The beginning of infant self-regulation: a longitudinal study involving infants, mothers and fathers in the Netherlands and China

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Chapter I

General Introduction

Self-regulation is an ability that influences different aspects of life. Problems with self-regulation can result in significant personal as well as social problems such as substance addiction (e.g., drugs, alcohol and cigarettes), health problems (e.g., obesity and eating disorders), violence and crime (e.g., Baumeister et al., 2015; Hirschi, 2004; Johnson et al., 2012). Self-regulation emerges in early infancy and increases dramatically in later infancy and toddlerhood. This process has been described as the development from external regulation depending on caregivers to independent self-regulation (Calkins, 2002). During this transition, both infant factors (e.g., infant attention) and social factors (e.g., parental behaviors) contribute to the development of self-regulation (e.g., Bernier et al., 2010; Kopp, 1989; Miyake et al., 2000). As mother-infant and father-infant relationships provide different experiences for infants, the parental impact on self-regulation may also differ between mothers and fathers (e.g., Braungart-Rieker et al., 1998; Feldman et al., 2003). Yet, most parenting and infant research has focused on mothers, whereas fathers – and other family members with a caregiving role – are rarely investigated. Moreover, empirical studies of parenting and infant development have largely been restricted to North America and Western Europe (e.g., Bornstein, 2015; Tomlinson et al., 2014). As some evidence shows that the association between parental behaviors and the process of infant development is dependent on country and the associated cultural context (e.g., Deater-Deckard et al., 2011; Landford et al., 2016), it is also important to carry out research in non-Western countries to understand the generalizability of theories built in Western contexts and primarily rooted in Western tradition to non-Western populations. China, a non-Western country, which has the world's most populous country with traditions of multi-generational co-residence (including grandparents). However, few empirical studies have focused on grandparenting, parenting and child development. The current dissertation longitudinally investigated the parental role in infant self-regulation during the first two years of life in the Netherlands and China and also specifically focused on the role of grandparents in China.

Infant self-regulation

Self-regulation refers to the ability to deliberately control one's affect and behavior to meet certain standards such as customs, norms and social expectations, and to pursue long-term goals (Kopp, 1982). Mischel and colleagues (1995) suggested that self-regulation is a dynamic cognitive-affective processing system (CAPS) which contains two components: a "hot" emotional system and a "cool" cognitive system. The "hot" emotional system is quick allowing individuals to have rapid, impulsive and simple reactions such as crying (Metcalfe & Mischel, 1999). The "cool" cognitive system is slow and controls rational, logical and strategic behaviors. The two systems interact with one another. The hot system can be evoked as well as cooled through the connection with the cool system (Mischel & Ayduk, 2004).

Emotional self-regulation is the process of maintaining and regulating emotional responsiveness (Bridges & Grolnick, 1995). According to Kopp's (1982) overview, emotional self-regulation emerges around 3 months of age along with the development of self-soothing behaviors (e.g., sucking) and simple movement (e.g., turning around).

Between 3 and 6 months of age, infants are capable of using attention to engage in their stimuli of interest and disengage from negative events. This attentional control from negative stimulation (e.g., a scary doll) is important to decrease negative affect (Rothbart, 1981, 1986). Around the end of the first year, infants become more active and purposeful in trying to manage their emotions although they do still fail at times. (Calkins & Dedmon, 2000; Kopp, 1989).

