

**Maternal Psychological Maturity, Parenting  
and Toddler Regulation**

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**Abstract**

Developing the capacity to regulate behaviour and emotions is a major developmental task of early childhood and becomes particularly salient during toddlerhood, in the context of increased cognitive, behavioural and emotional capacities. The development of self-regulation depends on children's biological and genetic characteristics and cortical maturation as well as on learning and socialisation provided by parents. Therefore, while encouraging autonomy, parents, must balance sensitive support and teaching their toddlers with setting firm boundaries and rules. This can be a challenging and stressful period for both parents and children; sometimes resulting in temper tantrums and parent-child conflict.

The current research examined maternal characteristics posited to influence optimal parenting. This research has been influenced by several key developmental theoretical perspectives that emphasise the fundamental role played by the quality of parent-child interactions in child development (Ainsworth, Blehar, Waters, & Wall, 1978; Biringen & Easterbrooks, 2012; Bowlby, 1969/1982). The research has also been influenced by the suggestion that, while acknowledging the contribution of child characteristics, the psychological resources of the parent are a key determinant of parenting quality (Belsky, 1984; Bornstein, 2006). Baumrind's (1968) description of an authoritative parenting style (characterised by warmth, limit setting and support) provides an optimal framework for children's emotional and self-regulatory development and further informs the specific focus of this research: the evaluation of maternal psychological maturity (hardiness) and maternal sensitivity. Child domains examined were night-time sleep, regulation within challenging contexts (daytime napping and managing frustration) and socioemotional capacities during toddlerhood.

Participants in this study were 134 first-time mothers, aged between 26 and 43 years (mean age 33.8 years), and their toddlers (mean age 19.4 months, ranging from 18 to 22

months). In response to the current trend in developed countries for women to delay parenthood, women who were first-time mothers and older age were recruited during pregnancy into a larger longitudinal study. To allow for maternal age comparisons, the longitudinal study over-sampled older mothers relative to population rates; and to accurately reflect fertility decline in this age cohort, mothers who conceived with assisted conception were also over-represented. As a result, the current research sample was older than average first-time mothers in Australia, and 40% conceived with assisted conception. This sample were predominantly married or in a de-facto relationship, English-speaking, highly educated, working part-time at 18 months post-partum, and living in metropolitan areas within Australia. In all studies, these sample characteristics were taken into account.

The overarching research question in this thesis was: are more psychologically mature women more capable of providing optimal parenting to promote their children's self-regulatory development during toddlerhood? Structural equation modelling was used to examine the contribution of maternal age and psychological maturity along with other relevant variables. Participants reported on a measure of hardiness (psychological maturity) during their third trimester of pregnancy and the remaining data were collected during the first 12 postnatal months, then during a home visit when the children were approximately 18 months old. During the home visit, two mother-child interactions (free play and frustration/split attention task) were filmed and, later, coded for a) mother and child emotional availability and b) child emotion regulation strategies and distress, respectively. All three studies considered a number of potential confounding variables including maternal age at time of birth, level of education, mode of conception, language spoken at home, hours in paid work and concurrent mood at 19 months. Several child variables were also considered: child gender, birth weight, admission to ICU, ongoing illnesses, hours spent in day-care per week, and infant and toddler temperament. The three different studies in this



thesis, which were prepared for publication, addressed different aspects of child emotion regulation.

**Study 1.** The first study focused on toddlers' night time sleep. Participants were 134 mothers who reported on child sleep at 7 and 19 months post-partum. At 19 months post-partum, mothers also reported on their cognitions and involvement around their children's bedtime: half the sample used actigraph monitors to validate maternal reports of child sleep. Path analysis confirmed that higher prenatal maternal hardiness was associated with fewer problematic sleep-related cognitions and less involvement at bedtime, and more optimal child sleep during toddlerhood; after considering concurrent maternal mood and child temperament, all  $ps < .01$ .

**Study 2.** The second study explored toddlers' capacity to regulate within challenging contexts; namely, daytime napping and during a frustration task. Mothers ( $N = 134$ ) reported on child temperament at four months postpartum and completed a four-day sleep diary at 19 months regarding both daytime naps and night-time sleep. 'Toddlers' daytime napping was hypothesised to relate to their capacity to regulate emotions during a frustration task; however, this association was not found. Therefore two separate path models were tested: one to explain contributions to toddler napping, and the other to emotion regulation maturity. Structural equation modelling revealed that mothers with higher levels of hardiness and sensitivity had toddlers who napped for longer ( $ps < .01$ ), and concurrent temperamental rhythmicity was not associated with the amount of time toddlers' napped. Unexpectedly, male toddlers ( $p < .01$ ) and toddlers with older mothers were reported to nap for less time ( $p < .05$ ).

In relation to the frustration task, two explanatory pathways were identified. The first path identified that toddlers who had mothers with higher levels of hardiness and mothers who demonstrated more sensitivity demonstrated more maternal support-seeking (all  $ps < .01$ ) to manage their frustration. Whereas, the second path identified that older toddlers who

were rated by their mothers at 19 months as more temperamentally persistent used more autonomous self-regulatory strategies (all  $ps < .001$ ). Both types of strategies reduced child distress; however, as expected, more autonomous self-regulation was more effective (all  $ps < .001$ ). Finally, children rated by their mothers as more temperamentally reactive demonstrated significantly more distress. That reactivity was not at all associated with self-regulatory strategies suggests that reactivity stops toddlers from being able to effectively engage in more adaptive coping.

**Study 3.** The final study included 128 mothers for whom complete questionnaire data were available. They had reported on infant temperament at four months postpartum and parenting stress, toddler socioemotional competence and problem behaviours at 18 months postpartum. Path analyses demonstrated two distinct pathways from prenatal hardiness (one via parenting stress and the other via maternal emotional availability) that indirectly related to all indices of toddler socioemotional competence. The first path indicated that higher scores for hardiness were related to lower parenting stress scores which, in turn, were significantly associated with maternal reports of greater toddler socio-emotional competence and less problematic behaviour (all  $ps < .001$ ) as well as more optimal observed child emotional availability ( $p < .05$ ): toddlers who are more involving of and responsive to their mothers. The second path indicated that higher scores for hardiness were associated with higher maternal sensitivity which, in turn, was significantly associated with more optimal child emotional availability (all  $ps < .01$ ). Furthermore, harder mothers had perceived their toddlers' temperaments as less difficult during infancy ( $p < .001$ ). This related to reports of less parenting stress ( $p < .01$ ) during toddlerhood and, indirectly via less parenting stress, to reports of less problem behaviour ( $p < .01$ ).

In summary, the combined results of the three studies reported here add to a small but growing body of research that has identified maternal hardiness as an important influence in parenting and child development. These findings also reveal that maternal psychological

maturity is related to maternal sensitivity and that the two together provide a positive parenting context for children's self-regulatory and socioemotional development in the second post-natal year. It appears that a mother's capacity to view herself, her child and her circumstances in a flexible and adaptive way allows her to engage with her child with sensitivity and provide the necessary structure and boundaries in order to effectively meet her child's self-regulatory and socio emotional developmental needs during toddlerhood.

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### **Certification by Candidate**

I certify that the work in this thesis entitled “Maternal Psychological Maturity, Parenting and Toddler Regulation” has not been submitted previously for a degree, nor has it been submitted as part of the requirement of any other degree or diploma at any other University or institution.

I also certify that this thesis is an original piece of research and written by me. Any help or assistance that I have received in my research and the preparation of this thesis itself is acknowledged hereafter.

Each of the papers contained within this thesis lists multiple authors. I am the primary author of the three papers included in this thesis. I contributed to the conceptualisation and methodology of all studies, completed data collection and performed statistical analysis and was responsible for the preparation of each of the initial manuscript drafts and revised drafts for publication. Authors Catherine McMahon and Frances Gibson contributed to the conceptualisation and design of each paper and revised all manuscripts. In addition, Alan Taylor, contributed to the statistical analysis in Paper 1.

The research presented in this thesis was approved by the Macquarie University Ethics Committee (Human Research) on 27 July, 2009 under protocol number HE26JUN2009-D0000 (see Appendix B).

**Nikki Johnson**

29th April, 2015.

### **Acknowledgment**

Setting out to produce a PhD thesis, I didn't ever expect the process to mirror my research. Like the toddlers in my research I have been challenged to grow and develop new perspectives and skills; in need of nurturance, sensitivity, support and boundaries.. What is more, I have discovered that like the toddlers who were fortunate enough to have hardy and sensitive mothers to guide their growth, I have been even more fortunate to have a selection of extremely sensitive, dynamic and flexible individuals scaffold my journey and promote my development, I thank you all.

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### **Dedication**

Ruben and Lola your wonderful individual ‘ways’ constantly amaze me. I hope that you will always believe in yourselves and find joy in whatever you do. Don’t forget to embrace the challenges – they too bring happiness in the end. Thank you for your endless patience.

I love you both to infinity.

