This chapter explores the stability of infant temperament across the ages of 4 months, 18 months, and 3 years, and the impact of early caregiving arrangements on infant temperament at 3 years of age.

Stability of Temperament

Extant literature indicates that child temperament has longitudinal stability from infancy to early and middle childhood. Researchers have demonstrated the *structural stability* of temperament characteristics (Casalin, Luyten, Vliegen, & Meurs, 2012; Komsi et al., 2006; Putnam, Rothbart, & Gartstein, 2008). These studies find temperament domains such as activity level (surgency), positive affectivity (e.g., smiling and laughter), negative affectivity (limitations to distress and fear) to be stable from infancy to middle childhood – from as early as 3 to 8 months of age, to 2 or 5 years of age (Casalin et al., 2012; Komsi et al., 2006; Putnam et al., 2008).

In terms of *absolute stability*, previous work has shown some temperament domains to be stable from infancy to toddlerhood. Using the Infant Behaviour Questionnaire at 8 to 13 months and the Early Childhood Behaviour Questionnaire at 20 to 25 months, Casalin et al. (2012) found no differences for negative affectivity and effortful control between the first and second time point, although positive affectivity was reliably lower at the second time point. Other researchers observe temperament to be largely stable over time, though not during infancy, and to become more stable from toddlerhood on (Caspi et al., 2003). For example, Partridge and Lerner (2007) found infants to have

relatively more difficult temperaments at 2 years of age, but easier temperaments thereafter. Their longitudinal study also observed large individual differences, with temperament characteristics remaining stable for some infants, while fluctuating widely for others.

Given that previous studies have shown children to have a more difficult temperament as they reach their second birthday, and to have an easier temperament subsequently (e.g., Partridge & Lerner, 2007), we would expect our sample to show a similar trend, with more children with difficult temperaments at 18 months of age, compared to 4 and 36 months of age.

The Impact of Caregiver Arrangements on Temperament

As discussed in Chapter 1, infant temperament is largely viewed as being innate though modifiable by environmental factors. For example, Bornstein and colleagues (2015) noted that temperamental traits were observable in infants from 2 months onwards. The authors also observed changes in temperament over time. Harsh parenting and responsive parenting are two external factors which have been observed to result in markedly different outcomes in toddlers – greater and less fearfulness respectively (van den Akker et al., 2010).

Researchers have also considered other factors which may influence infant temperament, and of these, caregiving experience is one. Using data from a longitudinal cohort study which followed 5,000 toddlers from birth or their first birthday to their second or third birthday, Yamauchi and Leigh (2011) examined the impact of non-parental care on children's temperament at 3 years. Using the Short Temperament Scales for Infants (Prior et al., 2000), the authors found longer hours in non-parental care (over 20 hours per week) to be associated with difficult rather than easy temperaments. Regardless of care quality and

whether children were in home-based or centre-based non-parental care, those in full-time (as opposed to part-time) care had lower approachability and persistence, and higher reactivity.

Two groups of children in our study, those in home-based care and those in centre-based care, can be considered to be in full-time non-parental care. Like Yamauchi and Leigh (2011), temperament is assessed using the Short Temperament Scales (Prior et al., 2000). Based on the findings of Yamauchi and Leigh (2011), it is possible that children in home-based and centre-based non-parental care in our study may have more difficult temperaments, compared to those in parental care. At the same time, there is also the possibility that it is the duration of non-parental care rather than being in non-parental care per se that leads to children exhibiting behaviours associated with a difficult rather than easy temperament. Following this reasoning, children in home-based non-parental and those in centre-based care may not necessarily be more likely to have a difficult temperament compared to those in parental care.

No study has previously investigated the impact of caregiver stability on temperament. One study which has investigated the impact of caregiver stability on problem and prosocial behaviours, has however found caregiver stability to impact externalising behaviours, but not internalising or prosocial behaviours at 3 years of age (Pilarz & Hill, 2014). Given that temperament dimensions, such as approach and persistence, have been shown to be related to externalising behaviours including anger and aggression (Pekdogan & Kanak, 2016), there is a possibility that caregiver stability which is associated with more externalising behaviours, may also have an effect on children's temperament. Less caregiver stability may be associated with difficult rather than easy temperaments. In the present study, we explore

whether the number of main caregiver changes experienced between birth and 3 years of age affects children's temperament at 3 years of age.

The Impact of Home-based Care on Child Temperament

As mentioned previously, we aim to explore whether specific outcomes are associated with parental care. In this chapter, we thus explore the impact of parental care on child temperament, and include in our analysis four categories of main caregivers, namely parental care, home-based (non-parental) care, centre-based (non-parental) care, and combination care. We also examine the impact of caregiver stability on child temperament.

4.2 Design

To investigate the impact of caregiving arrangements and attachment on child temperament at 3 years of age, we included the following independent variables in our analysis:

- children's main caregiver at 4 months, 18 months, and 3 years of age (we term this *Type of Main Caregiver*; this variable was dummy coded, with parental care as the reference group);
- the number of times children experienced a change in their main caregiver from birth to 3 years of age (we term this *main caregiver changes*);
- mother-child attachment at 18 months and 3 years of age;
- child temperament at 4 and 18 months of age; and
- maternal closeness at 4 months, 18 months, and 3 years of age.

We included the following control variables in our analysis:

- child's gender (dummy coded, with boys as the reference group);

- maternal employment (dummy coded, with full-time employment as the reference group);
- maternal education; and
- housing type.

The dependent variable in this analysis was child temperament at 3 years of age. Design methodology relating to all variables in this chapter were described in detail in Chapter 2.

4.3 Results

Is Temperament Stable over Time?

Mean temperament scores were 2.91 at 4 months of age (*SD* = 0.51; *Md* = 2.94; range = 1.13 to 4.28), 3.42 at 18 months of age, (*SD* = 0.52; *Md* = 3.41; range = 2.22 to 4.99), and 3.23 at 3 years of age (*SD* = 0.50; *Md* = 3.25; range = 1.67 to 5.03). Mothers viewed their child as having a more difficult temperament at 18 months than at 4 months of age. They also viewed their child as having an easier temperament at 3 years than at 18 months of age.

Sphericity was violated when we used a repeated-measures ANOVA to compare temperament scores over time. We therefore analysed our data using the Friedman Test, a non-parametric test. The results revealed statistically significant differences in temperament across the three time points, at 4 months, 18 months, and 3 years of age, χ^2 (2, n = 437) = 203.20, p < .001. The Kendall's coefficient of concordance was .23, indicating a weak effect size (Rovai, Baker, & Ponton, 2013).

Post hoc comparisons using the Wilcoxon signed-rank test showed significant differences between each time point. Temperament scores, where higher scores indicate more difficult temperaments,

increased significantly from 4 to 18 months of age, and decreased significantly from 18 months to 3 years of age. This means that children had a reliably easier temperament at 4 months than at 18 months of age, and a reliably easier temperament at 3 years than at 18 months of age.

The Impact of Caregiver Arrangements on Temperament

To investigate the impact of caregiving arrangements and attachment on temperament at 3 years of age, we conducted a two-step hierarchical multiple regression. The descriptive statistics for all the variables in this regression analysis are summarised in Table 20.

Although 439 mother-child dyads completed our study, there were missing data for 13 children due to some mothers not providing information regarding maternal employment (n = 2), housing type (n = 1), type of main caregiver (n = 5), maternal closeness (n = 3), child temperament (n = 1), and mother-child attachment (n = 1). As mentioned in Section 3.2, we also excluded children in centre-based care at 4 months and those in combination care at 3 years due to the small numbers in each cell, and the child with 11 caregiver changes. All analyses involving temperament and attachment variables were therefore limited to 417 dyads.

Table 20

Descriptive Statistics: Predicting Temperament

Control variables	*N*	*M*	*SD*	%	Range
Child's Gender	417				
Boys	202			48.4	
Girls	215			51.6	
Maternal Employment	417				
Working Full-time	322			77.2	
Working Part-time	32			7.7	
Not Working	63			15.1	
Maternal Education	417	4.01	1.20		1 to 5
Housing Type	417	2.36	0.78		1 to 4
Independent variables					
Type of Main Caregiver					
At 4 months	417				
Parental Care	239			57.3	
Home-based Care	123			29.5	
Combination Care	55			13.2	
At 18 months	417				
Parental Care	88			21.1	
Centre-based Care	31			7.4	
Home-based Care	287			68.8	
Combination Care	11			2.6	
At 3 years	417				
Parental Care	75			18.0	
Centre-based Care	154			36.9	
Home-based Care	188			45.1	
Main Caregiver Changes	417	1.96	1.24		0 to 6
Maternal Closeness					
At 4 months	417	4.62	0.58		3 to 5
At 18 months	417	4.65	0.57		3 to 5
At 3 years	417	4.74	0.48		3 to 5
Attachment					
At 18 months	417	.23	.16		-.29 to .63
At 3 years	417	.28	.16		-.22 to .71
Temperament					
At 4 months	417	2.91	0.51		1.13 to 4.28
At 18 months	417	3.42	0.52		2.22 to 4.99
Dependent variable					
Temperament at 3 years	417	3.23	0.50		1.67 to 5.03

Note. Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because there were relatively few children with these caregivers at those ages.

Table 21

Correlation Matrix: Predicting Temperament

		1.	2.	3.	4.	5.	6.	7.	8.
Independent Variables									
1.	Home-based Care at 4 months	-							
2.	Combination Care at 4 months	-.25***	-						
3.	Centre-based Care at 18 months	-.14**	.02	-					
4.	Home-based Care at 18 months	.37***	.01	-.43***	-				
5.	Combination Care at 18 months	-.12**	.20***	-.05	-.26***	-			
6.	Centre-based Care at 3 years	.04	-.02	.33***	-.03	-.04	-		
7.	Home-based Care at 3 years	.13**	.06	-.23***	.44***	-.03	-.70***	-	
8.	Main Caregiver Changes	-.01	.02	.16***	.18***	.04	.34***	-.14**	-
9.	Attachment at 18 months	-.12**	.05	.04	-.08	.03	-.04	.01	-.01
10.	Attachment at 3 years	-.03	.02	.08	-.07	.04	-.01	-.02	.04
11.	Temperament at 4 months	.04	.05	-.01	.05	.04	.00	.06	.03
12.	Temperament at 18 months	.02	.06	.05	.07	-.01	.07	.04	.09*
13.	Maternal Closeness at 4 months	-.22***	-.07	.08*	-.24***	.03	-.04	-.09*	-.12**
14.	Maternal Closeness at 18 months	-.16**	.06	.11*	-.25***	.07	.01	-.14**	-.11*
15.	Maternal Closeness at 3 years	-.16***	-.04	.14**	-.23***	.00	.07	-.19***	-.02
Dependent Variable									
16.	Temperament at 3 years	-.02	-.02	.02	.05	-.02	.06	.00	-.01

Table 21

Correlation Matrix: Predicting Temperament (continued)

	9.	10.	11.	12.	13.	14.	15.
Independent variables							
9. Attachment at 18 months	-						
10. Attachment at 3 years	.52***	-					
11. Temperament at 4 months	-.31***	-.47***	-				
12. Temperament at 18 months	-.47***	-.38***	.40***	-			
13. Maternal closeness at 4 months	.18***	.15**	-.12**	-.08	-		
14. Maternal closeness at 18 months	.17***	.18***	-.10*	-.09*	.42***	-	
15. Maternal closeness at 3 years	.15**	.19*	-.10*	-.10*	.39***	.47***	-
Dependent variable							
16. Temperament at 3 years	-.36***	-.47***	.31***	.49***	-.15**	-.10*	.12**

Note. Parental care was the reference group (dummy coded as 0). Lower scores indicate easier temperament. Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because too few children had these caregivers at those ages.

*$p < .05$ **$p < .01$. ***$p < .001$.

Table 21 presents the correlations among the independent variables and dependent variable. Compared to parental care, home-based care at 4 months, but not at 18 months or 3 years, was weakly correlated to attachment security at 18 months, but not 3 years of age. Compared to parental care, centre-based and combination care were not reliably correlated to attachment at any age. In other words, children in home-based care were more securely attached than those in parental care.

Compared to parental care, home-based care at 4, 18, and 36 months of age was weakly correlated to maternal closeness at all three time points. Compared to parental care, centre-based care at 18 months, but not at later ages, was related to maternal closeness at all three time points. Compared to parental care, combination care was however not related to maternal closeness at any time point. The results indicate that mothers of children in home-based (non-parental) care, and to an extent those in centre-based care, were more likely to perceive themselves close to their child, compared to mothers who were their child's main caregiver.

Relative to parental care, home-based and centre-based care at 18 months, and centre-based care at 36 months were positively correlated with main caregiver changes. In contrast, home-based care at 3 years was negatively correlated with main caregiver changes. In other words, children in home-based and centre-based care at 18 months, and those in centre-based care at 3 years, were more likely to have experienced changes to their main caregiver between birth to 3 years of age, compared to peers in parental care. Children in home-based care at 3 years of age on the other hand were less likely to have experienced main caregiver changes from birth to 3 years of age. On the whole, associations between the number of times the main

caregiver changed between birth and 3 years of age and the child's main caregiver at the three time points were weak; only main caregiver changes and centre-based care at 3 years were moderately correlated.

Attachment security and temperament at 4 months, 18 months, and 3 years of age were reliably correlated with one another. Children who were securely attached at 18 months were also likely to be securely attached at 3 years of age; those with easy temperaments at 4 and 18 months also had easy temperaments at 3 years of age. Moreover, those who were securely attached at both ages were likely to have easy temperaments at all three time points. Conversely, those who were insecurely attached at both ages were likely to have difficult temperaments at all three time points.

Of interest to this chapter is the observation that maternal closeness was also correlated, albeit weakly, to temperament at 3 years of age. Mothers felt close to their child at 4 and 18 months for children with an easy rather than difficult temperament at 3 years of age. However, they felt less close to their child at 3 years, for children with an easy rather than difficult temperament at 3 years of age.

Our data met the assumptions of normality, multicollinearity, linearity, and homoscedasticity. Table 22 presents the regression model with the 4-month temperament data (Model 1); Table 23 presents the regression model without the 4-month temperament data (Model 2). In both models, the control variables – child's gender, maternal employment, maternal education, and housing type – were entered at Step 1. All independent variables and control variables were entered together at Step 2.

Table 22

Regression: Predicting Temperament (Model 1)

Predictor	*R*	R^2	Δ R^2	*B*	*SE*	*β*	*t*
Step 1	.09	.01	.01				
Child's Gender				0.02	0.05	.02	0.37
Working Part-time				-0.01	0.09	-.01	-0.11
Not Working				-0.10	0.07	-.07	-1.42
Maternal Education				0.01	0.02	.03	0.50
Housing Type				0.02	0.03	.03	0.60
Step 2	.60	.37***	.36***				
Child's Gender				0.04	0.04	.04	1.00
Working Part-time				-0.05	0.09	-.03	-0.56
Not Working				-0.05	0.09	-.04	-0.57
Maternal Education				0.02	0.02	.05	1.24
Housing Type				0.03	0.03	.05	1.08
Home-based Care							
At 4 months				-0.10	0.05	-.09	-1.90
At 18 months				0.06	0.08	.05	0.73
At 3 years				-0.05	0.10	-.05	-0.53
Centre-based Care							
At 18 months				0.08	0.10	.04	0.79
At 3 years				-0.04	0.09	-.04	-0.05
Combination Care							
At 4 months				-0.10	0.06	-.06	-1.51
At 18 months				0.05	0.12	.02	0.43
Main Caregiver Changes				-0.03	0.18	-.84	-1.90
Attachment							
At 18 months				-0.10	0.16	-.03	-0.65
At 3 years				-0.96	0.15	-.31***	-6.46
Temperament							
At 4 months				0.07	0.04	.07	1.53
At 18 months				0.31	0.05	.33***	6.69
Maternal Closeness							
At 4 months				-0.08	0.04	-.09	-1.94
At 18 months				0.02	0.04	.02	0.41
At 3 years				0.00	0.05	.00	0.08

Note. Parental care, boys, and full-time work were the reference group (dummy coded as 0). Centre-based care at 4 months of age and combination care at 3 years of age were excluded because too few children had these caregivers at those ages.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 23

Regression: Predicting Temperament (Model 2)

Predictor	*R*	R^2	Δ R^2	*B*	*SE*	*β*	*t*
Step 1	.09	.01	.01				
Child's Gender				0.02	0.05	.02	0.36
Working Part-time				-0.01	0.09	-.01	-0.11
Not Working				-0.10	0.07	-.07	-1.41
Maternal Education				0.01	0.02	.03	0.48
Housing Type				0.02	0.03	.03	0.65
Step 2	.60	.36***	.36***				
Child's Gender				0.04	0.04	.04	1.00
Working Part-time				-0.07	0.09	-.04	-0.72
Not Working				-0.08	0.09	-.06	-0.85
Maternal Education				0.02	0.02	.06	1.29
Housing Type				0.03	0.03	.05	1.19
Home-based Care							
At 4 months				-0.10	0.05	-.09*	-1.97
At 18 months				0.06	0.08	.06	0.83
At 3 years				-0.09	0.10	-.09	-0.91
Centre-based Care							
At 18 months				0.08	0.10	.04	0.78
At 3 years				-0.04	0.09	-.04	-0.39
Combination Care							
At 4 months				-0.10	0.06	-.07	-1.50
At 18 months				0.07	0.13	.03	0.56
Main Caregiver Changes				-0.03	0.02	-.09	-1.90
Attachment							
At 18 months				-0.12	0.16	-.04	-0.77
At 3 years				-0.99	0.15	-.32***	-6.60
Temperament							
At 18 months				0.33	0.05	.35***	7.37
Maternal Closeness							
At 4 months				-0.08	0.04	-.09*	-1.99
At 18 months				0.02	0.04	.02	0.43
At 3 years				0.00	0.05	.00	0.03

Note. Parental care, boys, and full-time work were the reference group (dummy coded as 0). Centre-based care at 4 months of age and combination care at 3 years of age were excluded because too few children had these caregivers at those ages.

*p < .05. **p < .01. ***p < .001.

For the model where 4-month temperament data were included as an independent variable, when control variables were entered at Step 1, the model was not significant, 0.8%, $F(5, 425) = .64$, $p = .64$. After entering all the independent variables including the 4-month temperament data at Step 2, the total variance explained by the final model was 36.5%, $F(20, 410) = 11.78$, $p < .001$. The independent variables explained an additional 35.7% of the variance in temperament at 3 years of age, after controlling for child gender, maternal employment, maternal education, and housing type. *R* squared change was .357, *F* change (15, 410) = 15.37, $p < .001$.