Cognitive self-regulation - often called executive function (EF) - refers to a set of higher-order cognitive processes that includes goal-directed actions such as working memory, inhibition, and cognitive flexibility (e.g., Hughes & Ensor, 2005). Historically, there were two theoretical approaches of the development of EF. One approach focused on EF as a unitary construct with a central attention system regulating different subprocesses, whereas the other approach saw EF as dissociable processes with variation in the developmental sequence of EF components (e.g., Baddeley, 1986; Diamond, 1991; Posner & Rothbart, 1998; Zelado & Frye, 1998). Miyake et al. (2000) described an integrative theoretical framework of these opposing theories: "unity and diversity of EF". This new theory indicates that EF components are partially independent but still intercorrelated with one another. Later research provided considerable evidence to support this "unity and diversity" idea (e.g., Huizinga et al., 2006; Lehto et al., 2003). However, other studies also indicated that the unity and independence of three EF components (working memory, inhibition, and cognitive flexibility) may vary in different age groups (Best & Miller, 2010). For example, working memory was found to be related to inhibition, and cognitive flexibility was not related to the other two components among preschoolers (Senn et al., 2004). Another study found that inhibition was independent of working memory and cognitive flexibility, and the latter two components were associated with each other among 7-,11-,15- and 21-year-olds (Huizinga et al., 2006).

Most research indicates that the maturation of attention lays the foundation for the development of EF (e.g., Baddeley, 2002; Miyake et al., 2000; Sethi et al., 2000). An influential model proposes that the executive attention network is pivotal to regulate other brain networks (Posner & Rothbart, 2007) such as networks in the prefrontal cortex which are strongly associated with the development of EF (e.g., Diamond, 1991; Welsh & Pennington, 1988). The development of infant attention starts with the orienting system, which is important for infants to engage with novel stimuli. Later development of the attention system facilitates infants' ability to select and focus on the stimuli, as well as the later ability of shifting between objects (Garon et al., 2008; Hendry et al., 2016). With those emerging systems of attention, infants are able to process information from their surroundings which is necessary for any goal-directed task (Garon et al., 2014).

Parenting as a predictor of self-regulation

Parents interact a lot with infants through daily routines (e.g., feeding, bathing, and playing) during which parents are likely to play an essential role in shaping and socializing both emotional self-regulation and EF. According to attachment theory (Bowlby, 1969, 1988), repeated infant-caregiver interactions construct an "internal working model" to infants. Through this model, infants develop expectations about how caregivers would respond to infants' emotions and behaviors. The attachment theory emphasizes the importance of caregivers' ability to detect infants' signals and adjust to infants' behaviors. Consistent responsive and sensitive caregiving (i.e., a caregiver's ability to perceive and accurately interpret the signals and communications in a child's behavior, and given this understanding, to respond appropriately and promptly) strengthen infants' sense of security, promote the relationship between infants and caregivers and teach infants to have positive expectations from caregivers (Ainsworth, 1978).

Sensitive caregiving not only allows infants to safely show both negative and positive affect and ensures comfort and response from caregivers, but also helps infants regulate their emotions, thereby promoting emotional self-regulation (Cassidy, 1994). Over time, those exchange experiences for emotions integrate into an internal working model that guides infants' behavior (Hofer, 1994). In other words, infants of sensitive caregivers learn that caregivers are reliable sources of support when they are distressed, which encourages infants to show their emotions and helps infants regulate their emotions. The impact of caregivers' sensitivity on infants has not only been tested during normal face-to-face interactions, but also has been tested in challenging situations such as the still-face paradigm (SFP). Tronick and colleagues (1978) designed the SFP to examine whether infants are active contributors to social interactions. In the SFP paradigm, infants are observed during three brief face-to-face episodes with an adult, starting with a normal interaction baseline, followed by an interruption in interaction in which the adult keeps a neutral still face, and ending with a resumption of normal interaction (Tronick et al., 1978). A well-regulated interaction is dyadic with infants and caregivers attuning to each other and reciprocally exchanging emotions (Stern, 1985). The theory of innate intersubjectivity claims that although infants are weak and immature, they are capable of social awareness of subjective states in others (Trevarthen, 1998, 1999). This natural sociability of engaging in others' feelings, interests and purposes during social interactions has equipped infants with abilities of the dyadic exchange of emotions (Schore, 1994, 1996). As early as 2-months-old, infants are able to enter a face-to-face and attentive interaction with caregivers. Infants and caregivers mutually respond to and regulate each other's attention and feelings through vocal, facial and gestural expression (e.g., Fogel & Thelen, 1987; Weinberg & Tronick, 1994). Dyadic regulation is not only influenced by infants' engagement, but also caregivers' response to infants' signals. During the still-face episode, infants in general display less positive affect and increasingly gazing away compared to in the other interaction episodes (Mesman et al., 2009). Infants' reactions clearly show that they have expectations for the adult, and the absence of signal exchange interrupts the dyadic interaction. Infants respond to the still and silent adult with less positive emotions and use self-regulation strategies to regulate themselves in the stressful situation. These reactions in turn highlight the importance