X Mum X



# Chapter 1

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## Introduction

## **Introduction**

The overarching aim of this research is to examine maternal psychological maturity in relation to children's self-regulatory and socioemotional development during toddlerhood. The current chapter presents a brief overview of the scope of the work, the theoretical frameworks that informed the research and the key constructs examined. This will be followed by a literature review (Chapter 2) of selected, relevant research regarding the development of sleep regulation, emotion regulation and socioemotional competence during toddlerhood, with a focus on parent characteristics known to contribute to adaptive development. Risks related to poor self-regulatory capacity will also be discussed. The specific aims of the current research are described, including information regarding sampling and measurements used in the prospective research design.

### **Development of Self-Regulation**

Temper tantrums, the hallmark of the 'terrible twos', gain much attention in the popular press with extensive and often conflicting advice for puzzled parents. Undoubtedly the first two years of a child's life are complex and dynamic. Towards the end of the first year, the infant's rapid acquisition of new skills in cognitive, behavioural and emotional domains and the capacity to walk brings a new perspective on the world and on the self as an independent, autonomous being. These exciting new capacities can be out of synchrony with the toddler's ability to regulate, so that toddlerhood is often a turbulent, perplexing and frustrating period for toddlers and parents, alike.

Due to its complex origins, the development of self-regulation has been studied from various theoretical approaches, exploring temperament, personality, neuropsychological, psychobiological, developmental and parenting contributions. All share some fundamental conceptual foundations. There is consensus that self-regulation development begins in infancy and relies primarily on cortical maturation of the pre-frontal cortex and development

of the attentional system (Bernier, Carlson, & Whipple, 2010; Eisenberg, Spinrad, & Eggum, 2010). Early and ongoing co-regulatory experiences throughout childhood are essential for the gradual shift from external- to self-regulation that is necessary for socioemotional regulation (Calkins & Hill, 2007; Sheese, Rothbart, Posner, White, & Fraundorf, 2008; Spinrad, Stifter, Donelan-McCall, & Turner, 2004; Sroufe, 2000). Developing the skills to regulate emotions, attention and behaviour are crucial developmental milestones (Bronson, 2000; Degangi, Breinbauer, Roosevelt, Porges, & Greenspan, 2000; Kopp, 1982). Although the development of self-regulation begins in infancy, it is only during toddlerhood through processes of imitation, shared interaction and co-operation with caregivers that toddlers' increased capacity to independently control or modify behaviours and emotions emerges (Kopp, 1982; Tomasello, Carpenter, Call, Benhe, Moll 2005). Along with cortical maturation, this capacity depends on parenting and early parent-child experiences, and encompasses both internal- and external-regulation (Eisenberg et al., 2010). Importantly, evidence suggests that young children who fail to develop adequate self-regulatory skills demonstrate anger, poor social competence and ongoing socioemotional difficulties (see Calkins & Fox, 2002 for a review; Mattes et al., 2007).

During early infancy, children rely almost entirely on their caregivers to meet emotional and physical needs, including managing their affect, feeding, sleeping and acquiring the capacity to effectively self-soothe (Kopp, 1982; Papousek & Papousek, 1996; Sroufe, 1988, 1996). Yet, even in the first few months of life, infants have an innate attention orienting system (Berger, 2011; Derryberry & Rothbart, 1997; Kopp, 1982; Rothbart, Sheese, Rueda, & Posner, 2011) that allows them to modulate their level of arousal by diverting their attention (closing their eyes, diverting their gaze) from distressing stimuli (Kopp, 1982). This early attention orienting system does not simply evolve into a more mature attention regulatory system but, rather, children's capacity to develop more complex regulatory strategies emerges between 15 and 18 months-of-age, with the development of higher-order

cognitive processes such as executive functioning. Impulse control, set shifting, and working memory, all aspects of executive functioning, aid monitoring and control of thought and action (Best & Miller, 2010; Sheese et al., 2008). Individual differences in executive functioning are believed to be, in part, related to differences in the quality of the parent-child relationship.

Responsive and sensitive parenting (Carlson, 2003; Harrist & Waugh, 2002; Kopp, 1982; Perry et al., 2013; Rothbart et al., 2011), attunement to infant mental states and, especially, promotion of autonomy (Bernier et al., 2010) during infancy and toddlerhood have been associated with better child performance on executive functioning tasks at 18 and 26 months of age. This was found above and beyond the contribution of parental education and child cognitive functioning. These findings suggest that optimal parenting stimulates neural connections involved in executive functioning development; thereby, improving children's self-regulatory capacity. As toddlers' executive functioning system continues to mature they remain substantially reliant on their parents to encourage and teach them to manage developmental challenges. Learning to regulate emotions within a supportive parent-child relationship is the foundation of socioemotional competence and pivotal to ongoing healthy development and wellbeing (Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997; Denham, Renwick, & Holt, 1991; Leerkes, Blankson, & O'Brien, 2009; Perry et al., 2013). Common developmental challenges that parent-child dyads face and which are the focus of this research are down regulating for sleep, as well as managing emotions and behaviours in the face of everyday stresses and frustrations.

To effectively support toddlers' self-regulatory development, the parenting environment must provide specific guidelines and rules for children to follow (Baumrind, 1966; Larzelere, Morris, & Harrist, 2013) as well as the structure to extend and assist their learning (Baumrind, 1966, 1971; Bernier et al., 2010; Biringen, 2004; Houck & Lecuyer-Maus, 2004). Importantly parental sensitivity to child cues and emotionally congruent interactions

(Ainsworth & Bell, 1970; Biringen & Easterbrooks, 2012; Tamis-LeMonda & Baumwell, 2011) facilitate a sense of connectedness and security. Through this co-regulation, it is argued that toddlers are most likely to internalise the values, rules and behaviours modelled and valued by those around them (Calkins & Hill, 2007; Kopp, 1982; Sroufe, 1996) and, thereby, increase their capacity to self-regulate (Sroufe, 1988, 1996, 2000). The current research adopted a developmental perspective on toddlers' capacity to self-regulate and acquire socioemotional competence.

To assess toddlers' capacity to self-regulate emotion in this research, Gross' (1998) process model of emotion regulation was operationalised. Gross' (1998) model is specific to regulatory strategies that individuals' use (depending on their goal) to dampen, intensify or maintain an emotion. The proposed strategies are developmental in nature and include innate and acquired strategies. Attentional deployment strategies are akin to the attentional orienting system, mentioned previously, which emerges during infancy; but they are not necessarily the most mature or effective for long-term learning. More complex strategies that enable flexible and effective regulation (i.e., problem solving, reappraisal of the source of frustration or of one's ability to manage the situation; see, Gross, 1998 for a detailed discussion of emotion generation and regulation) rely on cortical maturation as well as the internalisation of strategies and rules provided by parents.

The overarching aim of this thesis was to examine the contribution of parental factors that support toddlers' self-regulatory development whilst also taking account of child factors including age, health, gender and temperament. The theories which have influenced this research are discussed below.

### **Theoretical Influences on Current Research**

Several developmental theories influenced this research. Firstly, theories that posit that stable psychological resources of the parent are a key determinant of parenting quality

(Belsky, 1984; Heinicke, 1984) and that psychological maturity associated with age, may be associated with more optimal parenting (Bornstein, 2006). Secondly, the proposition that an authoritative parenting style characterised by high warmth as well as appropriate limit-setting provides an optimal framework for children's development (Baumrind, 1966, 1991). Thirdly, to understand the co-regulation of emotion through relationships, this research was informed by the seminal work on the mother-child attachment relationship (Bowlby, 1958, 1969/1982, 1973), the primacy of early sensitive interactions for the development of infant emotion regulation and healthy relationships (Ainsworth, Bell, & Stayton, 1971; Ainsworth, Blehar, Waters, & Wall, 1978), and the importance of considering dyadic emotional availability (Biringen & Easterbrooks, 2012; Biringen, Robinson, & Emde, 2000; Emde, 2012; Emde & Easterbrooks, 1985). Finally, although this research focuses on the contribution of parenting to child development, child temperamental dispositions are also considered, particularly Rothbart (2011) and her colleagues' views on self-regulation and reactivity as integral aspects of temperament.

### **Psychological Maturity and Age.**

Belsky (1984) proposed a simple but comprehensive theoretical model to explain individual differences in parenting and identified three contributing factors: parental functioning, characteristics of the child (temperament in early childhood), and contextual sources of stress and support (including broader social support, parent employment and marital relations). Belsky also argued that parental psychological resources were the primary determinant and proposed that in order to provide responsive and sensitive care for their children, parents needed to feel secure, be able to effectively take the perspective of others, control their impulses to ensure their children's needs were met.

Belsky and Barend (2002) subsequently elaborated on these characteristics as indices of psychological maturity. In a review of parent personality and parenting literature, they

concluded that parents who were psychologically healthy and had an internal locus of control were able to provide parenting that was sensitive, responsive, authoritative (as opposed to authoritarian or permissive) and child-centred. Moreover, they argued that, in the context of frustrating child behaviour, those parents who could decentre from the self, regulate their own emotions, consider their child's perspective and be tolerant and patient would offer growth promoting parenting.

Belsky and Barend's (2002) review concluded that inadequate attention had been paid to the influences of parent personality in parenting and child development outcomes and proposed that different aspects of parental personality would most likely predict parenting behaviour in specific parenting domains, as opposed to parenting per se. They also suggested that research consider the possibility that parental age may be related to psychological maturity when evaluating the effects of personality on parenting.