For the model where 4-month temperament data were excluded, the model at Step 1 was not significant, 0.8%, $F(5, 417) = .68$, $p = .64$. At Step 2, the total variance explained by the final model was 36.3%, $F(19, 403) = 12.08$, $p < .001$. The independent variables explained an additional 35.5% of the variance in temperament at 3 years of age, after controlling for child gender, maternal employment, maternal education, and housing type. *R* squared change was .355, *F* change (14, 403) = 16.03, $p < .001$.

With the inclusion of the 4-month temperament data, temperament at 18 months and attachment at 3 years were significant predictors of temperament at 3 years of age, with temperament at 18 months recording the higher beta value, $\beta = .33$, $p < .001$, and attachment at 3 years of age recording a beta value of -.31, $p < .001$.

When 4-month temperament data were excluded, four variables – temperament at 18 months, attachment at 3 years, maternal closeness at 4 months, and having home-based care rather than parental care at 4 months of age – significantly predicted temperament at 3 years of age. Temperament at 18 months of age recorded the highest beta value, $\beta = .35$, $p < .001$, followed by attachment at 3 years

of age, β = -.32, p < .001, then maternal closeness at 4 months of age, β = -.093, p = .047, and finally home-based care at 4 months of age, β = -.091, p = .049.

The regression models with and without 4-month temperament data account for a similar amount of variance, but yield different results. With the 4-month temperament data included as an independent variable, the model indicates that only temperament at 18 months and attachment at 3 years predict temperament at 3 years of age. Without the 4-month temperament data, these two variables, in addition to maternal closeness and home-based care at 4 months of age, predict temperament at 3 years of age. Results from the second model indicate that children had an easier temperament at 3 years of age if they had an easier temperament at 18 months, and were more securely attached at 3 years, closer to their mother at 4 months, and in home-based rather than parental care at 4 months of age.

In both models, the number of times the main caregiver changed did not reliably predict temperament at 3 years of age. Given that temperament at 18 months and attachment at 3 years predicted temperament at 3 years in both models, but home-based care (rather than parental care) at 4 months and maternal closeness at 4 months also predicted temperament at 3 years in the second model, we discuss our findings in relation to the second model.

4.4 Discussion

Our aim in this chapter was to i) investigate the stability of infant temperament from birth to 3 years of age, and ii) explore whether caregiving arrangements would affect temperament at 3 years of age.

Is Temperament Stable over Time?

We found that mothers perceived their child to have an easier temperament at 4 months than at 18 months, and to have an easier temperament at 3 years of age than at 18 months of age. Our findings are in line with previous findings, where children had a more difficult temperament at 2 years, but a less difficult temperament at 5 years (Partridge & Lerner, 2007). Temperament experts recognise early toddlerhood to be a period of great change (Goldsmith et al., 1987), where more developmental changes may be reflected in the fluctuations of easy-difficult temperament, such as those observed in our study.

While research has established that temperament is stable across early childhood, studies have also observed temperament to be more stable over shorter rather than longer assessment periods. Positive affect (surgency) and negative affect have both shown to be stable from 6 months to 5.5 years of age (Komsi et al., 2006) and from 3 to 50 months of age (Putnam et al., 2008). At the same time, studies demonstrate larger correlations for temperament measured across shorter intervals, such as between 2 and 5 months or 5 and 13 months of age, than over the longer interval, between 2 and 13 months of age (Bornstein et al., 2015). Finding a similar trend in a Korean sample, Gartstein and colleagues (2015) have observed surgency and negative affect to correlate strongly at the shorter intervals of 6 to 12 months of age, and 12 and 18 months of age, but only moderately at the longer interval of 6 and 18 months of age. Rapid changes in the first years of life, such as the development of infant attention (Rueda, 2012), are a likely explanation for these observations of fluctuating stability in temperament.

The Impact of Caregiver Arrangements on Temperament

When we included the 4-month temperament data, temperament at 18 months and attachment at 3 years both predicted temperament at 3 years of age. When we excluded the 4-month data, we found four variables to predict temperament at 3 years of age. In addition to temperament at 18 months and attachment at 3 years, maternal closeness at 4 months and home-based care (relative to parental care) at 4 months also predicted temperament at 3 years of age. Since the variables in the first model are also those in the second model, we discuss the results from the second model (i.e., without 4-month temperament data as a predictor) in the following section.

Type of Main Caregiver

Compared to parental care at 4 months of age, non-parental home-based care at 4 months reliably predicted child temperament at 3 years of age. Children who were cared for by their grandmother, domestic helper, nanny, or relative at 4 months were more likely to have an easy temperament at 3 years of age, compared to peers in parental care. Our results are in contrast to earlier findings. Couched in the language of our study, Yamauchi and Leigh (2011) found children in parental care more likely to have an easy temperament than those in non-parental care, be it home-based or centre-based care. We found the opposite. In our study, children in home-based care were more likely to have an easy temperament, while those in parental care were more likely to have a difficult temperament.

One explanation for our findings is that children in home-based care in our sample were in reality cared for by multiple caregivers. Having more interaction partners supports children's behaviours in a social setting, in turn influencing their temperament scores (e.g.,

Thompson, 2007). The home-based main caregiver may have been the child's grandmother, but the child may also have interacted with his grandfather, even his other grandparents. Mothers' interview responses support this explanation. We observed more caregivers present at home for children in home-based than parental care. However, the same advantage was not observed for children in combination care, who according to maternal report, would have had at least two if not more adults at home to interact with, making this account a less credible explanation.

A more likely explanation for our findings is that infants in home-based care were being looked after by an experienced caregiver. We observed 67% and 11% of children in home-based care at 4 months to be in the primary care of their grandmother and a nanny respectively. Grandfathers, domestic helpers, and other relatives were the main caregivers for the remaining 22%. Grandmothers and professional nannies, being potentially more experienced at caregiving than first-time parents, can be expected to respond appropriately to infant cues, creating an environment with less negativity for infants. Research based on a sample of 68 infants in Melbourne found maternal responsiveness to predict temperament at 6 months of age (Newnham, Milgrom, & Skouteris, 2009). In this study, infants, whose mothers who participated in a parenting programme for 2 weeks when infants were 3 months old, were more likely to have an easy temperament at 6 months of age, than controls whose mothers did not receive parenting training.

We suggest that the temperament advantage due to caregiver sensitivity may not have been similarly bestowed upon infants in combination care at 4 months. Most in this group (83%) were cared by their grandmother and another caregiver (e.g., mother, father, grandfather, domestic helper, nanny, childcare centre). As seen in Table

9 in Chapter 3, most children in combination care at 4 months were not in the care of two experienced caregivers, such as their grandmother and a nanny. We note that all parents in our sample were first-time parents, and may be relatively less experienced in caregiving. Children in combination care at 4 months may have therefore been looked after by an experienced caregiver for only half the week. It is possible that spending only part of the week with the child makes it relatively challenging for even experienced caregivers to respond as sensitively to infants at 4 months of age as if they were to have spent the entire week with the child.

This account is also consistent with our observations that home-based care at 4 months was weakly but reliably correlated to attachment at 18 months of age and to maternal closeness at 4, 18, and 36 months of age, relative to parental care. In other words, children in home-based care at 4 months were more securely attached at 18 months than those in parental care. Moreover, mothers perceived themselves closer to their child at all three time points if children were in home-based rather than parental care at 4 months. Given that attachment and temperament were moderately correlated, we posit that having a full-time experienced caregiver at 4 months likely contributed to children being more securely attached at 18 months, and to more of them having an easy temperament at 3 years of age.

Main Caregiver Changes

Whether 4-month temperament data were included in the analyses or not, the number of times the main caregiver was changed (e.g., from mother to grandmother, or grandmother to childcare centre) was not found to significantly predict temperament at 3 years of age.

Temperament, Attachment, and Maternal Closeness

Apart from home-based care at 4 months, the reliable predictors of child temperament at 3 years were temperament at 18 months, a concurrent measure of attachment, and how close mothers perceived their child to be to them at 4 months of age.

That temperament at 18 months is a significant predictor of temperament at 3 years speaks to the stability of temperament (Bornstein et al., 2015). Children with an easy temperament at 18 months of age continue to have an easy temperament 18 months later. Conversely, those with a difficult temperament at 18 months are likely to have this trait later on.

Our finding that securely attached children at 3 years of age are more likely to have an easier temperament at the same age supports the view that the contribution that temperament and attachment make to each other is not solely in one direction. While most studies frame temperament as a reliable predictor of attachment security, others have provided evidence that secure attachment supports children's social behaviours, with secure children displaying behaviours consistent with easy temperaments, particularly in the context of stressful situations (Roque, Verissimo, Fernandes, & Rebelo, 2013). Rispoli, McGoey, Koziol, and Schreiber (2013) found children who were insecurely attached at 2 years of age to display more negative emotions in social situations at the same age, while Kochanska (2001) found attachment security to be reliably associated with subsequent displays of negative emotions associated with difficult temperament. In the latter study, children showed less fearfulness and anger, and more joy at 22 and 33 months of age if they had been securely rather than insecurely attached at 14 months of age. In the context of stressful situations, secure

children were more likely to display positive emotions, and insecure children negative ones.

As mentioned earlier, children whose mothers felt close to them at 4 months of age, were more likely to have an easy temperament at 3 years of age, than peers whose mothers did not feel as close to them. This is in line with our observations that maternal closeness at 4 and 18 months correlated, though weakly, with temperament at 3 years. It also seems intuitive that mothers would feel close to children with an easy temperament. Given that mothers with positive feelings towards their child are likely to display corresponding emotions to their child (Taylor et al., 2005), one might posit that infant behaviours associated with easy temperaments are modelled from mothers who smile and laugh in face-to-face interactions with their child. Children who engage in positive affect with their mother are likely perceived to have an easy rather than difficult temperament (Chess & Thomas, 1999).

4.5 Conclusion

Children are more likely to have an easy temperament at 3 years of age if they were more securely attached and had an easy temperament at an earlier age. Having a caregiving arrangement where infants are primarily looked after by an experienced caregiver appears to lead to children having an easy temperament at 3 years of age. Having a mother who feels close to their infant also appears to benefit children later in terms of an easy temperament at 3 years of age. Finally, toddlers are relatively more difficult at 18 months of age, but the good news is that their temperament returns to a level more similar to an earlier age, once past the period also known as the “terrible twos”.

CHAPTER 5 – MOTHER-CHILD ATTACHMENT

5.1 Introduction

The main aim of this chapter is to examine the impact of caregiving arrangements on mother-child attachment at 3 years of age.

The Impact of Type of Main Caregiver on Attachment

As discussed at the beginning of the monograph, secure attachment is associated with positive developmental outcomes, and insecure attachment with negative outcomes. Given the importance of mother-child attachment, the practice of mothers returning to work and entrusting their infants to other caregivers has raised concerns about the emotional bond between working mothers and their infants (e.g., Belsky, 1988). Most studies have not found maternal employment to be reliably associated with attachment security (e.g., Brooks-Gunn, Han, & Waldfogel, 2010; NICHD ECCRN, 1997, 2001). Only one study has found maternal employment to be associated with attachment security, with the relationship in the unexpected direction. A study of 145 Australian mother-infant dyads by Harrison and Ungerer (2002) found mothers who had returned to work earlier more likely to have securely attached infants.

Research which has assessed the impact of time spent at childcare, rather than maternal employment, on attachment security has yielded limited results. Two studies found longer hours in childcare associated with insecure attachment (Belsky & Rovine, 1988; Hazen, Allen, Christopher, Umemura, & Jacobvitz, 2015), but the threshold for childcare quantity was markedly different in the two studies.

With a sample of 149 infants, Belsky and Rovine (1988) found infants with more than 20 hours of childcare, more likely to be insecurely attached at 12 to 13 months of age. In the same study, infants with mothers working over 35 hours a week were more insecurely attached than those with mothers working fewer hours. It is unclear however whether these findings can be explained in terms of mothers in Belsky and Rovine's sample having lower maternal sensitivity, since other studies (NICHD ECCRN, 1997, 2001) showed that childcare hours were associated with attachment only when maternal sensitivity was low, and Belsky and Rovine assessed neither childcare quality nor parenting style.

Hazen et al. (2015) examined the effects of non-maternal care on attachment in two separate analyses, first with 145 parent-infant dyads, and then with 1,364 dyads from the NICHD ECCRN sample. In their study, non-maternal caregivers included fathers, other relatives, nannies, and childcare centres. In both analyses, infants in non-maternal care were more likely to be insecurely attached (disorganised classification) at 12 to 15 months, but this was only true when infants received extensive non-maternal care (over 60 hours a week). In comparison, infants were not more likely to be classified as insecure-disorganised when infants receiving more than 40 or 50 hours of non-maternal care were compared to infants receiving fewer hours of non-maternal care. It is worth noting however that the authors did not find quantity of childcare to predict attachment security when childcare quantity was treated as a continuous variable (i.e., number of hours in childcare), in keeping with NICHD ECCRN (1997, 2001) findings. Given that over 60 hours of non-maternal care is extensive, there is the possibility that the disorganised insecure attachment style observed

may relate to other factors associated with families who leave their children in childcare for such extended hours.

A third and extensive study involving 1,153 infants by the US NICHD ECCRN (1997, 2001) demonstrated no reliable association between childcare and attachment security. In their study, childcare per se as measured by type, quality, and quantity of care at 7 to 8 months did not significantly predict attachment security at 15 months of age. Instead, poorer childcare quality, more hours in childcare, and multiple changes in the caregiving arrangement (e.g., changing the main caregiver) led to insecure attachment, *only* if maternal sensitivity was low.

Earlier research together indicates that only extensive hours in centre-based care adversely impact mother-child attachment. No earlier study however has examined whether other types of non-parental care adversely impact mother-child attachment. In this chapter, we address this issue by investigating whether non-parental care affects mother-child attachment, compared to parental care, where non-parental care in our study includes home-based (e.g., grandparents, domestic helpers, relatives, and nannies), centre-based, and combination care.

The Impact of Caregiver Changes on Attachment

Apart from extensive childcare hours, researchers recognise that having different main caregivers over time can potentially have an adverse effect on attachment security. However, only one study has found changes to childcare arrangements to impact attachment security. In a meta-analysis of 40 studies involving a total of 2,867 infants, Ahnert, Pinquart, and Lamb (2006) found infants in a continuous caregiving arrangement to be more securely attached at 11 to 13 months of age than those in a discontinuous arrangement. In other words, infants with

the same main caregiver were more likely to be securely attached than those who experienced different caregivers over time.

In contrast, other studies have not found caregiver stability to be associated with attachment security. As mentioned earlier, changes to caregiving arrangements, as well as childcare hours and quality, were only associated with insecure attachment in context of low maternal sensitivity (NICHD ECCRN, 1997, 2001). Using NICHD ECCRN protocols, McKim et al. (1999) also did not observe any association between multiple changes in caregiving arrangements and attachment security at 15 months of age, in their analysis involving 120 infants. Changes to caregiving arrangements from 6 to 15 months of age also did not predict attachment security at 15 months in another study of 419 infants (Tran & Weinraub, 2006).

Differences in results may be attributed to sample size differences. Only 26 of the 40 studies included in Ahnert et al.'s (2006) meta-analysis were relevant to their investigation of caregiver stability and attachment, but a small effect of caregiver stability on attachment security may still be more easily observed in a sample of 2,491 infants than in individual studies (e.g., McKim et al., 1999; NICHD ECCRN, 1997, 2001; Tran & Weinraub, 2006). Families sampled in Ahnert et al.'s (2006) meta-analysis did not include children from Asian cultures. In spite of the small effect size of caregiver instability on attachment, it is possible that changes in the caregiving arrangement in the local context, due to cultural factors, may still impact attachment in local children.

It is worth noting that the individual studies measured the number of times the main caregiver was changed (e.g., from mother to childcare teacher or childcare centre) in a designated time frame. In contrast, Ahnert et al. (2006) used a binary variable where children either had a discontinuous arrangement (at least one change in

caregiver) or a continuous one (no change in caregiver). Such a categorical measure of caregiver stability may have adequately captured the range of changes to caregiving arrangements. This is because children in previous research generally have appeared to experience relatively few changes in their caregiving arrangements.

In McKim et al.'s (1999) study involving a total of 189 infants, only 47 (25%) experienced one change in caregiving arrangements, and of those 47, only 36 (19%) experienced a change not due to having a new childcare teacher. In particular, only three children experienced two changes (the maximum number of changes) in their childcare arrangement. Most children also experienced a stable childcare arrangement in the NICHD ECCRN (1997, 2001) study. As many as 61% had the same main caregiver from birth to 15 months of age; the rest experienced one change across two consecutive time points (e.g., from 0 to 6 months, 6 to 9 months, 9 to 15 months). Given that not all infants in Singapore appear to experience such stable caregiver arrangements, we investigate the impact of main caregiver changes on mother-child attachment. In our study, we operationalise main caregiver changes as the number of times a child's main caregiver is changed between birth and 3 years of age.

No study has yet to examine the impact of local caregiving arrangements on mother-child attachment. As discussed in Chapter 3, we observed that children in our sample experienced on average two changes in their main caregiver between birth and 3 years of age. Moreover, 32% of our sample experienced at least three changes in their main caregiver. It is conceivable that infants are less securely attached to their mothers when they experience multiple changes to their main caregiver, such as from their mother, to their grandmother, and then to a childcare teacher. At least one other study has found this

association to be reliable (Ahnert et al., 2006). In the present study, we thus examine whether experiencing a change of main caregiver over time affects mother-child attachment in the local context.

Taken together, extant literature indicates some evidence that extensive centre-based care and multiple changes to the main caregiver may have an adverse effect on mother-child attachment. We thus include in our analysis the same four categories of main caregivers, namely parental, home-based, centre-based, and combination care, and explore the relationship of parental care and mother-child attachment. At the same time, we examine the impact of main caregiver changes on mother-child attachment.

The Impact of Type of Main Caregiver and Caregiver Changes on Maternal Closeness

As mentioned previously in Chapter 1, we wanted to explore the relationship between caregiving arrangements, attachment, and maternal closeness. We posited that mothers with more securely attached infants might feel closer to their infants. In view of this, we investigated the impact of type of main caregiver and main caregiver changes, as well as the other independent variables including child temperament and mother-child attachment, on maternal closeness at 3 years of age.