of sensitive responsiveness from parents which can promote the dyadic infant-parent interaction and help infants regulate their emotions.

Sensitive caregiving is also associated with EF development (e.g., Bernier et al., 2010; Blair et al., 2011). One hypothesis on the effect of sensitivity on EF suggests that sensitive parents are better at attuning to children. They structure and assist in the task in order to facilitate children to become independent. With the help from parents, children can develop based on their own needs and learning processes which can contribute to their performance on EF tasks. Another hypothesis is that sensitive caregiving provides infants with a safe and predictable environment to engage in activities, processing information and exploring surroundings. These explorations in turn can stimulate brain development and also inspire infants on how to solve problems which lead to EF development. Empirical research showed that maternal sensitivity at 12 to 15 months was weakly related to EF at 26 months (Bernier et al., 2010). Blair and colleagues (2011, 2014) also found that positive parenting including sensitivity was related to better child EF at 36 and 60 months in a sample of low-income families.

The role of fathers in the development of self-regulation

The nuclear family is a systemic unit with both mothers and fathers playing important roles in infant development (McLoyd, 1990). Although an increasing number of studies on child development also focus on fatherhood (Cabrera et al., 2000), the impact of fathers on infants especially for self-regulation remains virtually untapped in the literature. It is argued that mother-infant and father-infant relationships provide different experiences for infants, thus two parents may contribute to different aspects of infant development (Lewis & Lamb, 2003). Mothers in general spend more time with infants in caretaking functions, while fathers are more likely to regard themselves as an active playmate and engage infants in more physical and exciting play than mothers (e.g., Hagan & Kuebli, 2007). For example, father-infant interactions can be characterized as less predictable, more physical and exciting and evoke more infant arousal than mother-infant interactions (Feldman, 2003). Moreover, fathers tend to use more complicated vocabulary and more attractive language than mothers (Lewis, 1997). In the face-to-face infant-parent interactions, studies that explored infant emotional self-regulation to both parents showed that infants used similar regulation strategies to respond to mothers and fathers (e.g., Bridges et al., 1997; Martins et al., 2016). However, results of studies of infants' reactions in a challenging situation such as the SFP are inconsistent. Three of these studies found that infants expressed similar negative and positive affect during mother–infant and father–infant still-face episodes (Ekas et al., 2013; Forbes et al., 2004; Kisilevsky et al., 1998). One study found that infants showed more negative affect with fathers when fathers did the SFP with their infant following the SFP by mothers (order was counterbalanced; Braungart-Rieker et al., 1998).

Only two studies to our knowledge have investigated maternal and paternal sensitivity together in relation to the development of child EF. Towe-Goodman and colleagues (2016) suggested an emergent role of paternal sensitivity such that paternal sensitivity

in toddlerhood (age 24 months) was more strongly related to 36-month-old EF abilities than was paternal sensitivity in infancy (7-months-old). In contrast, the contribution of maternal sensitivity to EF abilities was stable from infancy to toddlerhood. The other study (Lucassen et al., 2015) found that maternal sensitivity at 4 years was concurrently linked to EF, whereas there was no relation between paternal sensitivity and EF. Inconsistent evidence for infants' reactions in the SFP across parents and the association between paternal sensitivity and EF underscore the need to further investigate this issue. As limited research has focused on fathers' role in infant emotional and cognitive self-regulation, and the existing research provides inconsistent results, the current dissertation addressed this research gap by investigating both mothers and fathers' role in infant dyadic regulation and EF.