Bornstein (2006) also proposed that older maternal age may be related to more optimal parenting in first-time mothers, invoking the maternal maturity hypothesis to propose that older mothers may benefit from more life experiences, better education, financial security and psychological resources associated with more evolved executive functioning capacities enabling 'flexibility and effectiveness of verbal self-regulation, skilful use of strategy and behaviours that alter the likelihood of later events' (p.906), which he noted were also requirements of optimal parenting. In a sub-sample of mothers aged between 15 and 30 years, Bornstein and Putnick (2007) identified a strong relationship between increasing maternal age and mothers' parenting satisfaction, knowledge, sensitivity, limit setting and structuring capacity. However, this relationship was not evident in their older sub-sample of 30 to 47 year old mothers. They suggested that this finding may have been due to the fact that cortical development (and executive functioning) reaches full maturation during the third decade of life.

Consistent with Belsky and Barend's (2002) suggestions, the current research operationalised maternal psychological maturity through hardiness, a personality construct which has been associated with other psychological maturity constructs such as ego-resilience (Block & Block, 1980) and an internal locus of control (Rotter, 1966). As recommended, maternal hardiness (assessed during pregnancy) was examined in relation to the specific challenge of promoting children's development of self-regulatory capacities during toddlerhood, across a number of contexts, as well as explored in relation to maternal age (at first birth). Both maternal age and psychological maturity were also assessed in relation to child self-regulatory outcomes.

**Hardiness.** Hardiness is a personality style characterised by attitudes of control, challenge and commitment, and conceptualised to develop through an existential process of overcoming adversity by gaining meaning and moving forward decisively in life, despite future uncertainty (Kobasa, Maddi, & Kahn, 1982; Maddi & Khoshaba, 1994). A hardy person is posited to perceive stressful events as meaningful and interesting (commitment), changeable (control), an aspect of everyday life and an opportunity for growth (challenge; Maddi & Kobasa, 1984). Individuals who are less hardy are expected to avoid or deny stressful situations in order to protect themselves (Maddi, 1999).

The capacity for individuals to cope effectively in the face of adversity is theorised to be due to a hardy individual's cognitive flexibility, adaptability and internal sense of control. Attributes that allow people to appraise potential stressors as tolerable (Gramzow, Sedikides, Panter, & Insko, 2000), take the perspective of others, view difficult circumstances as opportunities from which to grow and act decisively and adaptively. Hardiness is believed to continue to develop through repeatedly transforming difficult experiences into opportunity (Maddi, 2002).

Hardiness has only recently been examined in the context of everyday parenting, and findings suggest that hardiness encompasses attributes that are adaptive for effective



parenting and child outcomes during infancy and early childhood (Camberis, McMahon, Gibson, & Boivin, in press; Johnson & McMahon, 2008). Indeed, attributes of hardiness are strikingly congruent with those identified as key determinants of an authoritative parenting style (i.e., commitment, flexibility, self-regulation and perspective taking; Baumrind, 1966) identified in Baumrind's seminal longitudinal research (Baumrind, 1967, 1989, 1991; Baumrind, Larzelere, & Owens, 2010).

**Parenting Typologies.** Baumrind proposed four qualitatively different patterns of parenting based on different levels of control and warmth. According to Baumrind (1966, 2013), an authoritative parent is mid-way between the two maladaptive typologies of authoritarianism and permissiveness. This parenting approach is characterised by being responsive whilst making developmentally appropriate demands, confronting whilst autonomy supportive, affectionate but power assertive when necessary. The authoritative parent is able to balance each of these aspects of parenting according to the given circumstances. She notes that authoritative parents provide challenging and stimulating environments for their children and offer guidance, encouragement and support as well as firm boundaries, high maturity demands and clear rules and expectations to conform to norms.

Baumrind's (1967, 1989, 1991, 2010) research demonstrates stable patterns of child development from preschool to 15 years of age which were related to the style of parenting children received. Children of authoritative parents were characterised by 'self-reliance, achievement motivation, prosocial behaviour, self-control, cheerfulness and social confidence' (Steinberg, 2001 as cited in Baumrind, 2013). Baumrind's theory was based on a sample of mostly high-functioning, two-parent, middle-class European American families but due to equivocal findings in studies including African American families and Chinese families living in America and in China concerns have been raised over the cultural generalisability of the theory (see, Sorkhabi & Mandara, 2013 for review of studies).

Collectivist societies such as China and other Asian countries are said to value obedience, authority, and duty or obligation to the group and, therefore, it has been argued that Baumrind's authoritative parenting style that promotes autonomy is incongruous with these cultures. A cultural equivalence perspective proposes that autonomous and independent behaviour is not only necessary for children's personal development but also for their compliance with parental directives and conformity to societal expectations. Further guidance and structure can be viewed as universal needs (Sorkhabi & Baumrind, 2009) that children require until they are cognitively and emotionally mature enough to cope with the demands of adulthood in their society (Lamborn & Felbab, 2003). In a recent review of cross-cultural research, findings supported the notion that Baumrind's authoritative parenting style was valid cross-culturally (in both collectivist and individualist societies) but the authors suggested that expression of emotional closeness and responsiveness may differ according to culture (Sorkhabi & Mandara, 2013).

Thus the notion of authoritative parenting provided a clear framework for the current research which was interested in examining the influence of parental psychological maturity on toddler's developing self-regulatory capacities. This research takes the view that parents who provide clear boundaries, set developmentally appropriate expectations and also provide warmth are most likely to promote their child's capacity to manage in challenging everyday situations. The importance of the balance between control and warmth for optimal child development is central to Baumrind's model. In order to assess the emotional quality of the connection between mother and child, the present research is also informed by influential theories of parent-child interactions.

**Parent-Child Relationship.** Attachment theory emphasises the crucial role of the early mother-child relationship in child development; more broadly, with a particular focus on emotion regulation. Central to attachment theory is the idea of a balance whereby caregivers provide a secure base for the children to return to at times of threat or distress but also

support their exploration and autonomous engagement with the world (Bowlby, 1969/1982; Powell, Cooper, Hoffman, & Marvin, 2014). Over time, through processes of internalisation, children become less immediately dependent on their parent's presence and are able to generalise their exploration to other contexts, reflective of emerging self-regulation (see Sroufe, 1988). The central tenets of attachment theory, namely, a flexible balance between warmth and closeness and support of exploration, are congruent with Baumrind's description of an authoritative parent. Furthermore, the complexity of parenting requirements, apparent in both theoretical frameworks, suggest that a psychologically mature parent, who is flexible, adaptable and has the capacity to take their child's perspective, would be best suited to provide the necessary levels of support while encouraging their child's autonomy.

Ainsworth's (Ainsworth et al., 1971; Ainsworth, Bell, & Stayton, 1974; Ainsworth & Bell, 1970) construct of maternal sensitivity was based on extensive observational research and has been central to empirical approaches to the assessment of the parent-child relationship quality. According to Ainsworth, a sensitive mother is characterised by a broad knowledge of her child (based on careful observations) that enables her to perceive things from her child's perspective, allows her to read and interpret her child's cues accurately and perceive signals as representative of her child's internal states, needs and wishes. Consequently, she is able to respond appropriately and in a timely manner to meet her child's needs. Importantly, a sensitive mother also monitors her child's responses to her actions to ensure that she has correctly interpreted her child's initial cue and flexibly adjusts her behaviour as required. Ainsworth's description of maternal sensitivity emphasises the complex and dyadic nature of this construct and demonstrates that simply showing affection to a child is not adequate. Rather, in an optimal mother-child relationship, the mother must understand her child's signals and meet her child's needs in order to effectively support her child's emotional development. Emotional Availability (EA), a related conceptual

framework concerning the parent-child relationship (Biringen et al., 2000; Emde, 1989; Emde & Easterbrooks, 1985), extended on Ainsworth's notion of maternal sensitivity and drew on attachment theory to develop an approach to assess the quality of dyadic exchanges between a parent and child within a multidimensional framework (Biringen, 2008; Biringen & Easterbrooks, 2012).

The recognition of the importance of emotions as regulatory mechanisms within the mother-child relationship is central, and the approach examines how affect is responded to, shared, communicated about and regulated within the dyad. Like attachment, the EA construct emphasizes the importance of parental sensitivity: congruent emotional and behavioural sensitivity and appropriate responsiveness to the child's emotional cues as well as attunement, flexibility, and acceptance of the child. In addition, however, three other dimensions of parental emotional availability are considered: structuring, the provision of appropriate guidance and scaffolding around the child's activities, acting as a mentor while also setting down rules and instilling appropriate limits in order to promote adaptive, regulated behaviour; non-hostility, the parent's capacity to interact with the child without signs of covert or overt irritability or anger; and non-intrusiveness, the parent's respect for the child's autonomy and personal space by not being over-protective, overly-directive, interfering or intrusive.