5.2 Design

To investigate the impact of caregiving arrangements and temperament on attachment at 3 years of age, we included the following independent variables in our analysis:

- children's main caregiver at 4 months, 18 months, and 3 years of age (we term this *type of main caregiver*; this variable was dummy coded, with parental care as the reference group);
- the number of times children experienced a change in their main caregiver from birth up to 3 years of age (we term this *main caregiver changes*);
- temperament at 18 month and 3 years of age;
- mother-child attachment at 18 months of age; and
- maternal closeness at 4 months, 18 months, and 3 years of age.

We included the following control variables in our analysis:

- child's gender (dummy coded, with boys as the reference group);
- maternal employment (dummy coded, with full-time employment as the reference group);
- maternal education; and
- housing type.

The dependent variable in this analysis was mother-child attachment and maternal closeness at 3 years of age. All variables relevant to this chapter were described in detail in Chapter 2.

To investigate the impact of caregiving arrangements and attachment on maternal closeness at 3 years of age, we included the same independent variables as those used to predict attachment at 3 years of age, with the exception of maternal closeness at 3 years of age, which was the dependent variable. In addition, attachment at 3 years was included as an independent variable.

5.3 Results

The Impact of Caregiving Arrangements on Attachment

To investigate the impact of caregiving arrangements and temperament on attachment at 3 years of age, we conducted a two-step hierarchical multiple regression.

Apart from *child temperament at 3 years* being an independent variable, and *mother-child attachment at 3 years* being the dependent variable in this regression analysis, all other variables in this analysis were the same as those in the previous regression analysis in Chapter 4.

As described in Section 4.3, participants with missing data were excluded from the regression analysis. We used the same data set (*N* = 417) as that from Chapter 4 to predict attachment at 3 years of age in this chapter. The descriptive statistics for the control and independent variables can be found in Table 20 in Chapter 4. For clarity, we restate the descriptive statistics for a subset of the independent variables, and the dependent variable, for this regression analysis. Table 24 summarises the descriptive statistics for attachment and temperament at 18 months and 3 years of age, with attachment at 3 years as the dependent variable.

Table 24

Descriptive Statistics: Predicting Attachment

Independent variables	*N*	*M*	*SD*	%	Range
Attachment					
At 18 months	417	.23	.16		-.29 to .63
Temperament					
At 18 months	417	3.42	0.52		2.22 to 4.99
At 3 years	417	3.23	0.50		1.67 to 5.03
Dependent variable					
Attachment at 3 years	417	.28	.16		-.22 to .71

Table 25 presents the correlations among the variables. As observed previously in Chapter 4, children in home-based care at 4 months were more securely attached at 18 months than those in parental care; children with an easy temperament at 4, 18 and 36 months of age, and those with a secure attachment at 18 months, were more likely to be securely attached at 36 months, than peers with a difficult temperament or less secure attachment at those ages.

As mentioned previously, the results for attachment at 3 years as the dependent variable, were similar whether the 4-month temperament data were included or excluded. For reasons already mentioned in Section 2.5 of Chapter 2, we thus report here the results *without* child temperament at 4 months as an independent variable.

Our data met the assumptions of normality, linearity, multicollinearity, and homoscedasticity. Table 26 presents the results of the regression model. In our model, the control variables (child's gender, maternal employment status, maternal education level, and housing type) were entered at Step 1. All independent variables and control variables were entered together at Step 2.

Table 25

Correlation Matrix: Predicting Attachment

		1.	2.	3.	4.	5.	6.	7.	8.
Independent Variables									
1.	Home-based Care at 4 months	-							
2.	Combination Care at 4 months	-.25***	-						
3.	Centre-based Care at 18 months	-.14**	.02	-					
4.	Home-based Care at 18 months	.37***	.01	-.43***	-				
5.	Combination Care at 18 months	-.12**	.20***	-.05	-.26***	-			
6.	Centre-based Care at 3 years	.04	-.02	.33***	-.03	-.04	-		
7.	Home-based Care at 3 years	.13**	.06	-.23***	.44***	-.03	-.70***	-	
8.	Main Caregiver Changes	-.01	.02	.16***	.18***	.04	.34***	-.14**	-
9.	Attachment at 18 months	-.12**	.05	.04	-.08	.03	-.04	.01	-.01
10.	Temperament at 18 months	.02	.06	.05	.07	-.01	.07	.04	.09*
11.	Temperament at 3 years	-.02	-.02	.02	.05	-.02	.06	.00	-.01
12.	Maternal Closeness at 4 months	-.22***	-.07	.08*	-.24***	.03	-.04	-.09*	-.12**
13.	Maternal Closeness at 18 months	-.16**	.06	.11*	-.25***	.07	.01	-.14**	-.11*
14.	Maternal Closeness at 3 years	-.16***	-.04	.14**	-.23***	.00	.07	-.19***	-.02
Dependent Variable									
15.	Attachment at 3 years	-.03	.02	.08	-.07	.04	-.01	-.02	.04

Table 25

Correlation Matrix: Predicting Attachment (continued)

	9.	10.	11.	12.	13.	14.
Independent Variables						
9. Attachment at 18 months	-					
10. Temperament at 18 months	.52***	-				
11. Temperament at 3 years	-.47***	-.38***	-			
12. Maternal Closeness at 4 months	.18***	.15**	-.08	-		
13. Maternal Closeness at 18 months	.17***	.18***	-.09*	.42***	-	
14. Maternal Closeness at 3 years	.15**	.19*	-.10*	.39***	.47***	-
Dependent Variable						
15. Attachment at 3 years	.52***	-.38***	-.47***	.15**	.18***	.19***

Note. Parental care was the reference group (dummy coded as 0); all other types of main caregivers were comparison groups (dummy coded as 0). Lower scores indicate easier temperament. Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because too few children had these caregivers at those ages.

*$p < .05$. **$p < .01$. ***p < .001.

Table 26

Hierarchical Multiple Regression: Predicting Attachment

Predictor	*R*	R^2	ΔR^2	*B*	*SE*	*β*	*t*
Step 1	.15	.02	.02				
Child's Gender				0.00	0.02	.00	-0.03
Working Part-time				-0.04	0.03	-.07	-1.34
Not Working				-0.01	0.02	.03	0.57
Maternal Education				0.02	0.01	.11*	2.13
Housing Type				0.01	0.01	.05	0.91
Step 2	.63	.39***	.37***				
Child's Gender				-0.07	0.01	-.02	-0.55
Working Part-time				-0.05	0.03	-.08	-1.76
Not Working				-0.04	0.03	-.09	-1.33
Maternal Education				0.01	0.01	.05	1.28
Housing Type				0.01	0.01	.05	1.18
Home-based Care							
At 4 months				0.01	0.01	.03	0.71
At 18 months				-0.01	-0.02	-.02	-0.23
At 3 years				-0.03	0.03	-.08	-0.89
Centre-based Care							
At 18 months				0.03	0.03	.04	0.81
At 3 years				-0.03	0.03	-.09	-1.00
Combination Care							
At 4 months				-0.00	0.02	-.01	-0.18
At 18 months				0.03	0.04	.03	0.63
Main Caregiver Changes				0.00	0.01	.02	0.48
Attachment							
At 18 months				0.34	0.05	.34***	7.27
Temperament							
At 18 months				-0.02	0.02	-.07	-1.33
At 3 years				-0.10	0.02	-.31***	-6.60
Maternal closeness							
At 4 months				0.00	0.01	.00	0.00
At 18 months				0.01	0.01	.05	0.98
At 3 years				0.03	0.02	.08	1.73

Note. Parental care, boys, and full-time work were the reference group (dummy coded as 0). Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because too few children had these caregivers at those ages.

*$p < .05$. **$p < .01$. ***$p < .001$.

When control variables (child's gender, maternal employment status, maternal education level, and housing type) were entered at Step 1, the model was not significant, 2.4%, $F(5, 417) = 2.01$, $p = .076$. When all variables were entered in Step 2, the total variance explained by the final model was 39.4%, $F(19, 403) = 13.77$, $p < .001$. The independent variables explained an additional 37.0% of the variance in attachment at 3 years of age, R^2 change = .37, F change (14, 403) = 17.57, $p < .001$.

In the final model, two variables predicted attachment security at 3 years of age — attachment at 18 months and temperament at 3 years of age. Children who were securely attached at 18 months were more likely to also be securely attached at 3 years of age, $\beta = .34$, $p < .001$; children with an easy temperament at 3 years of age were also more likely to be securely attached at this age, $\beta = -.31$, $p < .001$. Whether children were in parental care or non-parental care (i.e., home-based, centre-based, combination care), the number of times the main caregiver was changed did not impact attachment at 3 years of age.

The Impact of Caregiving Arrangements on Maternal Closeness

To investigate the impact of caregiving arrangements and attachment on maternal closeness at 3 years of age, we conducted a two-step hierarchical multiple regression. Apart from *attachment at 3 years* being an independent variable, and *maternal closeness at 3 years* being the dependent variable in this regression analysis, all other variables in this analysis were the same as those in the previous regression analysis. For clarity, we restate the descriptive statistics for a subset of the independent variables, and the dependent variable, for this regression analysis. Table 27 summarises the descriptive statistics for maternal closeness at 3 years of age as the dependent variable.

Table 27

Descriptive Statistics: Predicting Maternal Closeness

Independent variables	*N*	*M*	*SD*	%	Range
Attachment					
At 18 months	417	.23	.16		-.29 to .63
At 3 years	417	.28	.16		-.22 to .71
Temperament					
At 18 months	417	3.42	0.52		2.22 to 4.99
At 3 years	417	3.23	0.50		1.67 to 5.03
Dependent variable					
Maternal Closeness at 3 years	417	4.74	0.48		3.00 to 5.00

Table 28 presents the correlations among the variables. As seen from Table 28, maternal closeness measures were only moderately correlated with one another across all three time points. Maternal closeness was also weakly correlated to attachment at 18 months and 3 years of age, with mothers feeling closer to children who were securely attached.

As mentioned previously, the results for maternal closeness at 3 years as the dependent variable, were similar whether the 4-month temperament data were included or excluded. For reasons already mentioned in Section 2.5 of Chapter 2, we thus report here the results *without* child temperament at 4 months as an independent variable.

Our data met the assumptions of normality, linearity, multicollinearity, and homoscedasticity. Table 29 presents the results of the regression model. In our model, the control variables (child's gender, maternal employment status, maternal education level, and housing type) were entered at Step 1. All independent variables and control variables were entered together at Step 2.

Table 28

Correlation Matrix: Predicting Maternal Closeness

		1	2	3	4	5	6	7	8
	Independent variables								
1.	Home-based Care at 4 months	-							
2.	Combination Care at 4 months	-.25***	-						
3.	Centre-based Care at 18 months	-.14**	.02	-					
4.	Home-based Care at 18 months	.37***	.01	-.43***	-				
5.	Combination Care at 18 months	-.12**	.20***	-.05	-.26***	-			
6.	Centre-based Care at 3 years	.04	-.02	.33***	-.03	-.04	-		
7.	Home-based Care at 3 years	.13**	.06	-.23***	.44***	-.03	-.70***	-	
8.	Main Caregiver Changes	-.01	.02	.16***	.18***	.04	.34***	-.14**	-
9.	Attachment at 18 months	-.12**	.05	.04	-.08	.03	-.04	.01	-.01
10.	Attachment at 3 years	-.02	.00	.08	-.07	.04	-.01	-.02	.04
11.	Temperament at 18 months	-.03	.02	.08	-.07	.04	-.01	-.02	.04
12.	Temperament at 3 years	.02	.06	.05	.07	-.01	.07	.04	.09*
13.	Maternal Closeness at 4 months	-.22***	-.07	.08*	-.24***	.03	-.04	-.09*	-.12**
14.	Maternal Closeness at 18 months	-.16**	.06	.11*	-.25***	.07	.01	-.14**	-.11*
	Dependent variable								
15.	Maternal Closeness at 3 years	-.16***	-.04	.14**	-.23***	.02	.07	-.19***	-.02

Note. Parental care was the reference group (dummy coded as 0); all other types of main caregivers were comparison groups (dummy coded as 0). Lower scores indicate easier temperament.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 28

Correlation Matrix: Predicting Maternal Closeness (continued)

		9	10	11	12	13	14
	Independent variables						
9.	Attachment at 18 months	-					
10.	Attachment at 3 years	.52***	-				
11.	Temperament at 18 months	.52***	-.38***	-			
12.	Temperament at 3 years	-.47***	-.47***	.49***	-		
13.	Maternal Closeness at 4 months	.18***	.15**	-.08	-.15**	-	
14.	Maternal Closeness at 18 months	.17***	.18***	-.09*	-.10*	.42***	-
	Dependent variable						
15.	Maternal Closeness at 3 years	.15**	.19***	-.10*	.12**	.39***	.47***

Note. Lower scores indicate easier temperament.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 29

Hierarchical Multiple Regression: Predicting Maternal Closeness

Predictor	*R*	R^2	Δ R^2	*B*	*SE*	*β*	*t*
Step 1	.15	.02	.02				
Child's gender				-0.01	0.05	-.01	-0.12
Working part-time				0.11	0.09	.06	1.20
Not working				0.19	0.06	.14	2.90**
Maternal education				-0.01	0.02	-.02	-0.36
Housing type				0.01	0.03	.01	0.17
Step 2	.55	.30***	.28***				
Child's gender				0.01	0.04	.01	0.14
Working part-time				-0.01	0.09	-.01	-0.16
Not working				0.02	0.09	.01	0.19
Maternal education				-0.03	0.02	-.07	-1.56
Housing type				0.00	0.03	.00	0.08
Home-based care							
At 4 months				-0.04	0.05	-.04	-0.84
At 18 months				-0.01	0.08	-.01	-0.18
At 3 years				-0.08	0.09	-.09	-0.91
Centre-based care							
At 4 months				-	-	-	-
At 18 months				0.09	0.10	.05	0.92
At 3 years				-0.00	0.09	-.00	-0.04
Combination care							
At 4 months				-0.07	0.06	-.05	-1.05
At 18 months				-0.06	0.13	-.02	-0.45
At 3 years				-	-	-	-
Main caregiver changes				0.01	0.02	.04	0.74
Attachment							
At 18 months				0.04	0.16	.01	0.26
At 3 years				0.28	0.16	.09	1.77
Temperament							
At 18 months				-0.01	0.05	-.01	-0.14
At 3 years				0.00	0.05	.00	0.07
Maternal closeness							
At 4 months				0.17	0.04	.20	4.21***
At 18 months				0.30	0.04	.34	7.29***

Note. Parental care, boys, and full-time work were the reference group (dummy coded as 0). Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because too few children had these caregivers at those ages.

*$p < .05$. **$p < .01$. ***p < .001.

When control variables (child's gender, maternal employment status, maternal education level, and housing type) were entered at Step 1, the model was not significant, 2.2%, $F(5, 425) = 1.93$, $p = .087$. When all variables were entered in Step 2, the total variance explained by the final model was 29.8%, $F(14, 411) = 9.18$, $p < .001$. The independent variables explained an additional 27.6% of the variance in maternal closeness at 3 years of age, R^2 change = .37, F change (14, 411) = 11.52, $p < .001$.

In the final model, only maternal closeness at 4 and 18 months of age predicted maternal closeness at 3 years of age. Maternal closeness at 4 months ($\beta = .20$, $p < .001$) and at 18 months ($\beta = .34$, $p < .001$) predicted maternal closeness at 3 years of age. Attachment, temperament, type of main caregiver, and main caregiver changes did not reliably predict maternal closeness at 3 years of age.

5.4 Discussion

The Impact of Caregiving Arrangements on Attachment

We aimed to investigate the impact of caregiving arrangements on attachment at 3 years of age. We found that neither the type of main caregiver nor the number of times a child's main caregiver changed reliably affected attachment at 3 years of age. Rather, children who were securely attached at 18 months of age, and those with an easy temperament at 3 years of age, were more securely attached at 3 years of age.

Type of Main Caregiver

Who the main caregiver was at any time point in our study did not affect attachment at 3 years of age. According to maternal report, children in our sample were in centre-based or home-based care for 40 to 60 hours a week. Despite the extensive hours of non-parental care in our sample, those in parental care were not more or less securely attached than those in

home-based or centre-based care (i.e., non-parental care). Our results do not support the argument that placing children in non-parental care puts them at risk of an insecure attachment at 3 years of age, extending earlier work where attachment was assessed at a younger age such as 15 months of age (NICHD ECCRN, 1997, 2001).

Main Caregiver Changes

The number of times a child's main caregiver was changed (e.g., from mother to grandmother to childcare centre) did not affect attachment security at 3 years of age. As discussed in Chapter 3, children in our study experienced relatively more changes in their main caregiver than that observed in earlier studies, where caregiver stability was assessed between birth and 15 months of age (e.g., NICHD ECCRN, 1997, 2001). As mentioned earlier, this might be because the main caregiver is more likely to change with age, especially as children reach the preschool age. However, despite observing a range of main caregiver changes in our sample, we did not find more main caregiver changes to lead to insecure attachment.

Our findings are in line with most previous studies, which found no association between caregiver stability and attachment security (McKim et al., 1999; NICHD ECCRN, 1997, 2001; Tran & Weinraub, 2006; but see Ahnert et al., 2006). As such, we find no evidence that experiencing a limited series of different main caregivers necessarily leads to insecure mother-child attachment. It is worth noting however that almost all the children in our sample experienced only up to three changes in their main caregiver. We are unable to explore the extent to which experiencing numerous main caregiver changes would impact children's attachment.

Temperament and Attachment

In contrast, the reliable predictors of attachment security at 3 years of age were attachment security at 18 months, and a concurrent measure of

temperament at 3 years of age. In line with the existing literature (Laible, Panfile, & Makariev, 2008; Szewczyk-Sokolowski et al., 2005; Putnam et al., 2002), our results support the robust finding that securely attached children tend to have easy rather than difficult temperaments. As mentioned previously, our measures of child temperament and attachment security are limited by the need to rely on maternal report, but fortunately, their validity and reliability have been established (Moss et al., 2005; Posada et al., 1995).