The role of country in parenting and infant development

Parents socialize infants guided by certain societal norms, values and behaviors which in turn influence infant development. This means that parenting and infant development are shaped by cultural differences (e.g., Bornstein, 2015). Bronfenbrenner (1977, 1994) theorized a bioecological model to explain that culture can also have an impact on parenting and infant development. Children's development is influenced by four interconnected contextual systems: microsystem, mesosystem, exosystem and macrosystem (Bronfenbrenner, 1995). The microsystem refers to the environments that directly influence children such as family, school, religious institute and peers. The mesosystem is the relations between two or more microsystems with children taking part in (e.g., family-school). The exosystem refers to structures that children are not directly involved in but that they are indirectly influenced by such as government agencies and health care systems. The macrosystem encompasses the other three systems referring to culture or subculture of the place where children live in. However, the majority of existing research in parenting and child development is based on a so-called WEIRD (Western, educated, industrialized, rich, and democratic) cultural database (Henrich et al., 2010). Far less is known about other contexts such as families in non-Western countries. While conceptual and direct replication of studies within similar contexts are important, it behooves the field to move beyond a Western context to test and better understand the generalizability of theories built from data on child development in Western contexts and primarily rooted in Western tradition to non-Western populations. In order to test the role of the macrosystem in parenting and infant development, our study included families in the Netherlands and China.

Grandparenting

Grandparents play an increasingly important role in child development, especially in non-Western countries where multigenerational co-residence has been promoted such as China. Grandparents not only help with housework, but also function as joint parental caregivers in raising young children, and therefore may have both indirect and direct impact on child development. The indirect effect of grandparents (G1) on grandchildren

(G3) can take place through parents (G2) because of the existence of intergenerational transmission of parenting (e.g., Chen & Kaplan, 2001). Attachment theory is one of the theories that explains this integrational relation (Bowlby, 1988). Early experience of G2 adults with their G1 parents may contribute to the internal working model of G2 regarding attachment which in turn transmits similar parental behaviors to G3 children (e.g., Main et al., 1985). Securely attached G2 adults are considered to recall more warm interactions with G1 parents and are more sensitive to their G3 children. Grandparents may also have a direct effect on G3 development through their daily interactions with their grandchildren. However, associations between grandparenting, parenting, and child outcomes are rarely investigated. Our study included grandparents in China and examined grandparenting and parenting quality towards the development of the third generation in urban China.

Study Objectives

To examine maternal and paternal impacts on infant self-regulation in Western and non-Western countries, a longitudinal study was conducted with mothers, fathers and their firstborn 4-month-old infants in the Netherlands and China. Chinese grandparents were also included in the second wave of the study when the infants were 14 months old. The first aim was to examine the similarities and differences of infant behaviors in the still-face paradigm (SFP) across both parents and countries. The second aim was to investigate the roles of infant attention and parenting, specifically maternal and paternal sensitivity, in infant EF development in the two countries. The third aim was to examine the role of grandparenting (grandparental sensitivity) in relation to parenting and infant EF development in China.

Outline of The Dissertation

Chapter 2 gives background information of China, Confucianism, social transformation as well as family life in urban China. **Chapter 3** investigates infant behaviors in the SFP across parents and countries (the Netherlands and China). **Chapter 4** examines both infant (infant attention) and parenting (parental sensitivity) predictors of EF at 14 months in the Netherlands and China. **Chapter 5** tests the relation between grandparental sensitivity and parental sensitivity (biological child of the grandparent), as well as the unique contribution of sensitivity of multiple caregivers (mothers, fathers and co-residing grandparents) to EF at 14 months in China. **Chapter 6** integrates the main results of the dissertations followed by a discussion, limitations and future research directions.