A key strength of the EA approach is the dyadic focus. EA also captures the child's emotional availability towards the parent through two dimensions, responsiveness and involvement. Child responsiveness reflects the appropriateness, consistency and emotional and behavioural quality of children's responsiveness to their parent and is suggested to reflect or be associated with the quality of the attachment relationship regarding secure/insecure dyads (Biringen, Derscheid, Vliegen, Closson, & Easterbrooks, 2014). Child involvement reflects a child's ability to initiate and engage their parent with positive-involving behaviours and is thought to reflect the child's internalisation of autonomous agency and initiative.

More optimal scores for emotional availability (both mother and child) have been associated with a wide range of developmental outcomes (see Biringen et al., 2014 for a recent review). Of particular interest to the current thesis are findings linking emotional availability (EA) with greater emotional control during infancy (Little & Carter, 2005) and an increased child capacity for empathy at four years of age (Moreno, Klute, & Robinson, 2008). In light of these findings, children in the current research who demonstrate a greater socio-emotional capacity would be expected to have more emotionally available mothers and, in turn, be more emotionally responsive and involving of their parent, as these qualities likely reflect a greater sense of autonomy and security in the parent-child relationship.

Emotional availability, like attachment (Bowlby, 1969/1982) and sensitivity (Ainsworth et al., 1971, 1974; Ainsworth & Bell, 1970), is derived from observations of mother-child interactions but diverges from measures of attachment in that it can be evaluated within the context of a full range of emotions, both negative (e.g., distress, anger, sadness, frustration) and positive (e.g., interest, satisfaction, and surprise), in any age group and within any context (see, Biringen et al., 2014). Another important contribution, as previously mentioned is the inclusion of the child's emotional availability, reflecting the dyadic uniqueness of the measure.

The developmental theories and frameworks discussed here (i.e., authoritative parenting, attachment theory, maternal sensitivity and emotional availability) focus on the sharing and regulating of affective experiences between parent and child and highlight the complexity of providing quality parenting that is supportive of child social-emotional development. Moreover, they share a common view that critical aspects of optimal parenting include sensitivity, affection, availability to emotions as well as support, structure and encourage autonomy. This research anticipates that parents with higher levels of psychological maturity, because they are flexible, adaptive, and have an internal sense of control and the capacity to perspective take, will be more emotionally available to their

children and more competent at promoting their toddlers' self-regulatory capacities in the domains of night time sleep, frustrating contexts and socioemotional competence. Although, to this point, parental factors involved in toddlers' self-regulatory development have been the primary focus and, indeed, the focus of this thesis, this research also recognises the contributions made by child factors, particularly temperament.

### **Temperament Perspective on Self-Regulation Development.**

Like self-regulation, there are many theories regarding temperament and, most, acknowledge child and parent factors to explain individual differences (for an overview, see Putnam, Sanson, & Rothbart, 2002). More recently, a group of eminent temperament theorists proposed a new definition of temperament that included antecedents of temperament development, which they hoped might guide future study in the field. Shiner and colleagues suggested temperament was 'early emerging basic dispositions in the domains of activity, affectivity, attention, and self-regulation, and these dispositions are the product of complex interactions among genetic, biological, and environmental factors across time' (Shiner et al., 2012, p.437).

Rothbart's (1989) developmental approach to temperament was amongst the first in the field to integrate socialisation as well as executive attention capacities into a theory of temperament development. According to this view, temperament was best conceptualised as an evolving system that incorporated a dynamic and reciprocal relationship between tendencies to be more or less reactive and regulatory processes that influenced and were influenced by interactions with the environment (Rothbart, 1989, 2004; Rothbart & Derryberry, 1981).

Reactivity, a fundamental component of most definitions of temperament, refers to a child's emotional volatility and irritability and has been referred to as negative emotionality, irritability, anger or proneness to distress (Rothbart & Derryberry, 1981). Apparent from

early in development, reactivity is thought to be a fairly stable innate aspect of temperament that is modulated and shaped by the regulatory aspects of the parent-child interactive system. Negative reactivity has been associated with both internalising and externalising problems (Lengua & Kovacs, 2005; Mesman & Koot, 2001; Morgan, Izard, & Hyde, 2014) and poor social skills (Eisenberg et al., 2000; Eisenberg, Spinrad, & Smith, 2004).

According to Rothbart and colleagues, regulation refers to processes that can facilitate or inhibit reactivity. As noted earlier, from early infancy, children demonstrate a limited capacity to regulate their emotions with an orienting attentional network that enables them to turn away or divert attention from distressing visual or auditory stimuli. This primitive attention regulation capacity is believed to be related to innate temperament traits rather than parental or environmental characteristics (Rothbart et al., 2011). Subsequently in a child's second year a capacity for effortful control of attention (e.g., persistence, non-distractibility), emotions (e.g., self-soothing) and behaviour gratification (e.g., delay of gratification, Rothbart, 1989) emerges. Effortful control refers to an ability to inhibit a dominant response in order to perform a subdominant response as well as to plan and detect errors (Rothbart & Bates, 2006) and is more open to parenting and environmental influences (Gartstein, Bridgett, Young, Panksepp, & Power, 2013). Notably, low levels of externalising behaviour problems and good social competence have been linked with attentional self-regulation (Sanson & Prior, 1999).

More recently, studies have identified that the frontal cortex is the region of the brain responsible for executive functioning (encompassing attentional flexibility, inhibitory control, working memory and cognitive flexibility). Therefore, executive functioning develops in association with cortical maturation and is related to individual differences in effortful control (self-regulation); whereas, reactivity is neurologically related to the amygdala and dopamine neurotransmitter systems which are involved in initiating emotion and intensity of emotional experience (Rothbart & Bates, 2006).

The Australian Temperament Project (ATP) is a national longitudinal study (1980-2015) that originally recruited 2443 infants aged between four and eight months and has subsequently followed the children through to adolescence and adulthood. The study drew on Thomas and Chess' (1977) theoretically derived multidimensional approach to temperament which posited a number of aspects of temperament including activity, mood, threshold and intensity to respond, persistence, approach to novelty, adaptability, distractibility and rhythmicity. The ATP adopted and subsequently validated and normed the questionnaire Thomas and Chess originally used. This model of temperament is viewed as a bio-social model it acknowledges the biological origins of temperament but notes its expression in dynamic interactions with the environment (Putnam et al., 2002; Shiner et al., 2012).

The ATP study has confirmed that reactivity assessed in infancy remains relatively stable across childhood. Moreover, based on observations of mothers' reactions to their reactive toddlers, ATP researchers argued that while reactivity did not appear to relate to maternal characteristics, dimensions such as sociability might be more malleable and prone to being influenced by the caregiving environment. To capture developmental shifts in temperamental dispositions from infancy to toddlerhood, the current research utilised infant and toddler scales that were developed for the ATP from Thomas and Chess' (1977) model of temperament. While several dimensions are consistent from infancy to toddlerhood (reactivity, irritability), the ATP toddler scale also includes measures of persistence, distractibility and inflexibility (Sanson, Prior, Garino, Oberklaid, & Sewell, 1987) that reflect the emergence of effortful control and executive functioning capacities. ATP researchers found that toddlers who were at the extreme ends of persistence and adaptability scales (i.e., either very persistent or not persistent at all) tended to remain that way over time (see, Prior, Sanson., Smart, & Oberklaid, 2000), suggesting that these aspects of temperament were quite stable and difficult to shape with external regulation. Indeed, high negative reactivity and



low persistence (low regulation) have been identified as risk factors for the development of childhood behavioural problems (Prior, Sanson, Smart, & Oberklaid, 2000; Rothbart & Bates, 1998) and low levels of social skills and peer social status (Sanson, Hemphill, & Smart, 2004).

What appears to be crucial for child development outcome is the reciprocity or fit between the child's temperament and the mother's expectations and parenting capacity. Poor fit between a mother and child (based on the mother's perception of her child as more or a lot more difficult than other children the same age) has been associated with worse outcomes, regardless of temperament (Putnam et al., 2002; Smart & Sanson, 2001). Of equal concern is the finding that temperamentally 'easy' children who have a poor fit with their parent also declined on all social outcome measures over a two-year period from toddlerhood to school-age (Putnam et al., 2002).

In summary, some clear parallels exist between the theories of temperament and parenting that are central to the current research that account for parental and biological contributions to child development outcomes. While temperament is not the focus of the current research it was measured and considered across all three studies, utilising both the infant and toddler temperament scales developed in the ATP. The biological and developmental characteristics of the child such as age, birth weight, and gender (known differences) were also accounted for in the current research as these have been found to relate to different aspects of child developmental outcomes (see Bornstein, 2006 for a review).

## **Research Context**

The current research was nested in a larger prospective study, Parental Age and the Transition to Parenthood Australia (PATPA). This study examined adaptation to pregnancy and early parenthood in relation to older maternal age in the context of the well-established

trend in developed countries for women to delay parenthood. Consequently, older first-time mothers were over-sampled relative to population rates and, due to associated age-related fertility decline, mothers using assisted reproductive technology to conceive were also oversampled. Therefore, mothers in the current research were older than the Australian average age for first-time mothers and 40% had conceived with medical assistance.