Our finding that attachment security at 18 months predicts attachment security at 3 years, supports the stability of attachment security (Moss et al, 2005; NICHD ECCRN, 2001). Children who are securely attached at 18 months of age are also securely attached 18 months later. Conversely, those who show insecure attachment at 18 months are likely to be exhibit insecure attachment later on (IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999; NICHD ECCRN, 2001).

The Impact of Caregiving Arrangements on Maternal Closeness

Only earlier measures of maternal closeness predicted maternal closeness at 3 years of age. It is of interest to note that maternal closeness was only moderately correlated across time, with proximal measures of maternal closeness more closely related to each other than distal measures. Nevertheless, it would appear that mothers who were close to their child during infancy were also closer to their child at the preschool age.

It is also of interest to note that while mothers who were their child's main caregiver at 18 months did appear to feel somewhat closer to their child at 3 years of age compared to mothers whose children were in home-based care at 18 months, most of the correlations between type of main caregiver and maternal closeness were either weak or not significant. In other words, even with children being taken care of and potentially fostered by a grandparent, relative, or nanny at 18 months or 3 years of age, mothers

did not appear to feel more distant from their infants, compared to mothers who were their child's main caregiver. That mothers were more likely to report more distance at 3 years for children in home-based care at 18 months and 3 years compared to children in parental care at those ages, seems in line with our qualitative analysis that revealed some mothers to be slightly peeved by not having as much time with their child, or their child being disciplined differently by their main caregiver (usually their grandparent).

Given that the correlations between maternal closeness and attachment measures at both 18 months and 4 years were weak, it is perhaps not surprising that attachment was not a reliable predictor of maternal closeness at 3 years of age. Maternal closeness was also only tenuously related to temperament at 18 months and 3 years of age. It would appear that mothers' feeling of closeness to their 3-year-olds is not driven by their children showing behaviours associated with a secure attachment style nor by their children showing behaviours associated with an easy temperament.

5.5 Conclusion

Children with a strong emotional bond to their mother at an earlier age, and children with an easy temperament, regardless of whether or not their mother is their main caregiver, and regardless of the number of times their main caregiver is changed, within the range of variation studied, are those who are more likely to have a secure attachment at 3 years of age. Despite most experiencing up to three changes in their main caregiver, children in our study appear resilient to these changes in terms of their emotional bond to their mother. Being in the care of non-parental main caregivers does not appear to have an observable impact on mother-child attachment in the local context at 3 years of age.

CHAPTER 6 – DEVELOPMENTAL OUTCOMES

6.1 Introduction

The aim of this chapter is to examine the impact of caregiving arrangements on child developmental outcomes at 3 years of age, in the areas of communication, gross and fine motor, problem solving, personal-social, as well as social-emotional development.

The Impact of Type of Main Caregiver on Developmental Outcomes

As discussed in Chapter 1, studies have established that development outcomes in the preschool years are predictive of subsequent outcomes, including academic achievement and social-emotional competencies. Given the importance of young children's communicative, problem solving, and social skills, it is of interest to understand whether placing children in centre-based care or other forms of non-parental care impacts their early development.

Findings regarding the impact of childcare on children's social-emotional and cognitive development have been mixed. Studies reported longer hours in childcare at 2 years of age to be associated with poorer social-emotional outcomes at 4.5 years of age, for outcomes such as social skills (Campbell, Lamb, & Hwang, 2000) and externalising behaviours (NICHD ECCRN, 2004). In contrast, a UK study with a similar sample size did not find hours spent in childcare between birth and 3 years to predict either social skills or problem behaviours at 3 years of age (Barnes et al., 2010). Regarding cognitive outcomes, the NICHD ECCRN (2004) study found that longer hours in childcare during infancy predicted poorer cognitive performance at 4.5 years of age, although the same study also

found longer hours in childcare during toddlerhood to also predict more advanced language at 4.5 years of age.

Discrepancies in the above findings may be explained by caregiving arrangement differences. In the NICHD ECCRN (2004) sample, between birth and 4.5 years of age, children were placed in childcare for an average of 22.5 hours a week, while those in non-maternal care were cared for at home (e.g., babysitter, nanny) or by a relative for similar durations – on average 27.6 and 19.7 hours a week. In comparison, in the Barnes et al. (2010) study, children appeared to spend on average 3.9 hours a week in childcare (nursery) between birth and 3 years of age. Children cared for by a grandparent, childminder, or nanny, were in their care for an average of 3.4, 2.9, and 3.9 hours a week in the same time frame respectively. However, these children also appeared to have concurrent care arrangements – 44% of the sample attended nursery, while 43%, 33%, and 11% were cared for by a grandparent, childminder, and nanny respectively. Even taking into account all the time spent in non-parental care, children mainly at nursery spent only an average of 10.2 hours a week in non-parental care; those mainly cared for by a grandparent, childminder, or nanny were in non-parental care for an average of 4.3, 10.0, and 13.3 hours a week respectively. The limited hours in non-parental care in this UK sample may have contributed to the differences in results.

Cultural differences in caregiving practices may also explain the null results in Barnes and Melhuish's (2016) study. In a recent study of 939 children from Norway, Dearing, Zachrisson, and Nærde (2015) found only a modest relationship between the age of entry to childcare and aggression at 2 years of age; the authors also found aggression levels to diminish by 4 years of age. The fact that childcare enrolment in Norway only starts after 10 to 12 months of age, and the fact that childcare quality is highly regulated in Norway, were cultural reasons cited by the researchers to explain their

findings. Placing local children in centre-based care may not automatically adversely impact their development due to cultural differences in caregiving practices, underscoring the importance of investigating developmental outcomes in the context of local caregiving arrangements.

Comparisons of centre-based childcare and non-parental home-based care have also shown conflicting results. The NICHD ECCRN (2002) study observed that children in childcare had not only more advanced language and cognitive skills at 2 and 3 years of age, but were more socially competent, than children in non-maternal home-based care. In contrast, Barnes et al. (2010) did not find type of care to impact children's social competence or problem behaviours at 3 years of age. In their study, children in nursery were not at an advantage compared to those being cared for at home by their grandparents, childminder, or nanny.

One previous study has compared combination care (children who are being cared for by their mother with a relative) with that of centre-based care. Y. Lee and Lee (2016) followed 1,781 infants from birth to 2 years of age to assess their motor, communication, problem solving, and personal-social skills, using the Korean Ages and Stages Questionnaire (Chung et al., 2014), an instrument similar to that used in our study (ASQ-3; Squires & Bricker, 2009). In their study, four-fifths of the children in home-based care were cared for simultaneously by a relative and their mother; the rest were in childcare and had working mothers. The authors found that after taking into account demographic differences, gains in communication and problem solving were attributed to home-based care, while centre-based care was not associated with better social skills. Gains in gross motor skills were attributable to both home-based and centre-based care, whereas enrichment programmes (e.g., music, sensory experience, gymnastics) did not reliably contribute to any outcome. Surprisingly, fine motor skills regressed due to home-based care in their study.

No previous study however has compared non-parental care, be it centre-based or home-based care, with parental care. It is not clear whether children with their parent as their main caregiver would have better developmental outcomes than children in the primary care of a childcare centre, grandparent, domestic helper, relative, or nanny. We thus address this issue in the present chapter.

The Impact of Caregiver Changes on Developmental Outcomes

As with attachment security, experiencing a series of different caregivers is recognised as another factor which can impact children's developmental outcomes. Research on the impact of long-term caregiver stability on children's developmental outcomes reveals a largely consistent picture for children from disadvantaged family backgrounds. Large sample studies involving either low-income families (Bratsch-Hines, Mokrova, Vernon-Feagans, & The Family Life Project Key Investigators, 2015) or unmarried family units (Pilarz & Hill, 2014), have shown caregiver instability between birth and 3 years of age to lead to poorer social-emotional outcomes.

In a study following 1,292 children from 6 months to 3 years of age, Bratsch-Hines et al. (2015) found that more changes in caregiving arrangements predicted fewer prosocial behaviours and more problem behaviours, including aggressive-oppositional behaviours. In another longitudinal study of 1,105 children from birth to 3 years of age, Pilarz and Hill (2014) found that more changes to the main caregiver between birth and 3 years of age, predicted more externalizing (but not internalizing or prosocial) behaviours.

De Schipper, Tavecchio, van IJzendoorn, and van Zeijl (2004) did not find changes in caregiving arrangements between birth and 2.5 years of age to impact problem behaviours or emotional wellbeing in their study of

186 children, but the authors measured caregiver changes experienced within a day, not over time (i.e., with age). No study which did not sample disadvantaged families has previously investigated the impact of changes in the main caregiver over time on children's outcomes. There are likely to be differences between the populations studied previously and our study sample, which was not deliberately selected to have disadvantaged family backgrounds. In fact, as mentioned in Chapter 2, our sample had relatively few low-income families.

It seems likely that changes to caregiving arrangements impact children's social-emotional outcomes in the face of social adversity, because such children experience many caregiver changes. In the Pilarz and Hill (2014) study, caregiving arrangements on average changed as many as 1.9 times between birth and 3 years of age, but almost a quarter of their sample experienced three or more transitions. This is in contrast to the stable caregiving arrangements observed for the NICHD ECCRN (1997, 2001) sample, where infants experienced either one or no change up to 15 months of age. It may be the case that more changes in caregiving arrangements take place between 15 months and 3 years of age. Alternatively, children from families facing adversity tend to experience more caregiver changes. Whichever the case, one might expect many changes in caregiving arrangements to be associated with poorer social skills. We note that the average number of caregiver changes was on average 1.98 in our sample, and up to 90% of our sample experienced only three or fewer caregiver changes between birth and 3 years of age. It is possible that the relative few number of main caregiver changes in our sample may have little impact on children's social-emotional outcomes.

With regards to other outcomes such as language, cognition, and fine and gross motor skills, previous research has not investigated the impact of main caregiver changes on these outcomes per se. Related

studies have investigated the impact of keeping the same non-parental caregiving arrangement or changing the non-parental caregiving arrangement, on children's developmental outcomes, among low-income families (Ansari & Winsler, 2013; Tran & Winsler, 2011). In these studies, the researchers compared the impact of changing care arrangements, such as from home-based care to centre-based care.

Ansari and Winsler (2013) assessed language, cognitive, fine motor, and gross motor skills, among other outcomes, at the beginning and end of the preschool year when children were 3 and 4 years of age. Not surprisingly, moving to higher quality care – prekindergarten – resulted in better outcomes, but stable arrangements were also beneficial. Children who moved from childcare to structured prekindergarten made the most gains in fine (but not gross) motor skills, compared to those who remained in childcare or home-based care (care by a relative). Those who transitioned from centre-based childcare to home-based care, or vice versa, made the least gains. In other words, stable care arrangements were still more beneficial than unstable ones for fine motor outcomes.

In the above study of 2,682 children, this pattern was also observed for teacher-rated social skills, but not language and cognition (Ansari & Winsler, 2013). Moving to prekindergarten did not impact language and cognition, where gains were similar for both stable and unstable arrangements, consistent with findings from an earlier study of 3,238 children enrolled in government-funded childcare by Tran and Winsler (2011). Taken together, the impact of changes to caregiving arrangements may be more observable in social-emotional and fine motor skills, rather than language, cognitive, and gross motor skills, for children from disadvantaged family backgrounds.

To our knowledge, there are no studies about the impact of main caregiver changes on children's social-emotional and general development

among non-disadvantaged families. There may also be cultural differences between the children in earlier work (e.g., Ansari & Winsler, 2013; Bratsch-Hines et al., 2015; Pilarz & Hill, 2014; Tran & Winsler, 2011) and our study population. As such, we perceive a need to investigate whether caregiver changes affect children's social-emotional outcomes for the general population, in the local context.

The Impact of Home-based Care on Developmental Outcomes

In summary, we investigate the impact of two aspects of caregiving on children's communication, cognitive, gross and fine motor, and social-emotional skills. As mentioned previously, our interest lies in determining whether children's outcomes are associated with parents as the main caregiver. In this chapter, we thus include the same four categories of main caregivers, namely parental, home-based, centre-based, and combination care, to examine the impact of parental care on children's developmental outcomes. Additionally, we examine whether changes to the main caregiver affects children's developmental outcomes.

6.2 Design

To investigate the impact of caregiving arrangements and attachment on developmental outcomes at 3 years of age, we included the following independent variables in our analysis:

- children's main caregiver at 4 months, 18 months, and 3 years of age (we term this *type of main caregiver*; this variable was dummy coded, with parental care as the reference group);
- the number of times children experienced a change in their main caregiver from birth up to 3 years of age (we term this *main caregiver changes*);
- mother-child attachment at 18 months and 3 years of age;

- temperament at 18 months and 3 years of age; and
- maternal closeness at 4 months, 18 months, and 3 years of age.

We included the following control variables in our analysis:

- child's gender (dummy coded, with boys as the reference group);
- maternal employment (dummy coded, with full-time employment as the reference group);
- maternal education; and
- housing type.

The dependent variables in our analyses were communicative, fine and gross motor, problem solving, personal-social, and social-emotional skills at 3 years of age (see Chapter 2 for details of the measures). To control for multiple comparisons, a more stringent *p* value of .01 was applied.

6.3 Results

β-Regression

Preliminary analysis showed that children's scores for all five domains of general development violated the assumptions of standard regression (details are in Appendix 3D). All measures of general development were very negatively skewed, rendering hierarchical multiple regression inappropriate. We thus used *β*-regression (a type of generalized linear model), which is suited to variables with heteroscedasticity or asymmetry, to examine the impact of caregiving arrangements on general development. We carried out *β*-regression analysis for each dependent variable.

In addition to the missing data described in Section 4.3, there were an additional three children who did not complete the ASQ-3 and for whom general development scores were thus not available. As a result, only data from 414 participants were included the *β*-regression analyses. Table 30

presents the descriptive statistics of the variables included in the *β*-regression models.

As mentioned previously, the results for general developmental outcomes at 3 years as dependent variables, were similar whether the 4-month temperament data were included or excluded. For reasons already mentioned in Section 2.5 of Chapter 2, we thus report here the results *without* the 4-month temperament data.

Table 30

Descriptive Statistics: Predicting General Development

Demographic variables	*n*	*M*	*SD*	%	Range
Child's Gender	414				
Boys	199			48.1	
Girls	215			51.9	
Maternal employment	414				
Working full-time	320			77.3	
Working Part-time	32			7.7	
Not Working	62			15.0	
Maternal Education	414	4.00	1.20		1 to 5
Housing Type	414	2.36	0.78		1 to 4

Table 30

Descriptive Statistics: Predicting General Development (continued)

Independent variables	*n*	*M*	*SD*	%	Range
Type of Main Caregiver					
At 4 months	414				
Parental Care	240			58.0	
Home-based Care	117			28.3	
Combination Care	57			13.7	
At 18 months	414				
Parental Care	87			21.0	
Centre-based Care	32			7.7	
Home-based Care	284			68.6	
Combination Care	11			2.7	
At 3 years	414				
Parental Care	74			17.9	
Centre-based Care	154			37.2	
Home-based Care	186			44.9	
Main Caregiver Changes	414	1.96	1.24		0 to 6
Maternal Closeness					
At 4 months	414	4.62	0.58		3 to 5
At 18 months	414	4.65	4.65		3 to 5
At 3 years	414	4.74	0.48		3 to 5
Attachment					
At 18 months	414	.23	.17		-.29 to .63
At 3 years	414	.28	.16		-.22 to .71
Temperament					
At 18 months	414	3.42	0.52		2.22 to 4.99
At 3 years	414	3.23	0.50		1.67 to 5.03
Dependent Variables					
Communication Skills	414	54.32	7.73		5 to 60
Fine Motor Skills	414	45.71	14.47		0 to 60
Gross Motor Skills	414	56.06	6.91		20 to 60
Problem Solving Skills	414	53.05	8.46		20 to 60
Personal-Social Skills	414	51.30	8.65		15 to 60

Note. Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because too few children had these caregivers at those ages.

Table 31

Correlation Matrix: Predicting General Development

		1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
Independent Variables													
1.	Main Caregiver Changes	-											
2.	Attachment at 18 months	-.01	-										
3.	Attachment at 3 years	.04	.52**	-									
4.	Temperament at 18 months	.11	-.47**	-.38**	-								
5.	Temperament at 3 years	-.01	-.36**	-.48**	.49**	-							
6.	Maternal Closeness at 4 months	-.13	.17**	.15*	-.08	-.15*	-						
7.	Maternal Closeness at 18 months	-.12	.18**	.18**	-.10	-.10	.41**	-					
8.	Maternal Closeness at 3 years	-.03	.15*	.19**	-.11	-.12	.39**	.47**	-				
Dependent Variables													
9.	Communication skills	.03	.19**	.19	-.11	-.12	.08	.11	.10	-			
10.	Fine motor skills	.10	.24**	.18**	-.12	-.11	.17*	.07	.16*	.38**	-		
11.	Gross motor skills	.06	.06	.09	-.07	-.11	.03	.07	.04	.26**	.40**	-	
12.	Problem solving skills	-.04	.22**	.16*	-.12	-.15*	.09	.08	.14*	.37**	.40**	.36**	-
13.	Personal-social skills	.05	.17**	.13*	-.11	-.17**	.06	.06	.09	.51**	.40**	.35**	.27**

Note. Lower scores indicate easier temperament.

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

Table 31 presents the correlations among the variables in the *β*-Regression models. As seen from Table 31, all of the general developmental outcomes were positively correlated with one another. Among the five measures, the strongest correlation was between communication and personal-social skills. The weakest associations were between gross motor skills and communication, and between problem solving and personal-social skills. The remaining variables were moderately correlated to one another. For example, children with better fine motor skills also had better gross motor skills, problem solving, and personal-social skills.

In relation to the independent variables, it is of interest that four of the five outcome measures were associated with attachment at 18 months, and three of them were also associated with attachment at 3 years. Children who were securely attached at 18 months had better fine motor, problem solving, communication, and personal-social skills at 3 years; those who were securely attached at 3 years had better fine motor, problem solving, and personal-social skills at that age. However, it is worth noting that these were weak correlations.

Similarly, problem solving and personal-social skills were weakly correlated to temperament at 3 years; children with easy temperaments had better skills in these domains. Maternal closeness at 4 months and 3 years was weakly associated with better fine motor skills, while maternal closeness at 3 years was weakly associated with better problem solving. In contrast, the number of main caregiver changes experienced by children did not reliably relate to any of the general developmental outcome measures.