There is very limited research examining parenting in relation to older maternal age. However, several recent studies have suggested that older parenthood may provide some benefits in relation to adaptation to pregnancy, early parenthood (Camberis, McMahon, Gibson, & Boivin, 2014; Camberis et al., in press; McMahon et al., 2011) and the quality of parental interactive behaviour with toddlers (Bornstein & Putnick, 2007). Further, in large population studies, children with older parents have been found to experience fewer social and emotional difficulties at preschool age and more optimal health and emotional development at five years (Sutcliffe, Barnes, Belsky, Gardiner, & Melhuish, 2012).

Research findings in relation to parenting and child outcomes for mothers who have conceived with assisted conception technologies (AC) are more equivocal (Golombok et al., 2002; Golombok, Cook, Bish, & Murray, 1995; Hammarberg, Fisher, & Wynter, 2008). There is some evidence that mothers who conceive with AC are more protective of their infants and perceive them as more difficult (McMahon, Ungerer, Tennant, & Saunders, 1997) and vulnerable (Fisher, Rowe, & Hammarberg, 2012; Gibson, Ungerer, Leslie, Saunders, & Tennant, 1998; Hammarberg, Rowe, & Fisher, 2009). Some support was found for this in a series of Australian file audit studies that noted a four-fold higher incidence in mothers conceiving through AC of admissions to residential support facilities for unsettled infant behaviour (Rowe, Holton, & Fisher, 2012).

In contrast, no differences have been found in observed parent-child attachment quality or emotional availability between AC and spontaneous conception mothers and their infants (Gibson, Ungerer, Tennant, & Saunders, 2000). When compared with spontaneously

conceiving mothers, assisted conception mothers have also reported more maternal competence and emotional involvement with their preschool aged children (van Balen, 1996), greater warmth and involvement, and lower parenting stress (Barnes et al., 2004; Golombok et al., 1996; Golombok et al., 1995). More recently, research undertaken with the PATPA sample has demonstrated that compared to their younger counterparts, older mothers (37 years and over) reported less depression and anxiety and received higher hardiness scores during pregnancy (McMahon et al., 2011). Subsequently, mothers with higher levels of psychological maturity (conceptualised as a latent variable including hardiness, ego-resilience and ego strength) were shown to experience a more optimal transition to parenthood regardless of a history of infertility or mode of conception (Camberis et al., 2014). Compared with younger mothers, they were more attuned (higher sensitivity and mind-mindedness) to their seven-month-old infants; this is explained by higher levels of maternal hardiness (Camberis et al., in press).

In relation to children's development, socioemotional outcomes (Golombok et al., 1996; Wagenaar, Huisman, Cohen-Kettenis, & Delemarre-van de Waal, 2008), temperament, internalising and externalising behaviours (Barnes et al., 2004) have been found to be similar for both assisted conception and spontaneously conceived children.

There has been concern arising from population research and research reviews that children conceived with assisted conception may be more vulnerable to neurological developmental disorders than spontaneously conceived children (Stromberg et al., 2002; Zhan et al., 2013); but much of this vulnerability has been attributed to the complications of multiple births and preterm delivery. Indeed, singleton children born at term or near term with normal birth weights, irrespective of the assisted conception method used to conceive, appear to be developing normally according to available research (Hediger, Bell, Druschel, & Louis, 2013). In the current research only first-born singleton children were included and

none of the toddlers conceived with assisted or spontaneous conception were reported as having neurological or developmental difficulties.

As stated previously, the primary focus of this research was to examine whether maternal maturity and emotional availability (theoretically related to attributes of an authoritative parenting style) are associated with more optimal child self-regulation and socioemotional outcomes during the second post-natal year. However, due to the unique contextual characteristics of the research sample, maternal age and mode of conception were considered in all studies.

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# Chapter 2

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## Literature Review

This chapter will review research on early self-regulation development in the three developmental domains addressed in the current thesis: sleep, emotion regulation and socio emotional competence. The review will focus on the developmental progression and adverse outcomes related to poor regulation in each of these domains; on child temperament traits identified as contributing to their development; and on parental and parent-child relationship influences. Following the review, the aims and hypotheses of the research will be outlined in relation to each study.

### **Childhood Sleep**

In Western societies an estimated 25 to 35% of children aged one to five years do not receive adequate sleep due to behavioural issues related to bedtime difficulties and repeated night waking (e.g., Anders & Eiben, 1997; Davis, Parker, & Montgomery, 2004; Lam, Hiscock, & Wake, 2003; Mindell, Kuhn, Lewin, Meltzer, & Sadeh, 2006; Tikotzky & Sadeh, 2001). Indeed, infant and early childhood sleep problems are the most common concern reported to paediatricians (El-Sheikh, 2011a; Kahn, 2004; Lavigne et al., 1999). Sleep may be the single most important activity of the brain during early childhood (Dahl, 1996) and the emerging sleep-wake system is one of the earliest markers of behavioural organisation and adaptation (Sadeh & Anders, 1993). Moreover, sleep is involved with children's growth and health and thought to be involved with children's self-regulatory and emotional processing capacities (Bernier, Beauchamp, Bouvette-Turcot, Carlson, & Carrier, 2013; Reid, 2009; Turnbull, Reid, & Morton, 2013).

Well regulated sleep patterns rely on developing self-regulatory skills (self-soothing). While most infants can effectively soothe themselves to sleep without signaling to their parents (Anders et al, 1992; Goodlin-Jones, Burnham, Gaylor, & Anders, 2001), some infants have difficulties settling to sleep, experience frequent night waking and are unable to return to sleep alone. Instead they signal by crying (some in prolonged and inconsolable episodes),

awakening their parent and thus eliciting external regulation. Perhaps not surprisingly, infant settling problems are related to diminished parental confidence and feelings of helplessness, poor parent-child relationships and, ultimately, poorer quality care-giving (Brown, Heine, & Jordan, 2009).

The causes of infant settling problems are not believed to be medical (Hiscock & Jordan, 2004) or related to birth weight (Prior, Sanson, Smart, & Oberklaid, 2000) but rather with difficulties in self-soothing (Hiscock & Jordan, 2004). Indeed it is thought that how parents respond to their children during night awakenings influences the child's ability to gain self-regulatory capacities around sleep (Kopp, 1982; Sroufe, 1988, 1996). Consistent with this notion, attachment theorists have identified night-time sleep as the longest parent-child separation and parental responses which are consistent and sensitive to infant's cries, promoting a balance between security and exploration, are posited to encourage the child's development towards independence (Goodlin-Jones, Burnham, & Anders, 2000). There is also some evidence to suggest that co-sleeping during early infancy is associated with better stress regulation at one-year of age (Beijers, Risken-Walraven & de Weerth, 2013). However others argue that if parents are too quick to respond to night-time cries, their responses may interfere with the child's developing capacity to self-regulate and return to sleep autonomously (Dahl, 2006; Goodlin- Jones et al., 2001; Touchette et al., 2005). Moreover, by misreading infant cues parents may overstimulate their already tired children; thereby, increasing their distress and level of fatigue (Fisher et al., 2011; Hiscock & Jordan, 2004) as well as limiting their opportunities to learn to self-regulate. Parental responses such as these are posited over time to create behavioural patterns that can become entrenched.

Children who fail to learn the skills to self-soothe continue to rely on their parents for support into toddlerhood and the preschool years (Tikotzky & Shaashua, 2012). In fact, an estimated 50 to 80% of sleep difficulties experienced in infancy persist throughout early childhood if left untreated (Kataria, Swanson, & Trevathan, 1987; Lam et al., 2003; Richman,

1987; Richman, Douglas, Hunt, Lansdown, & Levere, 1985; Zuckerman et al. 1987). Therefore, experts and paediatricians have argued that parents must actively encourage and support the development of self-regulation around sleep (Brazelton, 1992; Ferber, 1987; Fisher et al., 2011; Goodlin-Jones, Burnham, E, & Anders, 2001; Hiscock, 2008; Oberklaid, 2000).

**Daytime Napping.** Although daytime sleeping (napping) is developmentally appropriate during early childhood, napping has been shown to rely primarily on environmental rather than biological factors (Touchette et al., 2013). There is, however, a noticeable absence of research regarding naps and antecedents to napping behaviour in the childhood sleep literature. This is especially concerning in light of research that demonstrates that young children who are restricted from napping are significantly less positive, more negative, less likely to adaptively engage in emotionally challenging contexts (Berger, Miller, Seifer, Cares, & Lebourgeois, 2012) and, more likely to experience accidental injuries (Boto et al., 2012).

A small number of studies have examined how caregiver attitudes and practices influence young children's napping. Jones and Ball (2013) found that children of parents who encouraged napping were reported to have significantly longer daily naps than those who were prevented or not encouraged. These researchers noted that napping was sporadic, negatively perceived and/or actively prevented by one-third of parents. Interestingly, in a sample of three to five year olds who were attending day-care, researchers noted that when children were given the opportunity to nap during the day during an allotted rest time, the majority of children slept. Further, those children who slept during the day slept significantly less at night, commensurate with other research (Acebo et al., 2005; Crosby et al., 2005), but over a 24 hour period all children regardless of napping received the same amount of sleep (Ward, Gay, Anders, Alkon, & Lee, 2008). It is possible that parents' reluctance to put their

children to sleep during the day arises from uncertainty around the effects of daytime napping on night time sleep or the need for napping in toddlerhood *per se*.