The results of the *β*-regression analysis are presented in Tables 32 to 36.

Table 32

β-regression: Predicting Communication Skills

	Communication Skills			
Variables	Estimation	*SE*	*Z* value	Pr(>|z|)
(Intercept)	1.85	0.85	2.19	0.03
Child's Gender	0.18	0.10	1.80	0.07
Maternal Employment				
Working Part-time	0.47	0.24	1.98	0.05
Not Working	0.17	0.23	0.75	0.45
Maternal Education	0.07	0.05	1.53	0.13
Housing Type	-0.06	0.07	-0.86	0.39
Main Caregiver at 4 months				
Home-based Care	0.03	0.13	0.24	0.81
Combination Care	-0.04	0.16	-0.27	0.79
Main Caregiver at 18 months				
Home-based Care	-0.12	0.19	-0.62	0.54
Centre-based Care	-0.15	0.26	-0.58	0.56
Combination Care	-0.38	0.34	-1.12	0.26
Main Caregiver at 3 years				
Home-based Care	-0.17	0.24	-0.70	0.48
Centre-based Care	-0.10	0.23	-0.41	0.68
Main Caregiver Changes	0.05	0.05	1.02	0.31
Maternal Closeness				
At 4 months	0.07	0.10	0.67	0.50
At 18 months	-0.08	0.11	-0.79	0.43
At 3 years	0.07	0.12	0.55	0.58
Temperament				
At 18 months	0.12	0.12	0.94	0.35
At 3 years	-0.20	0.12	-0.64	0.10
Attachment				
At 18 months	0.66	0.39	1.69	0.09
At 3 years	0.01	0.10	0.02	0.98

Note. Parental care, boys, and full-time work were the reference group (dummy coded as 0). Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because too few children had these caregivers at those ages.

Table 33

β-regression: Predicting Fine Motor Skills

	Fine Motor Skills			
Variables	Estimation	*SE*	*Z* value	Pr(>|z|)
(Intercept)	-1.14	0.92	-1.23	0.22
Child's Gender	0.39	0.11	3.48	0.00***
Maternal Employment				
Working Part-time	0.13	0.26	0.52	0.60
Not Working	-0.21	0.25	-0.85	0.39
Maternal Education	0.04	0.05	0.82	0.41
Housing Type	-0.03	0.07	-0.43	0.67
Main Caregiver at 4 months				
Home-based Care	0.17	0.14	1.19	0.23
Combination Care	0.09	0.17	0.54	0.59
Main Caregiver at 18 months				
Home-based Care	-0.07	0.21	-0.35	0.73
Centre-based Care	0.05	0.28	0.17	0.86
Combination Care	-0.50	0.38	-1.34	0.18
Main Caregiver at 3 years				
Home-based Care	-0.03	0.26	-0.11	0.92
Centre-based Care	0.01	0.25	0.05	0.96
Main Caregiver Changes	0.11	0.05	2.13	0.03
Maternal Closeness				
At 4 months	0.35	0.11	3.13	0.00***
At 18 months	-0.20	0.12	-1.70	0.09
At 3 years	0.18	0.13	1.37	0.17
Temperament				
At 18 months	0.09	0.13	0.68	0.50
At 3 years	-0.06	0.14	-0.44	0.66
Attachment				
At 18 months	1.00	0.43	2.35	0.02
At 3 years	0.34	0.44	0.79	0.43

Note. Parental care, boys, and full-time work were the reference group (dummy coded as 0). Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because too few children had these caregivers at those ages.

***$p < .001$

Table 34

β-regression: Predicting Gross Motor Skills

	Gross Motor Skills			
Variables	Estimation	*SE*	*Z* value	Pr(>|z|)
(Intercept)	3.11	0.85	3.67	0.00**
Child's Gender	0.11	0.10	1.04	0.30
Maternal Employment				
Working Part-time	-0.03	0.24	-0.13	0.90
Not Working	-0.02	0.23	-0.08	0.94
Maternal Education	0.01	0.05	0.29	0.77
Housing Type	0.00	0.07	0.00	1.00
Main Caregiver at 4 months				
Home-based Care	0.03	0.13	0.22	0.83
Combination Care	0.12	0.16	0.78	0.43
Main Caregiver at 18 months				
Home-based Care	-0.04	0.19	-0.21	0.83
Centre-based Care	0.23	0.26	0.91	0.36
Combination Care	-0.07	0.35	-0.21	0.84
Main Caregiver at 3 years				
Home-based Care	-0.07	0.24	-0.32	0.75
Centre-based Care	0.00	0.23	0.02	0.99
Main Caregiver Changes	0.02	0.05	0.39	0.70
Maternal Closeness				
At 4 months	0.04	0.10	0.44	0.66
At 18 months	0.00	0.11	-0.04	0.97
At 3 years	-0.01	0.12	-0.08	0.93
Temperament				
At 18 months	-0.12	0.12	-1.02	0.31
At 3 years	-0.10	0.12	-0.76	0.44
Attachment				
At 18 months	0.00	0.39	0.01	0.99
At 3 years	0.05	0.40	0.12	0.90

Note. Parental care, boys, and full-time work were the reference group (dummy coded as 0). Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because too few children had these caregivers at those ages.

**$p < .01$.

Table 35

β-regression: Predicting Problem Solving Skills

	Problem Solving Skills			
Variables	Estimation	*SE*	*Z* value	Pr(>|z|)
(Intercept)	1.92	0.85	2.26	0.02
Child's Gender	0.01	0.10	0.10	0.92
Maternal Employment				
Working Part-time	-0.06	0.24	-0.27	0.79
Not Working	-0.11	0.23	-0.47	0.64
Maternal Education	0.12	0.05	2.64	0.01**
Housing Type	-0.14	0.07	-2.05	0.04
Main Caregiver at 4 months				
Home-based Care	0.01	0.13	0.07	0.95
Combination Care	0.22	0.16	1.41	0.16
Main Caregiver at 18 months				
Home-based Care	0.19	0.19	1.02	0.31
Centre-based Care	0.54	0.26	2.10	0.04
Combination Care	-0.25	0.34	-0.74	0.46
Main Caregiver at 3 years				
Home-based Care	-0.35	0.24	-1.46	0.14
Centre-based Care	-0.44	0.23	-1.88	0.06
Main Caregiver Changes	-0.02	0.05	-0.33	0.74
Maternal Closeness				
At 4 months	0.04	0.10	0.41	0.68
At 18 months	-0.15	0.11	-1.42	0.16
At 3 years	0.27	0.12	2.15	0.03
Temperament				
At 18 months	-0.13	0.12	-1.03	0.30
At 3 years	-0.08	0.13	-0.65	0.51
Attachment				
At 18 months	0.41	0.39	1.04	0.30
At 3 years	0.51	0.40	1.28	0.20

Note. Parental care, boys, and full-time work were the reference group (dummy coded as 0). Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because too few children had these caregivers at those ages.

**$p < .01$.

Table 36

β-regression: Predicting Personal-Social Skills

	Personal-Social Skills			
Variables	Estimation	*SE*	*Z* value	Pr(>|z|)
(Intercept)	1.24	0.84	1.48	0.14
Child's Gender	0.40	0.10	4.00	0.00***
Maternal Employment				
Working Part-time	0.17	0.24	0.71	0.48
Not Working	0.06	0.23	0.25	0.80
Maternal Education	-0.02	0.05	-0.38	0.71
Housing Type	-0.05	0.07	-0.78	0.43
Main Caregiver at 4 months				
Home-based Care	0.26	0.13	2.02	0.04
Combination Care	0.34	0.16	2.46	0.01
Main Caregiver at 18 months				
Home-based Care	-0.11	0.19	-0.56	0.56
Centre-based Care	0.01	0.25	0.03	0.98
Combination Care	-0.42	0.34	-1.24	0.21
Main Caregiver at 3 years				
Home-based Care	-0.24	0.24	-1.04	0.30
Centre-based Care	0.13	0.23	0.55	0.58
Main Caregiver Changes	0.04	0.05	0.80	0.43
Maternal Closeness				
At 4 months	0.20	0.10	2.01	0.04
At 18 months	-0.11	0.11	-1.08	0.28
At 3 years	0.02	0.12	0.19	0.85
Temperament				
At 18 months	0.17	0.12	1.37	0.17
At 3 years	-0.25	0.12	-1.98	0.05
Attachment				
At 18 months	0.67	0.39	1.73	0.83
At 3 years	0.28	0.40	0.71	0.48

Note. Parental care, boys, and full-time work were the reference group (dummy coded as 0). Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because too few children had these caregivers at those ages.

***$p < .001$.

Communication and Gross Motor Skills. None of the independent or control variables predicted either communication or gross motor skills at 3 years of age.

Fine Motor Skills. Gender (odds ratio = 1. 47, $p < .001$) and maternal closeness at 4 months (odds ratio = 1.41, $p < .001$) predicted children's fine motor skills at 3 years of age, with the model explaining 11% of the variance. Girls had better fine motor skills than boys, while mothers who perceived themselves to be close to their child at 4 months of age tended to have children with better fine motor skills.

Problem Solving Skills. Only maternal education (odds ratio = 1.13, $p = .007$) predicted problem solving skills at 3 years of age, with the model explaining 13% of the variance. Children had better problem solving skills if their mothers had received more years of education.

Personal-Social Skills. Only gender (odds ratio = 1.50, $p < .001$) predicted personal-social skills at 3 years of age, with the model explaining 11% of the variance. Girls had better personal-social skills than boys.

Hierarchical Multiple Regression

Our data for children's social-emotional outcomes met the assumptions of normality, linearity, multicollinearity, and homoscedasticity. Thus, we employed a two-step hierarchical multiple regression model to examine the impact of caregiving arrangements on social-emotional outcomes at age 3 years, after controlling for the influence of demographic variables.

Apart from *social-emotional skills at 3 years* being the dependent variable in this regression analysis, and *child temperament* and *mother-child attachment at 18 months and 3 years* being independent variables

in this regression analysis, all control and other independent variables were the same as those used in the previous regression analyses (Chapters 4 and 5).

As described in Section 4.3, participants with missing data were excluded from the regression analysis. We used the same data set (*N* = 417) as that from Chapters 4 and 5 to predict social-emotional skills at 3 years of age. The descriptive statistics for the control and independent variables can be found in Table 20 in Chapter 4. For clarity, we restate the descriptive statistics for a subset of the independent variables, and the dependent variable, for this regression analysis. Table 37 summarises the descriptive statistics for social-emotional skills at 3 years of age, mother-child attachment at 18 months and 3 years of age, and child temperament at 18 months and 3 years of age, with social-emotional skills at 3 years as the dependent variable.

As mentioned previously, the results for social-emotional skills at 3 years as the dependent variable, were similar whether the 4-month temperament data were included or excluded. For reasons already mentioned in Section 2.5 of Chapter 2, we thus report here the results *without* the 4-month temperament data.

Table 37

Descriptive Statistics: Predicting Social-Emotional Skills

Independent Variables	*N*	*M*	*SD*	Range
Attachment				
At 18 months	417	.23	.16	-.29 to .63
At 3 years	417	.28	.16	-.22 to .71
Temperament				
At 18 months	417	3.42	0.52	2.22 to 4.99
At 3 years	417	3.23	0.50	1.67 to 5.03
Dependent Variable				
Social-Emotional Skills	417	52.65	26.12	0 to 145

Note. Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because too few children had these caregivers at those ages.

Table 38

Correlation Matrix: Predicting Social-Emotional Skills

		1.	2.	3.	4.	5.	6.	7.	8.
Independent Variables									
1.	Home-based Care at 4 months	-							
2.	Combination Care at 4 months	-.29***	-						
3.	Centre-based Care at 18 months	-.14**	.02	-					
4.	Home-based Care at 18 months	.37***	.01	-.43***	-				
5.	Combination Care at 18 months	-.12**	.20***	-.05	-.26***	-			
6.	Centre-based Care at 3 years	.04	-.02	.33***	-.03	-.04	-		
7.	Home-based Care at 3 years	.13**	.06	-.23***	.44***	-.03	-.70***	-	
8.	Main Caregiver Changes	-.01	.02	.16***	.18***	.04	.34***	-.14**	-
9.	Attachment at 18 months	-.12**	.05	.04	-.08	.03	-.04	.01	-.01
10.	Attachment at 3 years	-.03	.02	.08	-.07	.04	-.01	-.02	.04
11.	Temperament at 18 months	.02	.06	.05	.07	-.01	.07	.04	.09*
12.	Temperament at 3 years	-.02	-.02	.02	.05	-.02	.06	.00	-.01
13.	Maternal Closeness at 4 months	-.22***	-.07	.08*	-.24***	.03	-.04	-.09*	-.12**
14.	Maternal Closeness at 18 months	-.16**	.06	.11*	-.25***	.07	.01	-.14**	-.11*
15.	Maternal Closeness at 3 years	-.16***	-.04	.14**	-.23***	.00	.07	-.19***	-.02
Dependent Variable									
16.	Social-emotional Skills at 3 years	-.01	.02	-.04	.03	-.01	-.05	.01	.01

Table 38

Correlation Matrix: Predicting Social-Emotional Skills (continued)

	9.	10.	11.	12.	13.	14.	15.
Independent Variables							
9. Attachment at 18 months	-						
10. Attachment at 3 years	.52***	-					
11. Temperament at 18 months	-.47***	-.38***	-				
12. Temperament at 3 years	-.36***	-.47***	.49***	-			
13. Maternal Closeness at 4 months	.18***	.15**	-.08	-.15**	-		
14. Maternal Closeness at 18 months	.17***	.18***	-.09*	-.10*	.42***	-	
15. Maternal Closeness at 3 years	.15**	.19*	-.10*	-.12**	.39***	.47***	-
Dependent Variable							
16. Social-emotional Skills at 3 years	-.43***	-.46***	.27***	.27***	-.13**	-.11*	-.11*

Note. Parental care was the reference group (dummy coded as 0). Lower scores indicate easier temperament. Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because too few children had these caregivers at those ages.

*p < .05. **p < .01. ***p < .001.

Table 38 presents the correlations between the variables investigated in the hierarchical regression model. Social-emotional skills at 3 years was moderately correlated with attachment at both 18 and 36 months, and weakly correlated with temperament at both 18 and 36 months. In other words, children who were securely attached, and those with an easy temperament, were more likely to have better social-emotional skills. Social-emotional skills at 3 years was also weakly correlated with maternal closeness at all three ages, indicating that children with good social-emotional skills were those close to their mother.

Table 39 summarises the results of the hierarchical multiple regression. Demographic variables (child's gender, maternal employment, maternal education, and housing type) entered in Step 1 yield a significant model that explains a small (5.4%) but significant amount of variance in children's social-emotional skills at 3 years of age, F (5, 417) = 4.77, p < .001.

When care arrangement variables (type of main caregiver, main caregiver changes), maternal closeness, child temperament, and mother-child attachment are entered in Step 2, the model is significant, F (20, 402) = 8.98, p < .001. After controlling for demographic variables, the predictors explain an additional 25.5% of the variance in children's social-emotional skills at 3 years of age, R square change = .255, F change (15, 402) = 9.88, p < .001.

In the final model shown in Table 39, attachment at 18 months and 3 years of age, maternal education, and maternal employment significantly predicted children's social-emotional skills at 3 years of age. Attachment security at 3 years of age was the strongest predictor of social-emotional skills, β = -.29, p < .001, followed by attachment at 18

months of age, β = -.22, p < .001, maternal employment (not working), β = .15, p = .028, and maternal education, β = -.11, p = .016.

Table 39

Hierarchical Multiple Regression: Predicting Social-Emotional Skills

	R	*R²*	*Δ R²*	*B*	*SE*	*β*	*t*
Final model	.63	.39***	.37***				
Child's Gender				-3.89	2.19	-.08	1.77
Working Part-time				2.39	4.95	.02	0.48
Not Working				11.10	5.04	.15*	2.20
Maternal Education				-2.44	1.00	-.11*	-2.43
Housing Type				-1.84	1.45	-.06	-1.27
Home-based Care							
At 4 months				-0.91	2.80	-.02	0.48
At 18 months				-1.26	4.12	-.02	-0.31
At 3 years				9.02	5.23	.17	1.72
Centre-based Care							
At 18 months				1.06	5.46	.01	0.19
At 3 years				3.75	5.11	.07	0.73
Combination Care							
At 4 months				2.21	3.46	.03	0.64
At 18 months				-2.08	6.90	-.01	-0.3
Main Caregiver Changes				1.58	1.00	.08	1.58
Attachment							
At 18 months				-34.43	8.49	-.22***	-4.06
At 3 years				-47.41	8.61	-.29***	-5.51
Temperament							
At 18 months				1.42	2.65	.03	0.54
At 3 years				2.75	2.73	.05	1.01
Maternal Closeness							
At 4 months				-2.28	2.24	-.05	-1.02
At 18 months				0.69	2.35	.01	0.26
At 3 years				-0.10	2.71	.00	-0.04

Note. Parental care, boys, and full-time work were the reference group (dummy coded as 0). Centre-based care at 4 months of age and combination care at 3 years of age were excluded from the analyses because too few children had these caregivers at those ages.

*p < .05. ***p < .001.

In other words, children had better social-emotional development at 3 years of age if they were securely attached at 18 months and 3 years of age. Moreover, children with mothers in full-time employment at

3 years of age had better social-emotional skills than children whose mothers were not working. Finally, children had better social-emotional skills if their mothers were more rather than less educated.

6.4 Discussion

The aim of this chapter was to investigate the impact of caregiving arrangements on children's communicative, fine and gross motor, problem solving, personal-social, and social-emotional skills at 3 years of age. We found that neither the type of main caregiver nor main caregiver changes reliably predicted any of these outcomes at 3 years of age. Instead, mother-child attachment at 18 months and 3 years, maternal employment, and maternal education predicted social-emotional skills at 3 years of age. Maternal education also reliably predicted children's problem solving skills at age 3 years, while gender made a significant contribution to both personal-social and fine motor skills at age 3 years. Maternal closeness also contributed to fine motor skills at 3 years of age.

Type of Main Caregiver

We examined whether the type of main caregiver at 4 months, 18 months, and 3 years of age would predict developmental outcomes at 3 years of age, with the expectation that parental care would be associated with more positive outcomes compared to other types of care. We found no advantage in any of the domains for children in parental care compared to children with other types of main caregivers. It would appear that parents need not be overly concerned that their children would be worse off in terms of their general and social-emotional development, when placed in the care of grandparents, domestic helpers, nannies, relatives, and childcare centres.

Main Caregiver Changes

We examined whether experiencing more changes to the main caregiver between birth and 3 years of age would impact developmental outcomes at 3 years of age. However, we did not find main caregiver changes to reliably predict outcomes at age 3 years.

Our results are in contrast to those of Bratsch-Hines et al., (2015), but children in their sample came from low-income, disadvantaged family backgrounds; children in our sample were not. Like Pilarz and Hill (2014), we did not find caregiver changes between birth and 3 years to predict children's social skills at 3 years of age. About a quarter and a fifth of the Pilarz and Hill (2014) sample experienced two and three caregiver changes respectively; over a third and about a fifth of our sample experienced two and three caregiver changes respectively. Despite the fact that the children in the Pilarz and Hill (2014) study were from low-income families (and ours were not), the proportion experiencing three or more caregiver changes in our study was relatively similar to that of Pilarz and Hill (2014). About a third of our sample experienced three or more changes to their main caregiver between birth and 3 years of age, even though the most number of changes experienced by our sample was only five.

It may be the case that caregiver instability alone does not lead to poorer preschool social-emotional outcomes, but that other factors associated with caregiver instability in the context of low-income families are of importance. In our sample, a child with three caregiver changes could have been cared for by his mother, followed by his grandmother, and then a domestic helper, and finally, a childcare centre. With the middle caregivers (e.g., grandmother), he would have been cared for at his grandparent's home. If typical of our sample, he would likely have been the only child being cared for at home. Experiencing the same

three caregiver changes, but with caregivers who have other children to mind at the same time, may differentially impact children's social-emotional outcomes. Indeed, low quality childcare has been shown to have a disproportionately greater impact on children from lower income families than children from higher income families (Gialamas, Mittinty, Sawyer, Zubrick, & Lynch, 2015).

We also did not find more main caregiver changes to be associated with poorer fine motor skills at 3 years of age. Earlier work found staying in the same home-based care or childcare arrangement benefitted children from low-income families in terms of fine motor skills (Ansari & Winsler, 2013), but children in their study were from low-income families, whereas few families with low socio-economic status stayed till the end of our study.

Our findings indicate no risk of delay in fine motor skills from more main caregiver changes, though not necessarily when low-income families are considered. Despite the fact that most children in our study had two to three different main caregivers between birth and 3 years of age, these changes did not affect fine motor development. Rather, we speculate that caregiver instability may have a more prominent role in fine motor development, in the context of low family income or low quality care.

Taken together, we find no evidence that more changes to children's main caregiver between birth and 3 years leads to poorer developmental outcomes. Neither do we find evidence to suggest that not being in parental care adversely impacts developmental outcomes.

Mother-Child Attachment

Children who were more securely attached at 18 months and 3 years of age had better social-emotional outcomes at 3 years of age,

although attachment did not predict other outcomes, such as personal-social skills at 3 years of age. Supporting the well-established finding that secure children tend to be more socially competent (Allen, Porter, McFarland, McElhaney, & Marsh, 2007; Belsky & Fearon, 2002; Bohlin et al., 2000; Ding, Xu, Wang, Li, & Wang, 2014; Schmidt, Demulder, & Denham, 2002; Sroufe, 2005; West, Mathews, & Kerns, 2013), our findings sit well with observations that secure children make friends easily not just because they display prosocial behaviours, but because they are also good at regulating their emotions (Kerns, Abraham, Schlegelmilch, & Morgan, 2007; Kochanska, 2001; H. Steele, Steele, Croft, & Fonagy, 1999).

Maternal Employment

After mother-child attachment, maternal employment at age 3 years made the second largest contribution to children's social-emotional development at age 3 years. In our study, children had better social-emotional skills if mothers were in full-time work when they were 3 years of age than if mothers were not working at that age. We note that maternal employment status was relatively stable across the three time points of our study. Children with better social-emotional skills were in effect those children whose mothers were in full-time work from birth to 3 years of age.

Our results are in contrast to other findings. Sherlock, Synnes, and Koehoorn (2008) found that children had better social skills if mothers returned to work after rather than before their child's second birthday, while Brooks-Gunn et al. (2010) did not find a reliable association between preschoolers' social skills and mothers returning to work before their child's first birthday. Our results are in line with other findings that children were more securely attached at 18 months of age

when their mothers returned to work earlier rather than later (Harrison & Ungerer, 2002).

An explanation for our findings relates to the observation that nearly 60% of children with non-working mothers at 3 years of age, were in parental care throughout the study, and that 13 children from this subgroup had only one caregiver, their mother, at 3 years of age. In fact, these 13 children had only one caregiver throughout the study, from birth to 3 years of age. Although it is not recorded, their fathers may not have been living locally during the study. Unlike all other groups, parental care was the only group where the main caregiver for some children was the child's only caregiver. In contrast, children in home-based (non-parental) and centre-based care at 3 years of age had two to five caregivers, although most had two or three caregivers (as mentioned previously, only a handful of children were in combination care at 3 years of age and were therefore excluded from the analyses).

While children of non-working mothers could theoretically have any type of main caregiver, in practice, most children were in maternal care if their mothers were not working. When children were 18 months or 3 years of age, less than a handful of children were in home-based care because their mothers were pursuing a full-time course.

Most children with non-working mothers at 3 years of age had a total of two caregivers. In contrast, most children with working mothers at 3 years of age had a total of three caregivers. In other words, most children with non-working mothers had only their mother to interact with during the work week. In addition to their parents, those with working mothers had peers and teachers to interact with at the childcare centre or other adults to interact with at home. Given that social interactions help infants to understand their social environment and how they should respond (Moore, 2010), we posit that having more interaction partners is

one possible reason why children of working mothers had better social skills at 3 years of age.

Maternal Education

In our study, maternal education made a reliable contribution to children's social-emotional development, after contributions from mother-child attachment and maternal employment. Children whose mothers were more educated had better social-emotional skills at age 3 years. Maternal education also reliably predicted problem solving at age 3 years. Children whose mothers were more educated had better problem solving skills.

Mothers with more education may be motivated to encourage their child's cognitive learning and vocabulary acquisition. Beyond the observation that mothers with more education may be able to afford more books and toys for children's learning, there is evidence to suggest that mothers with more education spend more time doing activities which stimulate learning. Westerlund and Lagerberg (2008) observed mothers with a university degree to spend more time reading to their toddler than mothers with primary school education. Kalil, Ryan, and Corey (2012) similarly found mothers with university education to spend more time teaching their child when their child was 3 to 5 years of age, compared to mothers with secondary school education.

Regardless of whether mothers with more education engage their child more or whether they provide toys and picture books for the main caregiver to engage the child, such interactions likely help children develop not only their problem solving skills, but also their social skills. In addition to finding that maternal education predicted better social-emotional outcomes at 2 years of age, Baker (2013) reported that over and above the contribution of maternal education, mothers' involvement

in literacy activities also contributed to better social-emotional outcomes. It may also of course be the case that the emphasis on reading and learning by mothers with more education facilitates children's oral language development, which in turn facilitates their social-emotional development. For example, language precocity has been associated with greater social competence among Italian toddlers (Longobardi, Spataro, Frigerio, & Rescorla, 2016).

Child's Gender

Children's gender made a reliable contribution to children's fine motor and personal-social skills at age 3 years, with better outcomes associated with girls relative to boys. Previous findings support this trend. Better scores have been observed in girls for fine motor, self-help (Moser, & Reikerås, 2014; Kerstjens et. al., 2009), and social skills (Barbu, Cabanes, & Le Maner-Idrissi, 2011) at the preschool age.

Rather, it may instead be surprising that the trend was not also observed for communication, given that studies often observe language to emerge in girls earlier than boys (Berglund, Eriksson, & Westerlund, 2005; Bouchard, Trudeau, Sutton, Boudreault, & Deneault, 2009). Our results may however be explained by the fact that we assessed preschoolers' communication skills in terms of their ability to understand simple instructions, identify body parts, and form a sentence (items in the ASQ-3). Studies which observe gender differences (e.g., NICHD ECCRN, 2004) have typically obtained a larger range of scores from administering comprehensive standardised language tests.

The range of scores for the communication items may be at ceiling because the ASQ-3 is a screening tool. For example, typically developing children can respond to one-step instructions by 2 years of age (Centre for Disease Control and Prevention, 2018; Ministry of Social

and Family Development, 2018). Prepositions such as *on* and *under* are understood by English-speaking monolinguals before 30 months of age (Fenson et al., 1994); the preposition *on* and *in* are typically observed in production before 3 years of age (Brown, 1973). Thus, children in our sample would be expected to be able to put “the book on the table” or “the shoe under the chair” by 3 years of age. Comprehension and the ability to productively label body parts including *arm, leg, eye, nose, ear, hair,* and *mouth*, are acquired by at least 50% of English-speaking monolinguals before 30 months of age (Fenson et al., 1994). Inspection of the ASQ-3 data showed that almost all the children in our sample were able to produce sentences. Unlike the language ability for which girls may be more precocious, scores for communication milestones, such as those in the ASQ-3, may be less susceptible to a gender bias.

Maternal Closeness

Maternal closeness measured at 4 months of age reliably contributed to fine motor development at 3 years of age. Children whose mothers felt close towards them had better fine motor skills compared to children who had mothers who did not feel as close towards their children. One possible explanation for these results is that mothers who were close to their child, spent more time playing with their child, thereby facilitating their child’s fine motor development. Gutman and Feinstein (2010) observed that children whose mothers played with them more often, had better fine motor skills one year later.

Communication and Gross Motor Skills

None of the independent or demographic variables predicted either communication or gross motor skills. As a result of using the ASQ-3 (Squires & Bricker, 2009) which is a screening tool, to measure general development, our results may have been constrained by the

narrow range of scores obtained for each domain. Although children's performance was typically clustered at the maximum score across all domains of general development, we note that children were at ceiling for communication, gross motor, and personal-social skills. Close to 70% or more children received the maximum score of 60 in these domains. Aside from fine motor skills, scores for all other domains were also highly skewed, with 95% or more children achieving a score of 40 or higher in these domains. Although we accounted for the skewed data by using beta regression, our results may still have been affected by the narrow range of scores due to ceiling effects.

6.5 Conclusion

We found neither parental care, compared to other types of main caregivers, nor the number of times children's main caregivers were changed, to impact children's developmental outcomes. Rather, children with a strong emotional bond to their mother were more likely to have better social-emotional skills at 3 years of age. Additionally, caregiving arrangements which advertently or inadvertently provided children with more opportunities for social interactions and cognitive learning, may have had a positive impact on children's development. While maternal education and full-time maternal employment, which contributed to children's outcomes, are factors which are challenging to modify, other exogenous factors such as training main caregivers to engage toddlers in play and picture book reading at home, could effect similar positive outcomes.

CHAPTER 7 – GENERAL DISCUSSION

The premise of our study was that no earlier study had examined the impact of caregiving arrangements on children's early development in Singapore, or in other countries with similar caregiving arrangements to that of Singapore. We aimed to address this gap by investigating the nature of children's caregiving arrangements from birth to 3 years of age, and by exploring the impact of these caregiving arrangements on children's early development, which included child temperament, attachment security, and general and social-emotional outcomes.

7.1 Local Caregiving Arrangements

Children's Main Caregivers

We found caregiving arrangements for young children in Singapore to be consistent to some extent with the literature. For most children in our study, mothers identified themselves to be their child's main caregiver until infants reached 4 months of age, which marks the end of paid maternity leave for working mothers. From 4 months to 18 months of age, most children of working mothers were then in the care of grandparents, domestic helpers, nannies, or relatives in a home-based setting. Under half our sample at this age was in the care of their grandparents, although grandmothers, rather than grandfathers, were identified as the main caregiver of most children. By the third interview at 3 years of age, under half our sample were still in non-parental care in a home-based setting; only a third were being looked after at a childcare centre.

In our study, we observed mothers prioritising their child's welfare in making their child's caregiving arrangements. Mothers

typically wanted a trustworthy or experienced caregiver, or both these qualities in the child's main caregiver (e.g., the child's grandmother). Safety and child well-being were not mothers' only concerns; practical considerations were also prominent. For many families in our study, the child was in the care of their mother or grandmother, or at a childcare centre because no other caregiver was available, because the chosen caregiver was available, because both parents were working, or any combination of these reasons (cf. Cheung & Hawkins, 2014).

Implicit in the "no choice" rationale is the notion that another caregiver would have been preferred but was unavailable. For example, in addition to children's grandparents being unavailable because they were already looking after another child or were physically unable to assist with caregiving, it would appear that financial constraints often precluded domestic helpers, professional nannies, and centre-based care as possible solutions. Children's caregiving arrangements thus appeared to be a decision borne out of practical considerations, even though parents did prioritise their child's well-being, safety, and learning opportunities.

We raised the question of whether domestic helpers played a significant role in local caregiving arrangements. Previous work had not reported domestic helpers as the main caregivers of young children. We found 8% of children to be in the *sole* care of a domestic helper, and another 2% in the care of a domestic helper and another caregiver, between 4 months and 3 years of age. Up to 10% of children in our study thus had a domestic helper as a main caregiver, suggesting that domestic helpers play an important role in local caregiving.

We also observed some other caregiving arrangements that we did not anticipate. First, a proportion of children were being cared for by

two main caregivers, with each caregiver looking after the child half the week. As many as 13% of infants at 4 months were in combination care, with most being cared for by their mother and grandmother, and grandmother-domestic helper being the next most common combination. This concurs with informal observations that working parents often leave their child in the care of a domestic helper, with the child's grandparents in charge of overseeing the caregiving arrangement. Second, we observed caregiving arrangements to change fluidly with age. Most families preferred their child to be looked after in a home-based setting with at least one caregiver looking after the child exclusively between 4 and 18 months of age. Even though centre-based care was the modal caregiving arrangement at 3 years of age when all individual categories of caregivers were considered, the proportion of our sample in centre-based care at that age was only 37%. When all non-parental home-based main caregivers were grouped together, home-based care replaced centre-based care as the modal type of main caregiver at that age. Up to 44% of our sample was in non-parental home-based care at that age, with the rest in parental, centre-based, or combination care.

It would thus appear that working mothers in Singapore prefer their child to be looked after in a home-based setting rather than centre-based one, and they would prefer to place their child in the care of a grandparent rather than domestic helper or nanny. These preferences may reflect that fact that care at a childcare centre costs more than care by a domestic helper or nanny, and that care by a domestic helper or nanny incurs a cost whereas care by a grandparent does not. It is also likely influenced by the convenience of having a grandparent, who lives nearby due to public housing policies which promote proximity among extended families, as the child's caregiver. However, we have reason to think that the preference for a grandparent as the child's main caregiver

relates to factors beyond practical concerns. That the grandparent is trustworthy was a highly cited reason for these caregiving arrangements.

Caregiving arrangements reported in our study also paint a slightly different picture from that of earlier studies. Cheung and Hawkins (2014) reported that 18% to 28% of their sample was in the care of paid caregivers from birth to 3 years of age. In comparison, 6% to 15% of our sample had domestic helpers and nannies as their main caregiver from birth to 3 years of age. Including centre-based care, 7% to 23% of our sample was cared for by paid caregivers at 18 months of age, but almost half the sample was cared for by paid caregivers at 3 years of age. Our focus on only main caregivers, individuals who look after the child *most* of the time, rather than all individuals who look after the child, likely contributes to the fact that a smaller proportion of our sample was in the care of paid caregivers at 18 months of age than observed previously. It would appear that relatively few local families entrust the care of their infants to strangers, supporting our argument that local caregiving arrangements are guided by parental concerns about infant safety, as well as practical considerations.

On the other hand, it is evident that a larger proportion of our sample was looked after by paid caregivers at 3 years of age than observed previously. This may reflect the fact that childcare enrolment has continued to rise in recent years. The number of children aged 18 months to 6 years in local childcare rose by almost a quarter from 83,928 in 2014 to 110,826 in 2017, according to government statistics (Early Childhood Development Agency, 2018). However, parents placing their child at a childcare centre may be driven by what parents think their 3-year-old is likely to gain from this arrangement.

Parents in our study appeared to perceive childcare centres as a place where their child could develop their social and cognitive skills.

These were among the top reasons for placing children at a childcare centre at 3 years of age. It is interesting that none of these were common reasons for having mothers or grandmothers as their child's main caregiver at that age. This may reflect mothers' perception that childcare centres are places for cognitive learning and peer interactions. That time spent by mothers or grandmothers playing or interacting with the child in their care constitutes opportunities for cognitive learning and social development, may not be salient to mothers.

It seems possible that parents' perceptions of childcare teachers as trustworthy caregivers may be the cause for more children being placed in childcare. However, only up to 13% of responses regarding the advantages of childcare related to proper supervision and the trustworthiness of childcare teachers. In contrast, a much larger proportion of mothers named cognitive stimulation and peer interaction as the advantages of centre-based care. Parental emphasis on the importance of the learning environment for children's development, does nevertheless suggest that parents have an awareness about the changing developmental needs of their young children.

Main Caregiver Changes

In characterising local caregiving arrangements, we also investigated the stability of children's caregiving arrangements. We found children on average to experience two changes in their main caregiver from birth to 3 years of age. Nearly 90% experienced up to three changes, with a roughly equal three-way split between children experiencing one, two, and three changes to their main caregiver. The fact that only 11% of children in our study had the same caregiver for the first three years of life, lends support to the view that local caregiving

arrangements are more flexible than that in the literature for children in other countries (e.g., NICHD ECCRN, 1997, 2001).

It seems inevitable that young children of working mothers in Singapore will experience at least one change in their main caregiver since mothers return to full-time work at the end of paid maternity leave. Moreover, given that parents appear to prefer their child to be cared for by one main caregiver in a home-based setting at 18 months of age, and that they deem centre-based care more appropriate as children approach 3 years of age, it should therefore come as no surprise that many local children experience one to two changes in their caregiving arrangement.

In fact, it appears that local children experience up to three changes in their main caregiver *because* their parents prefer a single main caregiver in a home-based setting for their child at 18 months of age, and even at 3 years of age. This means putting children in the care of a different main caregiver whenever caregiver availability changes, such as when mothers return to work, and when grandmothers have another child to look after. Therefore, although local caregiving arrangements may appear unstable because children experience a number of changes to their main caregiver, parents may regard caregiving arrangements to be stable because the caregiver can devote herself or himself to her or his charge.