**Developmental Consequences of Childhood Sleep Problems.** Typically, toddlers are expected to sleep 11 to 14 hours in a 24 hour period, including at least two to three hours during the day (Davis, Parker, & Montgomery, 2004; Iglowstein, Jenni, Molinari, & Largo, 2003; Price et al., 2014). While there appears to be lack of consensus or clear guidelines as to how much sleep children require (Matricciani, Blunden, Rigney, Williams, & Olds, 2013; Matricciani, Olds, Blunden, Rigney, & Williams, 2012), a growing number of studies have demonstrated associations between early childhood sleep loss or disruption and emotional, behavioural and cognitive dysfunction (e.g., Beebe, 2011; Brown et al., 2009; Cho et al., 2015; Dionne et al., 2011; Reid, 2009; Gregory, Eley, O'Connor, & Plomin, 2004; Hiscock, Canterford, Ukoumunne, & Wake, 2007; Sadeh, Gruber, & Raviv, 2003), childhood obesity (Chen, Beydoun, & Wang, 2008; Hart & Jelalian, 2008) as well as ongoing sleep problems (e.g., Fallone, Owens, & Deane, 2002; Mattes et al., 2007).

Researchers have identified that preschool-aged children who receive less sleep per night and within a 24 hour period, demonstrate more externalising (anger, aggression, frustration) and internalising (fearfulness, inhibition, anxiety) problem behaviours (Lam et al. 2003; Richman, 1986; Zuckerman et al., 1987). Both externalising and internalising behaviours are related to a child's capacity for self-regulation (Block & Block, 1980; Bronson, 2000), which suggests that children's self-regulatory capacity may underpin the bi-directional relationship between sleep and emotional and behavioural problems. Although behavioural problems may be due to impaired pre-frontal cortex functionality (Dahl, 1996), they may also be attributed to sleepiness and the associated inattentiveness (Fallone et al., 2002; Sadeh et al., 2003; Tikotzky, & Sadeh, 2001) accompanying sleep loss.

Some researchers have used experimental manipulations to assess the impact of inadequate sleep. A sleep restriction study tested healthy toddlers' responses to a test after

they had been randomly assigned to either a daytime nap or no daytime nap. Toddlers were shown emotion eliciting pictures (positive, neutral, negative) and asked to complete two puzzles (solvable and unsolvable). Researchers found that toddlers in the sleep restriction group were 34% less positive, 31% more negative, and 39% less confused with an unsolvable puzzle (considered a non-optimal response) than those who had a nap prior to the test. These authors suggested that insufficient sleep reduced children's capacities to see the positive aspects of situations or to manage effectively within challenging situations, potentially placing children at risk of future emotional and behavioural problems (Berger et al., 2012). Another nap restriction study that included physiological measures found that following a 77 minute nap, children's recall on a spatial locations task was significantly better than after a trial without napping, and the improvement was still apparent the following day. Researchers observed that children's sleep spindle frequencies during napping and established that differences in children's performances was due to neural plasticity during the napping condition (Kurdziel, Duclos, & Spencer, 2013).

Studies have also demonstrated that optimal night-time sleep enhances toddlers' capacity for executive functioning tasks, especially those requiring a strong impulse control component (Bernier 2013). Similarly, research from a recent population-based study highlights the negative effects of shorter sleep duration and irregular bedtimes on 7-year-old children's verbal short-term memory (Cho et al., 2015). In combination, these findings suggest that childhood sleep functions to support the development of cortical growth, (Turnbull et al., 2013). This is also consistent with the large body of literature highlighting the negative impact of sleep loss on children's behaviour.

Detrimental long-term effects of early sleep problems on emotional wellbeing have also been demonstrated. Gregory and colleagues in a large longitudinal twin study found modest concurrent and predictive associations between sleep problems and anxiety, hyperactivity and conduct problems in early childhood and adolescence, even into adulthood

(Gregory, Caspi, et al., 2005; Gregory, Eley, O'Connor, & Plomin, 2004; Gregory, Eley, O'Connor, Rijdsdijk, & Plomin, 2005; Gregory & O'Connor, 2002). Of relevance to the current research is their finding that shared environmental factors (not genetic) predominantly explained the relationship between sleep and emotional problems. These findings highlight the ongoing risks for children who struggle to regulate in early childhood (Al Mamun et al., 2012) and emphasise the critical role that parenting can play in promoting children's capacity to regulate.

**Parental Characteristics and Childhood Sleep.** Although sleep is a bio-regulatory process (Seifer, Sameroff, Dickstein, Hayden, & Schiller, 1996), there is evidence that children's sleep can be influenced by various environmental stressors (Lozoff, Wolf, & Davis, 1985), cultural factors (Mindell, Sadeh, Kohyama, & How, 2010; Morelli, Rogoff, Oppenheim, & Goldsmith, 1992; Owens, 2004) as well as parental factors, including marital discord (El-Sheikh, 2011), maternal anxiety (Richman, 1981; Scher & Blumberg, 1999), maternal depression (Armstrong, O'Donnell, McCallum, & Dadds, 1998; Lam, Hiscock, & Wake, 2003; Zuckerman, Stevenson, & Bailey, 1987), parenting stress (Sadeh, Lavie, & Scher, 1994; Meltzer & Mindell, 2007), maternal orientation to motherhood (Scher & Blumberg, 1999), and adult attachment state of mind (Benoit, Zeanah, Boucher, & Minde, 1992).

Intervention studies in relation to unsettled behaviour problems support the notion that early sleep problems are potentially modifiable (Hiscock & Jordan, 2004; Owens, France, & Wiggs, 1999; Sadeh, 2005; Skuladottir et al., 2005). However, there is evidence that early unsettled behaviour and sleep interventions may only be effective in the short-term (Brown et al., 2009; Price, Wake, Ukoumunne, & Hiscock, 2012). Considering the large number of maternal correlates related to children's sleep problems noted earlier, it is possible that interventions may be more successful if they address underlying factors that may be interfering with mothers engaging with the content of sleep interventions, such as pre-existing mental health and attachment issues. This thesis proposes that it may also be useful



to identify mothers who are lacking in psychological maturity; particularly, the capacity to flexibly set limits (expectations) and sensitively promote children's self-regulatory development at bedtime.

The plethora of research in this field reflects the developmental importance of childhood sleep and also the salience of childhood sleep problems for parents. During toddlerhood bedtime struggles increase as children seek to assert their newfound autonomy. Authoritative parenting interactions (Baumrind, 1968) that provide sensitive support for emotional distress (Leerkes et al., 2009) and encourage appropriate challenges and opportunities for mastery (Sadeh, Tikotzky, & Scher, 2010) have been identified as optimal for supporting the development of child self-regulation.

In an earlier study with a community sample of preschoolers, the current researcher tested a model that posited that personality attributes likely to be characteristic of an authoritative parent would be associated with positive adaptation to the challenges of putting young pre-school-aged children to bed (Johnson & McMahon, 2008). The role of maternal psychological maturity (operationalised through the personality trait hardiness) was examined in relation to children's night time sleep. After accounting for child temperament, this cross-sectional study found that mothers with higher hardiness scores (characterised by cognitive flexibility, capacity to take on challenge and adaptability) reported more adaptive cognitions about their children's sleep (less self-doubt), were less involved at their children's bedtime and, as a result, their children slept for longer during the night. These findings are consistent with other studies that have shown parent cognitions about children's capacity to sleep independently are associated with less parental bedtime involvement and better sleep outcomes (Morrell, 1999; Morrell & Cortina-Borja, 2002; Sadeh, Flint-Ofir, Tirosh, & Tikotzky, 2007). The first study in the current thesis (Chapter 3) explores the contribution of psychological maturity, sleep cognitions and bedtime parent behaviours to toddlers' night-time sleep using a prospective design, and accounting for additional child and maternal

factors that may contribute to child sleep while also validating parental monitoring of child sleep using physiological measures.

**Parent-Child Relationship and Childhood Sleep.** More recently, research has focused on the quality of the parent-child relationship. Several studies have shown that secure attachment relationships (and more emotionally available parenting around bedtime) are associated with better sleep outcomes for the child (Bélanger, Bernier, Simard, Bordeleau, & Carrier, 2015; Bell & Belsky, 2008; McNamara, Belsky, & Fearon, 2003; Teti, Kim, Mayer, & Counterline, 2010). It has been suggested that securely attached toddlers may be more effective at integrating regulatory (self-soothing) skills required to return to sleep during the night, without maternal assistance because of previous, repeated experiences of successful sensitive co-regulation around bedtime (Belanger et al., 2015; Teti et al., 2010).

In addition to the importance of sensitive parenting, Bordeleau, Bernier and Carrier's (2012) recent longitudinal study has provided evidence that parental promotion of children's autonomy during toddlerhood is a key predictor to optimal sleep outcomes in the preschool years. Taken together, these findings suggest that parents who are authoritative, emotionally available and psychologically mature are likely to have children with adaptive sleep patterns. In light of this previous research, the current study examines whether maternal hardness and emotional availability are associated with children's day-time napping, a less studied domain which is yet to be examined in relation to these maternal characteristics. Furthermore, due to the lack of research into the relationship between parental antecedents of daytime napping and evidence of poor emotional and behaviour outcomes related to daytime sleep restriction (Berger et al., 2012), the relationship between toddlers' daytime napping and emotion-regulation capacity during a frustration task will also be assessed (Study 2/Chapter 4).

**Child Temperament and Toddlers' Sleep.** Temperament theorists identify self-regulation as an integral part of temperament along with reactivity. Sleep and temperament are rarely associated, although both appear to be fairly stable independently across early childhood (Halpern et al., 1994; Hayes, McCoy, Fukumizu, Wellman, & Dipietro, 2011). However, some researchers have found associations between maternal report of temperament and objective measures of child sleep (Scher, Epstein, Sadeh, Tirosh, & Lavie, 1992; Sadeh et al., 1994; Scher, Tirosh, & Lavie, 1998) and there is some evidence of behaviourally assessed temperament being associated with concurrent sleep-wake indices (Halpern, Anders, Garcia Coll, & Hua, 1994). These equivocal findings indicate the need for further exploration of the role of child temperament in the study of early childhood sleep behaviour. In the current thesis, mothers reported on child temperament when children were four and 18 months-of-age. 'Easy-difficultness' scores in infancy were considered in relation to night-time sleep in Study 1 (Chapter 3), and toddler rhythmicity was considered in relation to daytime napping in Study 2 (Chapter 4).

### **Emotion Regulation and Socio-Emotional Competence during Toddlerhood**

Infancy and toddlerhood present a unique opportunity for laying the foundations for healthy development. The first years of life are periods of great growth, but they are also defined by children's vulnerabilities. Learning to control emotions and behavioural responses are vital building-blocks towards social-emotional development. Research in the area of early childhood reveals various risk factors as well as buffers and highlights the important role of parenting for healthy development.

**Definition of Emotion Regulation.** Emotion regulation has been widely researched over the past 20 years and, as with self-regulation, there is no single agreed definition (Thompson, 1994; Gross & Thompson, 2007). Emotional regulation refers to the things we do to influence whichever emotions we have (when we have them) and how we experience

and express them (Gross, 1998); a necessary adaptive response when an emotional reaction is either too intense or not intense enough (Cole, Martin et al., 1998, Saarni, Mumme, & Campos, 1998, Thompson, 1998). Emotion regulation has also been described as a process of self-regulating emotion-related behaviours and responses (Eisenberg, Spinrad, & Smith, 2004; Eisenberg & Sulik, 2012) due to its theoretical similarities with self-regulation and self-regulation development.

Due to various existing approaches to emotion regulation, theorists have argued that researchers must clarify their approach to allow for meaningful interpretation and comparison of studies. In the current study, the conceptualisation of emotion regulation development was influenced by a range of theoretical approaches reflecting multiple contributing factors. Parenting (i.e., authoritative parenting, emotional availability) and personality (Hardiness) theories discussed earlier in Chapter 1 provided a framework from which to assess the effects of specific aspects of parents and parenting interactions on toddlers' development of emotion regulation capacities. To assess children's emotion regulation capacities, a frustration task was used along with Gross' (1998) model of emotion regulation. This model includes families of regulatory strategies that range from unconscious and innate, to conscious and learned; provides a succinct theoretical framework that conceptually links to child development as well as forms a basis for coding emotion regulation maturity (utilised in Study 2). Children's emotion regulation in the context of the parent-child relationship was assessed using the child scales from the recent edition of the Emotional Availability Scales (Biringen, 2008) and parents were asked to report on their child's behaviour and social adjustment (Study 3). To account for child factors, toddlers' underlying emotional and regulatory processes encompassed by models of temperament (introduced in Chapter 1) were also considered.

**Development of Emotion Regulation.** As with sleep, developing increasingly complex capacities to self-regulate emotions and emotion-related behaviours follows a transition from

predominantly external parent-regulation to self-regulation (Bronson, 2000; Kopp, 1982; Sroufe, 1996). As noted in Chapter 1, early adaptive responses of diverting attention from distressing stimuli (i.e., closing eyes and sucking to reduce over stimulation) are apparent from early infancy. However by six-month-of-age, they become more deliberate and predictable, signifying a new conscious capacity to self-regulate due to an increase in cortical maturation: specifically associated with attention (Berger, 2011; Derryberry & Rothbart, 1997; Johnson, Posner & Rothbart, 1991; Kopp, 1982; Kopp, 2009; Rothbart et al., 2011).

During toddlerhood, in combination with sensitive and supportive parenting that offers appropriate socialisation and opportunities for mastery, cortical maturation accompanied by increasing executive function capacities (Best & Miller, 2010; Carlson, 2003; Jones, Rothbart, & Posner, 2003) enables toddlers to develop more complex regulatory strategies. These include selecting, integrating and switching amongst competing demands to modify their behaviour and emotions in stressful contexts (Berger, 2011; Grolnick, Bridges, & Connell, 1996; Saarni et. al., 1998). In fact, quality of parenting is believed to positively impact neural development involved with executive functioning (Bernier, 2010; Schore, 2000; 2001). The transition to self-regulation culminates when children are able to develop their own understanding of the causes and consequences of emotions and ultimately their own representation of emotions (Stegge & Meerum Terwogt, 2007). This is accompanied by more complex adaptive and effective regulatory strategies such as reappraising and problem solving in challenging or unpleasant situations (Gross, 1998; Gross & Thompson, 2007).

Toddlers' emerging emotion-regulation capacities are usually captured through experimental paradigms that are designed to elicit fear, anger or frustration. During frustration tasks, toddlers are commonly prevented from accessing an enticing toy or an alluring object (in the current research a favourite toy was placed in a large locked Perspex box). In response, they demonstrate a range of reactions and behaviours including toy

exploration or substitutive play to regulate negative emotions (Braungart-Rieker & Stifter, 1996; Grolnick et al., 1996); inhibiting their responses (Calkins & Fox, 2002; Jones et al., 2003); ignoring the emotionally arousing stimulus or engaging with the task in an alternative way (Calkins & Johnson, 1998; Gross, 2007).

Observational studies of infants and toddlers demonstrate that sustained focus on a frustrating stimulus such as staring at a delayed prize or prohibited toy is associated with generalised distress (Calkins & Johnson, 1998; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002; Grolnick et al., 1996). On the other hand, the use of avoidance behaviours (i.e., turning or moving away from object), distraction (i.e., focusing attention on another object), and self-soothing during a frustration task have been associated with the maintenance of negative affect in 18-to 24 month-old-olds (Diener & Mangelsdorf, 1999). It has been suggested that distraction strategies used at older ages may reflect less mature and less effective ways of dealing with frustration when there is a problem-solving component to the situation (i.e., operating a difficult toy). However, not all children use the same complexity of regulatory strategies at the same developmental stage, and those who lack the capacity to adequately regulate their emotions can demonstrate emotional outbursts and temper tantrums (Kopp, 1982).

As previously mentioned, in this research, the approach to assessing toddler self-regulation capacity in response to frustration was informed by Gross' (1998) process model of emotion-regulation that identifies five separate points at which regulatory processes can assist individuals' (depending on their goal) to dampen, intensify or maintain an emotion. Theoretically, once an individual initiates an emotional response, they can engage in emotion regulation by consciously modulating one or a combination of proposed strategies (situation selection, situation modification, attention deployment, cognitive change, and response modulation) that are developmental in nature (Gross & Thompson, 2007).

Toddlers in the current research were required to manage independently within a frustration paradigm while their mothers were distracted with another task. Toddlers' level of distress was coded separately. Three of Gross' strategies that he refers to as antecedent-focused strategies (those that take place before the emotion response tendencies have become fully activated) were utilised in the current research. Attention deployment, situation modification and cognitive change were developmentally congruent with strategies available to toddlers and within the scope of the current research's capacity to measure emotion regulation (see discussion, Chapter 4).

Attentional deployment, initially emerging during infancy, refers to strategies that are used to divert attention away from the stressful situation (without changing the situation) in order to avoid distress (e.g., toddler sucking their thumb or gazing away from the source of frustration). Situation modification refers to strategies that alter the situation to reduce the likelihood of a negative reaction or increase the likelihood of a positive reaction. Examples from the current research included children walking away from the Perspex box, leaving the room or distracting themselves by taking on another task. Cognitive Change, the final family of strategies coded, refers to an individual's capacity to challenge their perception of an aversive situation or their perception of their own capacity to manage in order to alter the situation's emotional significance. As toddlerhood is a transitional phase from external to internal regulation, the current research also accounted for toddlers relying on maternal support during the frustration task. Therefore maternal support-seeking was coded separately as an external source of regulation.

Acquiring emotion regulatory skills relies on different levels of cognitive flexibility (Gross & Thompson, 2007; Sroufe, 2000) as well as parental influences (Calkins, Smith, Gill, & Johnson, 1998; Kochanska et al., 2001; Rothbart & Bates, 1998). Therefore, in the current study, toddlers' capacity to utilise strategies (from least to most complex) was evaluated in relation to maternal hardness and emotional availability. Child temperament factors were

also considered. Due to experiencing more sensitive and supportive parenting that also encourages autonomy, it was expected that toddlers with more psychologically mature mothers (high levels of both hardiness and emotional availability) would use more complex strategies to regulate their emotions.