7.2 Impact of Main Caregivers

Child Temperament

We explored whether children's main caregivers would impact child temperament, and found the largest predictor of temperament at 3 years of age to be temperament at 18 months, underlining the stability of temperament (e.g., Bornstein et al., 2015). Children in our study

maintained relative ranking on the easy-difficult dimension of temperament from 18 to 30 months of age; they also displayed a more difficult temperament at 18 months, reflecting the rapid changes posited to take place during early development (e.g., Rueda, 2012).

In comparison to the contribution to temperament at 3 years by temperament at 18 months and attachment at 3 years, we found the type of main caregiver to make only a small contribution to temperament at 3 years. Yamauchi and Leigh (2011) found children in full-time non-parental care more likely than those in part-time non-parental care to have a difficult temperament, independent of care quality, and regardless of children were in home- or centre-based care. We found instead children more likely to have an easy temperament at 3 years of age, if they were in home-based non-parental care rather than parental care at 4 months of age.

Our unexpected finding may be explained by our home-based (non-parental) group being cared for by an experienced caregiver during infancy (cf. Fergusson et al., 2008), but it may also relate to the characteristics of the parental care group in our study. The main caregiver for most children in home-based care at 4 months was their grandmother (the minority were cared for by their grandfather, a domestic helper, nanny, or relative). No other group in our sample had the benefit of one-to-one care by the same experienced caregiver throughout the work week.

The above account is supported by our observations that children in home-based care at 4 months were more securely attached to their mother at 18 months, and close to their mother throughout the study, than children in parental care at 4 months. Research indicates that the goodness-of-fit between children and their attachment figure is more easily established when the caregiver is appropriately responsive

to infant cues of distress (e.g., van den Boom, 1994). Having an experienced caregiver in infancy could facilitate this good fit between child and main caregiver. This could lead to working mothers being presented with a child who, at night and on the weekend, displays more positive affect and behaviours consistent with a securely attached child.

We note however that the, albeit small, contribution by home-based care at 4 months to child temperament was over and above that of attachment at 3 years, and maternal closeness at 4 months. This means that it is not just because the home-based group was more securely attached or closer to their mother, that they were more likely than the parental group to have an easy temperament at 3 years. Rather, the reason likely relates to the caregiving arrangements that were unique to children in parental care.

The main caregiver of most children in home-based care at 4 months was their grandmother, but she also looked after the child in concert with other caregivers, such as other grandparents, a domestic helper, and other relatives. In contrast, the main caregiver of most children in parental care at 4 months was their mother, with a third of these mothers looking after the child entirely on their own during the work week, and a proportion of them being their child's sole caregiver. The lack of instrumental support for mothers who were their child's sole caregiver in the infant years could be one reason for a less than ideal goodness-of-fit between child and mother. This caregiving arrangement could potentially be exacerbated by the demands of caring for an infant with a difficult temperament (e.g., De Schipper et al., 2004). We speculate that this could set up a pattern of interactions characterised by less positive affect, and subsequently result in children being more likely to have a difficult temperament at 3 years of age.

We interpret these findings to indicate that caregiving arrangements can impact child temperament. Previous research has demonstrated that toddlers can lean towards having a more easy temperament from having caregivers who are more responsive to their needs, or towards having a more difficult temperament from having caregivers who engage in more punitive reactions (e.g., Brooker and Buss, 2014; van den Akker et al., 2010). It is possible for young children to have a more difficult temperament due to less responsive or harsher parenting, which may arise when parents who are their child's sole caregiver, face caregiving difficulties on their own. Earlier work has shown parenting stress to adversely affect infant temperament (Zonderman, 2012), as well as young children's social-emotional and language development (Molfese et al., 2008). Further research would however be needed to confirm the hypothesis that parenting stress affects child temperament via parenting behaviours.

Attachment Security

We examined the impact of children's main caregivers on attachment security at 3 years of age. Earlier work found putting children in childcare per se not to impact attachment security, and more hours in childcare and low quality care to impact attachment security only when maternal sensitivity was low (NICHD ECCRN, 1997, 2001). Consistent with these findings, we did not find the type of main caregiver to impact attachment security; children were not more securely attached to their mothers if their mothers were their main caregiver. The implications of our findings are that working mothers were able to maintain their emotional bond with their child, even when contact with their child had been restricted to time spent together at night and on weekends.

In our study, children's emotional bond to their mother was not affected by the type of care they received. Rather, attachment security at 18 months and child temperament at 3 years both predicted attachment security at 3 years, in line with the literature regarding the stability of attachment (e.g., Moss et al., 2005) and the role of temperament in attachment (e.g., Laible et al., 2008). Although parental care at 4 months had some impact on child temperament at 3 years in our study, it is reassuring to note that mother-child attachment appeared resilient to the possible impact of parenting stress which may have arose from some mothers being the only caregiver of their infant.

Developmental Outcomes

We explored the impact of children's main caregivers on children's general and social-emotional development. We however did not find parental care, relative to other types of main caregivers, to be associated with any developmental outcomes at 3 years of age. We therefore discuss the factors found to predict social-emotional development in the following section. The factors which predict the other domains of general development are discussed in subsequent sections.

Social-Emotional Development

Children in our study were more likely to have better social-emotional outcomes if they were securely attached to their mother at both 18 months and 3 years of age, in keeping with findings that secure children have better self-regulation and social skills (Allen et al., 2007; Ding et al., 2014; Kerns et al., 2007; West et al., 2013). Previous studies found easy temperament to be associated with better social skills and fewer problem behaviours (Liew et al., 2004; Lahey et al., 2008; Rubin et al., 2002; Vitaro et al., 2006). We note however that temperament did not reliably predict social-emotional outcomes in our study, even though

temperament at 18 months was weakly correlated with social-emotional outcomes at 3 years. It seems that the contribution of temperament to social-emotional outcomes may have been subsumed by the contribution of attachment to social-emotional outcomes. The moderate correlations between temperament and attachment security in our study support this account. Our findings thus emphasise the importance of mothers developing a secure bond with their infants, and reiterate the advantages of having an easy temperament for social-emotional development in the early years.

Maternal employment and maternal education both also predicted social-emotional outcomes at 3 years of age, although the contribution by maternal employment was larger than that of maternal education. Given that mothers with more years of education tend to invest more time in literacy activities with their toddlers (Westerlund & Lagerberg, 2008), which in turn facilitates social-emotional development (Baker, 2013), it is perhaps not unexpected that higher maternal education was associated with better social-emotional outcomes in our study.

With regard to the contribution of maternal employment to social-emotional outcomes, our results were in the opposite direction of previous findings (Sherlock et al., 2008). We found children of working mothers to have better social-emotional outcomes than children of non-working mothers. This surprising finding likely relates to the caregiving arrangements for children with non-working mothers in our study. Thirteen children with non-working mothers were looked after entirely and only by their mother throughout the study, and most non-working mothers were the sole caregiver of their child in the work week. In our view, the absence of other interaction partners may have given these children relatively fewer opportunities for developing social skills, leading

to children with mothers in full-time employment to have an advantage in social-emotional outcomes in our study.

Thus, despite the popular view that children might have more opportunities for developing their social skills through interactions with peers at the childcare centre, our findings would appear to suggest that at least at 3 years of age, children's social-emotional skills advance across caregiving settings, as long as caregivers spend time with them. We posit that social-emotional skills are slower to develop when mothers, who are their child's sole caregivers with other responsibilities beyond caregiving, or who have less education, speak or play less with their children. Engaging children in conversation and play is a strategy (Smith & Pellegrini, 2013; Tamis-LeMonda & Rodriguez, 2009) which all parents can afford to pay more attention to.

General Development

One *could* expect the better opportunities for language and cognitive learning which children in centre-based care have over children with other types of main caregivers (NICHD ECCRN, 2002), to translate to better communication and problem solving skills. One *might* expect children in centre-based care to have better communication and problem solving skills than children in parental care. We however did not find the type of main caregiver to impact either communication or problem solving skills.

A logical explanation for our findings would be that children benefitted from having mothers as their main caregiver, since mothers may have been more likely than other caregivers to engage in activities which stimulate young children's learning, resulting in no observable communication and problem solving differences between children in parental care and those in centre-based care. However, this seems an

unlikely explanation since maternal education reliably predicted problem solving skills, as well as social-emotional outcomes at 3 years of age. Independent of Type of Main Caregiver, mothers with more education in our study may have spent more time interacting and playing with their child (e.g., Baker 2013), or may have encouraged their child's main caregiver to engage in these activities, thereby facilitating the development of their child's problem solving and social-emotional skills.

As we observed earlier, parents in our study perceived the benefits of placing their child in a childcare centre to include cognitive stimulation. However, our study offers no evidence to suggest that childcare centres are better than other care settings for developing problem solving skills at 3 years of age. We found only maternal education to predict problem solving skills. Our findings indicate that cognitive learning is an activity not exclusive to childcare centres, although more likely to be encouraged by mothers with more education, who may be mindful of the fact that children learn when their caregivers engage them in play (Tamis-LeMonda & Rodriguez, 2009).

Children in centre-based care were not more advanced in communication skills than those in parental care. It appears reassuring that children's communication skills were not distinguished by the type of main caregiver they had. However, as discussed previously, our findings are likely explained by the fact that almost all the children in our study received the maximum score for communication skills, as well as for gross motor and personal-social skills. It may be the case that caregivers provide similar amounts of language input to boys and girls across local care settings, an issue which could be explored using standardised assessments for language development, rather than communication milestones alone, in future work.

We do note however that maternal closeness and gender predicted fine motor skills. Throughout the study, almost all mothers chose the highest or the next highest score on a 5-point scale in response to whether they were close to their child. Despite these near ceiling scores for maternal closeness, we found children who were close to their mother at 4 months to have better fine motor skills, and girls to have better fine motor skills than boys. While girls may have an advantage over boys from engaging in activities which emphasise fine motor rather than gross motor movements (Kerstjens et. al., 2009; Kokštejn, Musálek, & Tufano, 2017), it is not clear why those close to their mother would have better fine motor movements. Further work to elucidate the role of language input and parenting style in the development of local children's language and social skills, could also shed light on the factors which promote fine motor skills among those close to their mother during infancy.

7.3 Impact of Main Caregiver Changes

As mentioned earlier, we observed the children in our sample to experience a number of main caregiver changes in the first three years of life. That children in our sample experienced about two changes on average, and that a third of them experienced three changes, would be of no or little importance if it had no impact on children's development. Earlier work however has suggested that children from low-income families who experience a number of changes to their main caregiver, are adversely affected by caregiver instability, particularly in terms of social development. However, we found the number of main caregiver changes to have no impact on any of the developmental outcomes measured in our study.

Child Temperament and Attachment Security

There is no prior research on the impact of main caregiver changes on child temperament. Only a meta-analysis found caregiver stability to adversely affect attachment security (Ahnert et al., 2006). Other work found main caregiver changes to affect attachment security only in the context of low maternal sensitivity (NICHD ECCRN, 1997, 2001). We also did not find child temperament or mother-child attachment at 3 years of age to be adversely affected by children experiencing more changes to their main caregiver in the first three years of life.

It is conceivable that changes to children's main caregivers which take place in a shorter span of time, such as within the day, may be more detrimental to children's outcomes, but research has shown such measures of caregiver instability to have limited impact on outcomes. De Schipper et al. (2004) found changes within the day to be associated with more problem behaviours, only in the context of difficult temperament. We posit that changes to children's main caregivers, in the context of high quality care, may not negatively affect early outcomes, such as mother-child attachment.

While the main caregiver may have changed a number of times for children in our study, we recognise that children's main caregivers may continue to be one of children's caregivers. Infants in combination care with their mother and their grandmother as their main caregivers, would experience continuity of care if the next main caregiver were to be the same grandmother. A domestic helper who may not be a child's main caregiver at 4 or 18 months of age, could still be a familiar figure to the child when she becomes the child's main caregiver at 3 years of age.

Children could also experience a change in their main caregiver, but not a change in their care setting. In the case where the

grandmother is no longer available as a main caregiver because she has to care for the child's younger sibling, the child who had her grandmother as her main caregiver at 18 months, could be cared for by a domestic helper at her grandmother's home at 3 years, since parents often give grandparents the task of supervising their domestic helper. Given that a large proportion of our sample remained in home-based care at 3 years of age, we propose that these reasons are possible explanations for why caregiver changes may not constitute discontinuity, and as such may not adversely impact outcomes such as mother-child attachment and child temperament.

Social-Emotional and General Development

Prior work involving low-income families and unmarried family units found more changes to children's main caregiver to result in poorer social skills (Bratsch-Hines et al., 2015) and more problem behaviours (Pilarz & Hill, 2014). While the number of main caregiver changes experienced by children in our study was similar to that found in earlier studies (e.g., Pilarz & Hill, 2014), we did not find any association between main caregiver changes and children's social-emotional outcomes at 3 years of age, possibly because our sample differed from those of previous studies.

We have argued that children in our study experience relatively high quality of care. Although we did not measure care quality in our study, we did observe the ratio of caregivers to children to be high. Most children in our study were in home-based care, where main caregivers typically had only one child to look after. Childcare centres in Singapore maintain a regulated ratio of one caregiver to five infants, although this ratio may be lower in practice for very young infants, such as one caregiver to two infants. With the exception of families where mothers

were the sole caregivers of their children during the work week or all the time, most main caregivers would likely have also received help from other people in the child's family. Children in our study were looked after by as many as four caregivers, including their parents. In the absence of high quality care, caregiver changes may then have a more observable impact on children's social-emotional outcomes.

7.4 Recommendations

We found positive outcomes to be associated with both maternal employment and maternal education. Better social-emotional skills were observed for children whose mothers had more education or whose mothers were in full-time employment. Better problem solving skills were also observed among children with more educated mothers. It would be challenging to insist that mothers receive more education, and reprehensible to compel mothers to work full-time. It is instead possible to provide guidance and training to both mothers and fathers, home-based caregivers, and childcare teachers, on how to engage young children in activities which promote cognitive and social learning, and in drawing, craft, and writing activities which facilitate fine motor development.

It is clear from our findings that home-based care and centre-based care between birth and 3 years of age had no adverse effects on children's outcomes. However, parental care also did not provide any advantages. In fact, children were more difficult at 3 years of age if they had been in parental rather than home-based care at 4 months of age. In assuming that parental care leads to better developmental outcomes, we may overlook the fact that mothers who are their first born infant's sole caregiver due to family circumstances, may experience relatively high levels of parenting stress, which may in turn impact children's

outcomes. Our findings suggest that it would unwise to assume that one type of caregiving arrangement is better than another, without considering the circumstances in which caregiving takes place.

Mothers need not feel guilty or apprehensive about pursing their careers or their education, since it may not be necessarily at the expense of their children, if mothers have made good caregiving arrangements for their children. We view our findings as evidence against the notion that a working career for a woman with infants or young children is somehow inconsistent with being a good mother. In fact, children of single parents could benefit by being in high quality care, where the ratio of caregivers to children is close to one, and the caregiver is sensitive and responsive to the child's needs.

We also found children with easy temperaments to be more securely attached, and children who were securely attached to have better social-emotional skills. While parents and caregivers seeking to promote a strong emotional bond to their child cannot change their child's temperament, parents and caregivers can adjust their responses to promote interactions which are characterised by positive rather than negative emotions. Parents can be trained to anticipate and manage situations to which children with difficult temperaments respond poorly (Rapee, Kennedy, Ingram, Edwards, & Sweeney, 2005). Caregivers can learn to substitute their existing interaction styles with responsive and consistent child management techniques, which help children with difficult temperaments regulate their emotions (McClowry, 2002; McClowry, Snow, & Tamis-LeMonda, 2005) — techniques which have been shown to effectively reduce subsequent problem behaviours among children with difficult temperaments (McClowry et al., 2005; McClowry, Rodriguez, & Koslowitz, 2008).

Training parents and caregivers to be more responsive in their parenting style would also promote the emotional bond between parent and child (Laible & Thompson, 2000), thereby facilitating children's cognitive and language learning (Tamis-LeMonda, Shannon, Cabrera, & Lamb, 2004). Given parents' interest in their child's cognitive development, a training workshop designed to increase caregiver (maternal) sensitivity would be well-received by parents, if parents were also apprised of its benefits to children in the cognitive domain.

7.5 Future Directions

Our study demonstrates that local children's caregiving arrangements in early childhood are complex. In other communities, children often have one caregiver from birth to three years of age. They may experience only one change in their caregiving arrangement, shifting from maternal or home-based care (usually with a grandparent) to care at a childcare centre. In Singapore, every permutation is possible. Children's main caregivers change from parents, to one or more other caregivers at different ages, obviating simple trend analyses.

Caregiving factors may impact child outcomes differently in low-income families (Coley & Lombardi, 2013; Kossek, Pichler, Meece, & Barratt, 2008). Low-income families face complex challenges such as financial difficulties, job instability, and strained family relationships. A recent local ethnographic study by Teo (2018) documents these challenges. Parents with a monthly gross income of $1,500 or less skip meals in order that their children might have regular meals. These challenges limit childcare options and result in frequent changes in caregiving arrangements, affecting children's social-emotional development (e.g., Hartas, 2011; McLoyd, 1998; Peng & Robins, 2010).

As a result of financial constraints and lower parental academic expectations in families with low-income, local children from low-income families often receive little or no preschool instruction and typically lack access to high quality childcare. Their lack of school readiness results in these children experiencing difficulties keeping apace with the school curriculum, with academic difficulties emerging as early as the first year of school (Teo, 2018). Given our findings that maternal education contributes to the development of social-emotional and problem solving skills, one might expect young children from low-income families to also be at a disadvantage in terms of early developmental outcomes.

Early childhood developmental programmes such as Head Start (US Department of Health and Human Services, n.d.) have been shown to improve school readiness, which has long-term implications for academic achievement and school engagement among children and youths from low-income families (e.g., Anderson et al., 2003; Burger, 2010). Such programmes do help socio-economically disadvantaged children level up, but are not without their own challenges. Parents on shift work, for example, may not be available to take their children to preschool or kindergarten. Instead, equipping caregivers of children from low-income families with the appropriate skills to facilitate children's cognitive and social development could be another way to mitigate the impact of low-income on children's developmental outcomes in the early years. Future work could focus on the benefits of interventions which equip and encourage low-income families to engage their young children in more conversation and play.

7.6 Conclusion

We find that placing children in non-parental care, be it with grandparents, domestic helpers, nannies, relatives, or childcare centres,

does not put children at a disadvantage in terms of developmental outcomes or mother-child attachment. It is clear from our study that there may be no single best caregiving arrangement for children in their first three years of life. The important factors which facilitate children's social-emotional development include a strong emotional bond between mother and child, and the provision of opportunities to engage in more play and interactions with caregivers (Mendelsohn et al., 2018). Our findings should provide some reassurance to parents who feel apprehensive that practical considerations took priority over placing children with caregivers they regard to be trustworthy or in environments which they regard to facilitate learning and social development. Finally, we offer a cautionary note regarding the possible repercussions on child temperament from not providing main caregivers with instrumental support or the support of another caregiver.

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Appendix A

Demographics of Recruited Participants

Demographic Characteristics	Completed *N* = 439		Dropped Out *N* = 192		Recruited *N* = 631			
	n	%	*n*	%	*n*	%	χ^2	*p*
Maternal Employment								
Not Working	83	18.9	57	29.7	140	22.2		
Working Part-time	38	8.7	14	7.3	52	8.2	9.0	.011
Working Full-time	318	72.4	121	63.0	439	69.6		
Mother's race								
Chinese	306	69.7	92	47.9	398	63.1		
Malay	81	18.5	62	32.3	143	22.7	27.4	.001
Indian	35	8.0	27	14.1	62	9.8		
Others	17	3.9	11	5.7	28	4.4		
Maternal Education								
Primary School	27	6.2	31	16.1	58	9.2		
Secondary School	38	8.7	33	17.2	71	11.3		
Post-secondary	43	9.8	27	14.1	70	11.1	38.2	.001
Diploma	140	31.9	53	27.6	193	30.6		
Degree and above	191	43.5	48	25.0	239	37.9		
Housing Type								
Up to 3-room HDB Flat	61	13.9	49	25.5	110	17.4		
4-room HDB Flat	192	43.7	77	40.1	269	42.6	12.9	.005
5-room HDB Flat	159	36.2	57	29.7	216	34.2		
Private Housing	27	6.2	9	4.7	36	5.7		

Note: Percentages may not add up to 100% as they are rounded up nearest 1 decimal place.

Appendix B

Semi-Structured Interview

Section 1: Demographic Characteristics

D1 What is your (respondent's) relationship to the infant?
- 1 Father
- 2 Mother

D2 What is your ethnic group?
- 1 Chinese
- 2 Malay
- 3 Indian
- 4 Others, specify _____

D2a Where were you born? _____

D2b Where was your spouse born? _____

D3 How old are you? _____

D4 What is your highest educational level? _____

D5 What is your type of housing? _____

D6 What is your employment status?
- 1 Working Full-time
- 2 Working Part-time
- 3 Flexible hours / Ad hoc
- 4 Not Working

D7 What is your spouse's employment status?
- 1 Working Full-time
- 2 Working Part-time
- 3 Flexible hours / Ad hoc
- 4 Not Working

D8 What is your marital status? (Don't ask if obvious)
- 1 Married
- 2 Divorced
- 3 Single
- 4 Widower

Section 2: Current Caregiving Arrangements

Semi-structured interview uses the following questions as a guide.

A1 Describe how your child is being cared for in a typical week.
Who is his/her main caregiver?
Who else cares for your child?
How much time is spent with each caregiver: __ day(s)

What do caregivers do with your child? Who bathes, changes diapers, feeds, plays, talks, reads, sings to the child?
What languages are spoken to your child?
What languages does he/she understand/speak?

A2 What reasons have led to this caregiving arrangement?

A3 What is/are the most important factor(s) which have affected your choice of caregiving arrangement?

A4 How happy are you with this arrangement? (Interviewer circle/mark)

1 Very unhappy 2 Unhappy 3 Neutral 4 Happy 5 Very happy

A5 What aspects of your current arrangement are you happy about?

A6 What aspects of your current arrangement are you unhappy about?

A7 What would be your ideal care arrangement for your child? Why?

A8 What else do you feel is important for choosing the care arrangement?

A9 Have there been any changes to your child's care arrangement? At what age did the caregiving arrangement start?

Section 3: Qualities of the <u>Ideal</u> Caregiver and <u>Ideal</u> Care Environment

B1 If you had a choice, what 3 qualities do you feel are most important for your child's caregiver to have?

B2 If you had a choice, what 3 aspects do you feel are most important for your child's caregiving environment to have?

Section 4: Maternal Closeness Ratings

C1 How close do you feel to your baby?

1 Not close at all 2 Not close 3 Neutral 4 Close 5 Very Close

Appendix C

Qualitative Analysis: Themes and Codes

Theme 1: Positive Aspects of the Caregiving Arrangement		
Frequency	**Example Codes**	**Words from the Interview**
5	Caring	Caregiver displays caring qualities, e.g., kindness, love, friendly attitude.
29	Working Parents	Parents are unable to care for their child because of work commitments.
40	Trustworthy	Caregiver is trustworthy, e.g., responsible, recommended, part of the family.
Theme 2: Negative Aspects of the Caregiving Arrangement		
Frequency	**Example Codes**	**Words from the Interview**
8	Inconvenient	Caregiving arrangement is inconvenient, e.g., affects parents' work.
16	No Time Flexibility	Mother does not have time for herself, e.g., to rest, for self-care, to resume employment.
22	Unhygienic	Child falls sick frequently; low standards of cleanliness, e.g., mention of germs.
Theme 3: The Caregiving Environment		
Frequency	**Example Codes**	**Words from the Interview**
7	Freedom to Explore	Environment allows child to explore freely, e.g., outdoor area, close to nature, no constraints.
11	Reputable	Arrangement has been recommended, e.g., childcare centre or nanny has a good reputation.
13	Structured	Tidy and neat, or regulated environment, e.g., clutter-free, discipline, daily routines.

Appendix D

Distribution of ASQ-3 Scores

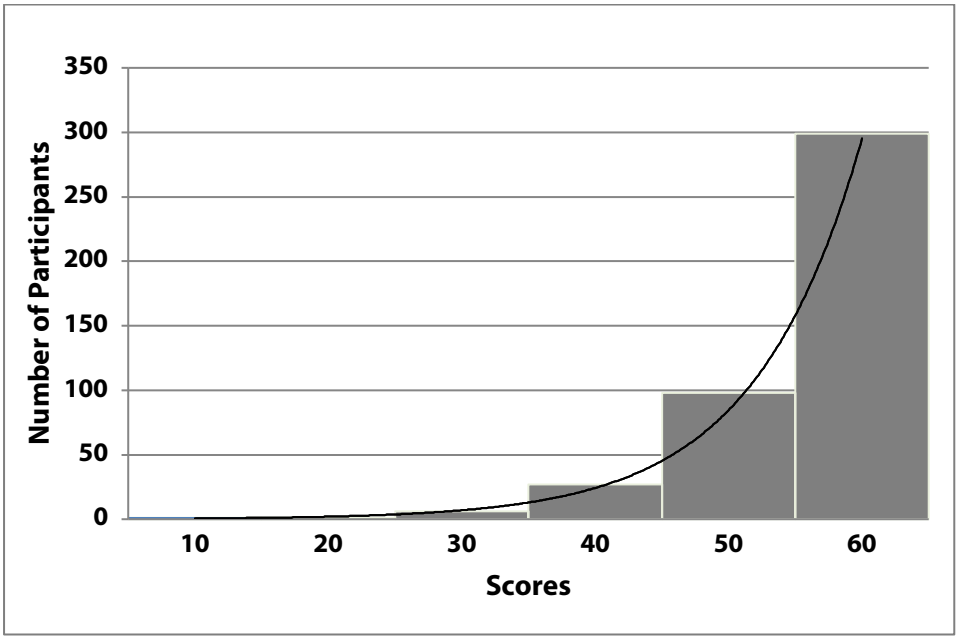

Figure D1. Distribution of ASQ-3 (Communication Skills) Scores

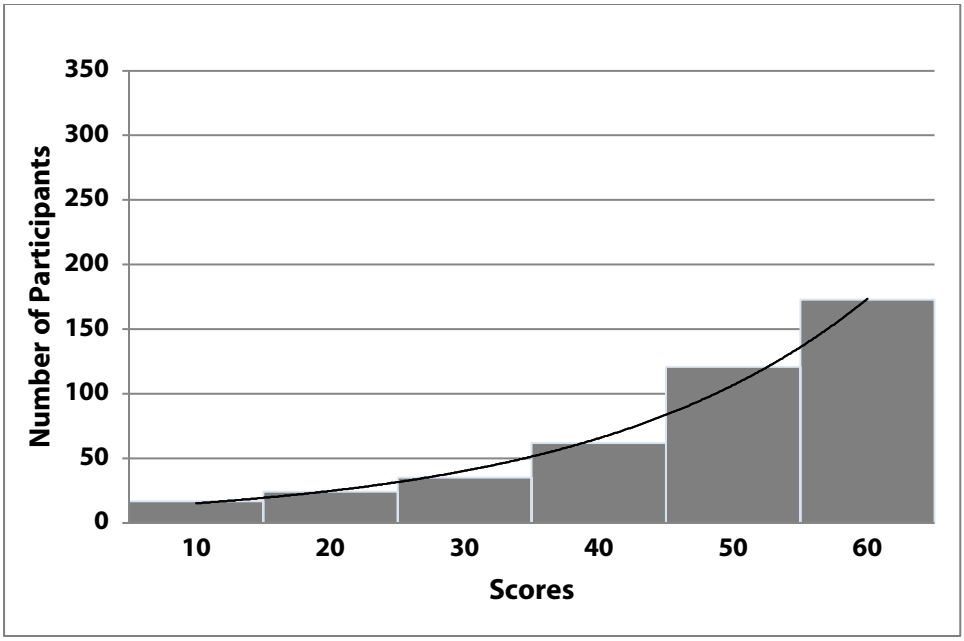

Figure D2. Distribution of ASQ-3 (Fine Motor Skills) Scores

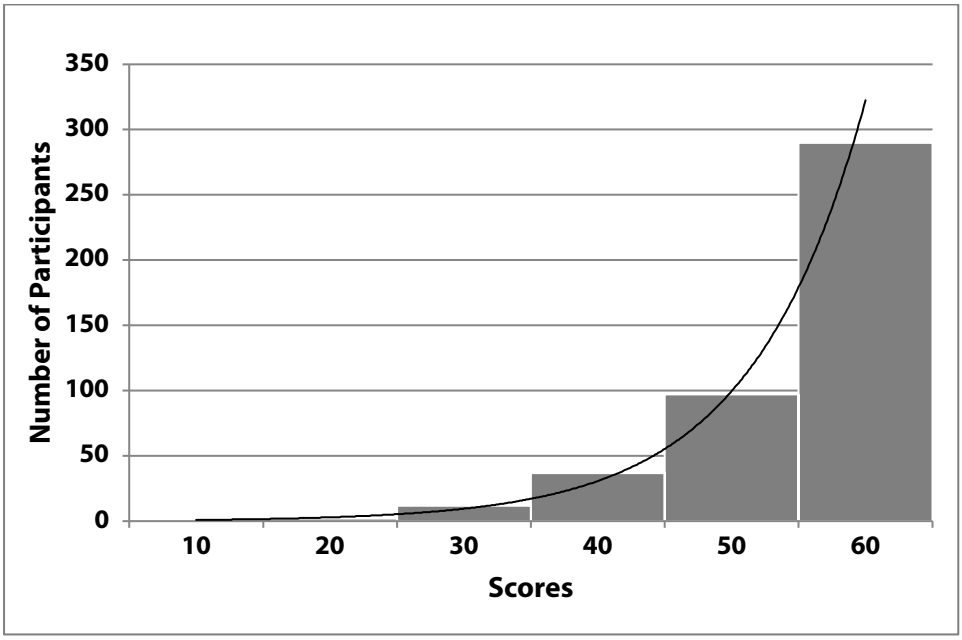

Figure D3. Distribution of ASQ-3 (Gross Motor Skills) Scores

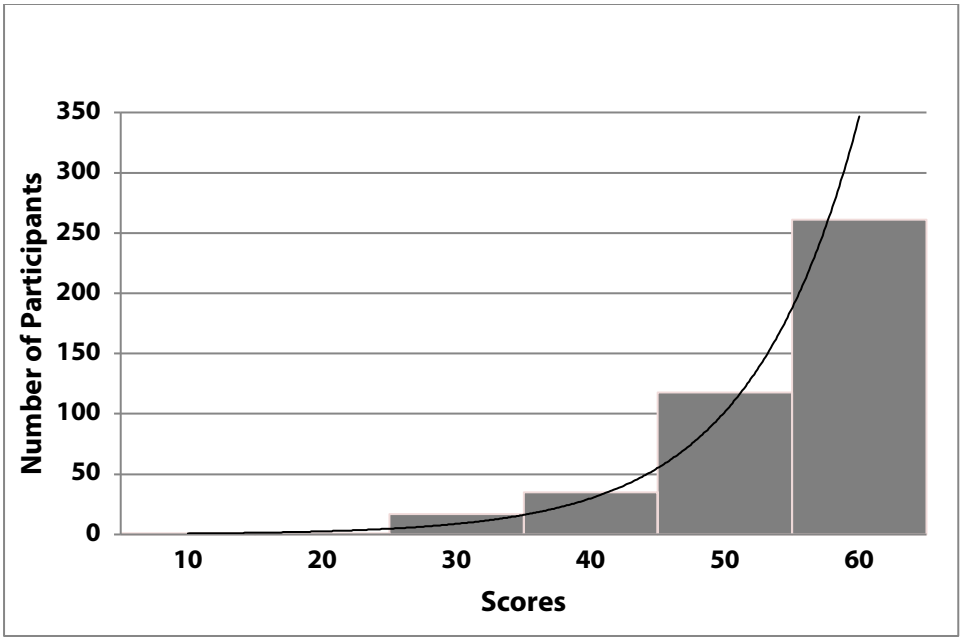

Figure D4: Distribution of ASQ-3 (Problem Solving Skills) Scores

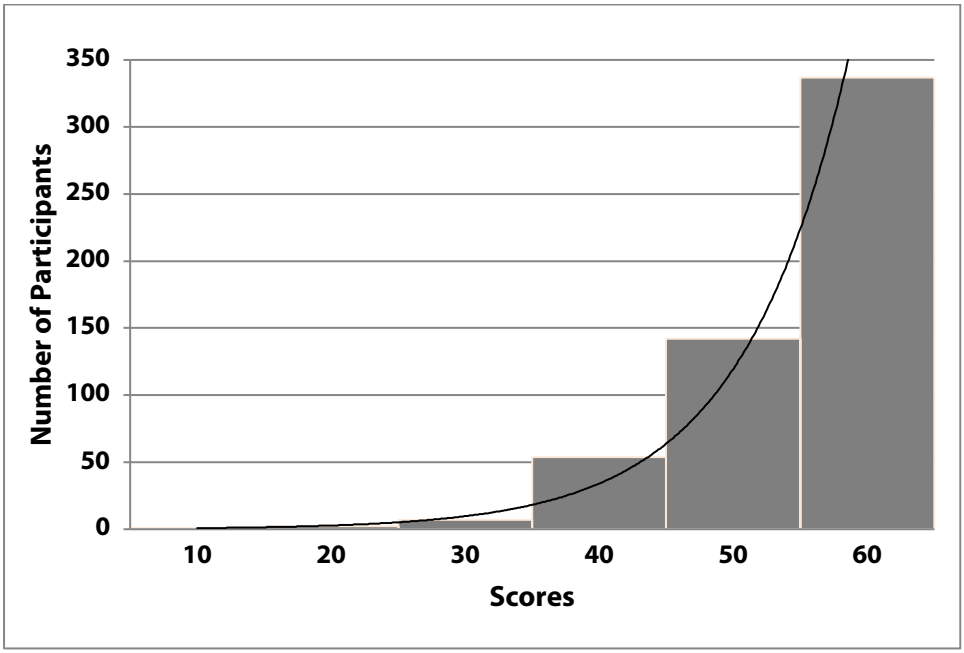

Figure D5. Distribution of ASQ-3 (Personal-Social Skills) Scores

LIST OF MONOGRAPHS

The Singapore Children's Society's monographs are available at https://www.childrensociety.org.sg/research-completed.

1. *The Public Perceptions of Child Abuse and Neglect in Singapore* published in December 1996 investigates the average Singaporean's thinking towards child abuse and neglect.
2. *The Professional and Public Perceptions of Child Abuse and Neglect in Singapore: An Overview* published in April 2000 focuses on the attitudes of professionals towards abuse or neglect, compared with those of the public; and on their opinions on the experience and reporting of child abuse and neglect.
3. *The Professional and Public Perceptions of Physical Child Abuse and Neglect in Singapore* published in April 2000 focuses specifically on the attitudes of professionals and the public towards physical child abuse and neglect.
4. *Emotional Maltreatment of Children in Singapore: Professional and Public Perceptions* published in February 2002 focuses on the attitudes of professionals and the public towards child emotional maltreatment.
5. *Child Sexual Abuse in Singapore: Professional and Public Perceptions* published in June 2003 focuses specifically on the attitudes of professionals and the public towards child sexual abuse.
6. *The Parenting Project: Disciplinary Practices, Child Care Arrangements and Parenting Practices in Singapore* published in October 2006 looks into how children are disciplined, who their main caregivers are, and how parents interact with their children in general.
7. *Children's Social and Emotional Well-Being in Singapore* published in July 2008 examined parents' and children's perspectives on children's state of social and emotional well-being.
8. *Bullying in Singapore Schools* published in July 2008 examined the prevalence of bullying in the Primary and Secondary schools of Singapore.
9. *Young Adults' Recall of School Bullying* published in July 2010 examined the possible long-term effects of bullying on victims after they leave school and enter the society.
10. *Changing Public Perceptions of Child Abuse and Neglect in Singapore* published in November 2015 and revised in January 2016, examined changes over the years in the way Singaporeans perceive child abuse and neglect, their views on reporting it and their judgment of its seriousness.
11. *Schools and the Social Divide: An Examination of Children's Self-Concept and Aspirations in Singapore* published in 2016 examined the influence of school type on children's self-concept and their perceptions of "elite" and "non-elite" schools.