**Development of Socioemotional Competence.** Learning to fit into the broader social environment is a significant challenge for toddlers (Cole, Michel, & Teti, 1994) and is vital in order for children to learn, play, interact and initiate interactions, co-operate with others and form friendships. Broadly defined, social competence reflects children's ability to be effective in their social interactions with respect to achieving their goals (Rubin, Bowker, & Kennedy, 2009). It requires the ability to utilise appropriate and effective emotional and behavioural strategies to successfully engage in social interactions and maintain relationships (Briggs-Gowan and Carter, 2004; Saarni et. al., 1998).

Therefore, gaining social competence depends on children learning to regulate their emotions within socially acceptable norms (Saarni et. al., 1998), which, in turn, relies on parenting that models appropriate emotional and behavioural responses and varied emotional expressions (Feldman & Masalha, 2010; Hart, Newell, & Olsen, 2003; Hill, 2005; Le Cuyer & Houck, 2006; Roque, Veríssimo, Fernandes, & Rebelo, 2013; Zhou et al., 2002). Boundaries, rules and co-operation are also learned within the safety of the parent-child relationship (Bronson, 2000; Sroufe, 1983). Social-emotional competence is thought to influence the longitudinal course of early-emerging emotional and behavioural problems. Children who lack age-appropriate social-emotional skills necessary for managing developmental challenges or situations are found to be more at risk of developing problem behaviours (Denham & Couchoud, 1990; Denham & Grout, 1993; Duncombe, Havighurst, Holland, & Frankling, 2013; Feng, Shaw, & Silk, 2008).

Indicators of social competence in pre-school- and kindergarten-aged children focus on peers in social contexts; whereas, with toddlers and younger children, the parent-child



relationship is the primary social context for emerging competencies. In the current study, to evaluate both maternal and child emotional availability (Biringen, 2008), mothers were observed in a free-play task with their child. Mothers also reported on the Brief Infant Toddler Social and Emotional Assessment (Briggs-Gowan & Carter, 2004) that reflects parents' perceptions of their children's socioemotional competencies. It was expected that mothers who were more emotionally available would have children who were more responsive and involving of their mothers in play. Moreover, it was anticipated that these children would be perceived by their mothers as more socially competent, with fewer problem behaviours (see Study 3).

### **Emotion Regulation and Socioemotional Problems in Early Childhood.**

Socioemotional and behavioural problems are prevalent (12-16%) in very young children and, approximately, a third of parents of two-year olds reported worrying about their children's behaviour (Briggs-Gowan et al., 2001). Although gender differences are not observed in problem behaviour (Briggs-Gowan and Carter, 1998; Keenan and Shaw, 1994; Rose et al., 1989), girls are reported to be more socio emotionally competent (Briggs-McGowan, 2001). Socio emotional competencies include compliance with adults, mastery and motivation, emerging empathy and connectedness with peers. Problem behaviours are those relating to emotional dysregulation, including internalising (anxious or shy) and externalising (excessively angry or aggressive) problems (Briggs-Gowan & Carter, 2001).

Learning to adaptively regulate emotional responses may decrease vulnerability for emotional and behavioural problems (Eisenberg, Fabes, Guthrie, & Reiser, 2002; Kopp, 1982). A number of studies with children of different ages have shown that infants and children with deficits in emotion regulation and cognitive flexibility are at higher risk for disruptive behaviour problems and conduct disorder (Duncombe, Havighurst, Holland., & Frankling, 2013; Stifter, Spinrad et al., 1999), and anxious and depressive disorders later in life (Calkins, 1994). Emotion regulation has also been conceptualised as emotional

dysregulation or the failure to meet developmental tasks of emotional development (Cole, Michel, & Teti, 1994; Gross & Thompson, 2007). Dysregulation is conceptualised as a continuum between under- and over-regulation. Under-regulation refers to high, intense levels of negative emotion associated with externalising disorders (Cassidy, 1994; Keenan, 2000; Sroufe, 1996); whereas, over-regulation refers to an excessive control of emotions associated with internalising disorders (Cassidy, 1994; Keenan, 2000; Sroufe, 2000).

Eisenberg and her colleagues (e.g., Eisenberg, Hofer, & Vaughan, 2007) have hypothesised that over-controlled children are overly inhibited and behaviourally rigid; low in effortful attentional regulation; and, low in problem-focused strategies or strategies that involve engaging with the adverse stimuli (i.e., cognitive change). The long-term risk of early emotion dysregulation is emphasised in findings from Lavigne, Arend, Rosenbaum, Binns, et al.'s, (1998) longitudinal study that found 43% of two to three-year-olds who were diagnosed with an internalising disorder showed stable diagnoses approximately five years later; and, of those diagnosed at five years of age, 90% retained their diagnoses one to three years later, with 78% of these children still meeting criteria two years on.

In an attempt to explain the antecedents and trajectory of early onset emotion dysregulation disorders, Feng, Shaw, and Silk (2008) followed 297 boys from low-socio economic backgrounds from 2 to 10 years of age. At this age, mothers reported on a semi-structured psychiatric interview for obtaining diagnoses on the basis of DSM–IV criteria (validated with clinical interviews). Numerous risk factors were considered and collected at different ages between 15 and 30 months: temperamental inhibition, emotion regulation strategies (sustained focus on frustration and passive/dependent behaviour), insecure attachment, maternal depression, and maternal negative control. Results indicated that the combined use of passive waiting and maternal comfort-seeking in early childhood was predictive of elevated levels of anxiety across early and middle childhood; and, high levels of maternal negative control and maternal depression in early childhood predicted worse

outcomes for all children regardless of temperament. These findings are limited in that girls were not considered; however, they highlight the combined influence of biological and parental factors on children's ongoing emotional wellbeing and suggest that children's early capacities to regulate emotions are predictive of ongoing childhood emotional development. Further, these findings provide evidence that maternal characteristics may be more influential in the long-term than temperament for children's emotional development.

### **Parent-Child and Contextual Factors involved with Emotion Regulation and**

**Socio emotional Competence.** From their first moments of life, children rely almost entirely on their parents' responses to meet their emotional and physical needs. The constant interactions between children and their parents during childhood offer multiple repeated opportunities for children to learn from their parents and for parents to learn about their children and to effectively support and nurture their development (Sroufe, 1996). There is evidence to suggest that the quality of parenting interactions can shape children's neural connections and executive-functioning capacities involved in their capacity to self-regulate (Bernier, 2010; Schore, 2000; 2001). While this appears encouraging for parents who can provide optimal care, it follows that disruptions to the parent-child relationship are potential risks to child development. Developmental theories emphasise the importance of parenting that supports and structures children's developing emotional competence; encourages independence, sets appropriate limits, models emotional expressions and responses, and demonstrates congruent emotional reactions (Baumrind, 1968; Biringen & Easterbrooks, 2012; Bowlby, 1971) rather than demanding compliance (Bronson, 2000). This approach is believed to help children learn self-initiated behaviours to regulate their emotions and develop socioemotional competency (Calkins 1998; Calkins, 2007; Sroufe 1996). This review will now consider evidence for parent factors that promote optimal social emotional development as well as briefly consider child (temperament) and contextual (parenting stress) factors.

**Parent Socialisation and Autonomy Support.** Parents' behavioural and emotional encouragement and discouragement have also been found to assist children to maximise positive and minimise negative emotional expression (Fabes, Eisenberg, Karbon, Bernzweig, Speer, & Carlo, 1991), which are important for optimal social functioning and general social-emotional competence (Denham 1991; Fox & Calkins, 2003). Parent socialisation of emotional expression may be particularly important in toddlerhood because of toddlers' limited self-regulation capabilities (Kopp, 1989; Spinrad, Stifter, Donelan-McCall, & Turner, 2004). Setting appropriate limits (Le Cuyer-Maus, & Houck, 2002), encouraging autonomy and mastery (Denham et al., 1991) have also been found to relate to emotion regulation and social competence in early childhood. Calkins and Johnson (1998) found that mothers' discouragement of their toddlers' autonomy through completing an activity set for them was associated with a tendency for toddlers to display distress during a frustration task. Perhaps the children of these mothers had not been given adequate opportunities to solve problems independently; and, thereby, they have not learnt to regulate distress.

Supporting the latter notion, Bernier, Carlson, and Whipple, (2010) prospectively explored the effects of quality of parenting (maternal sensitivity and mind-mindedness at 12 months, and maternal autonomy-support including scaffolding at 15 months) on children's executive-functioning capacity at 18 and also 26 month-of-age. They controlled for children's cognitive functioning and found that of all the parenting strategies assessed, autonomy-support was most strongly related to better performances from the children on working memory and categorisation at 18 months and conflict tasks at 26 months.

On the other hand, excessive parental control characterised as intrusive, excessive regulation of children's activities, overprotectiveness and/or a minimal level of autonomy-support has been associated with the development of children's internalising symptoms, in particular, anxiety (see Ballash., Leyfer, Buckley,, & Woodruff-Borden; 2006 for a review; Hudson & Rapee, 2001) and less adaptive use of emotion regulation strategies (Calkins et al.,

1998). It is possible that parental control inhibits children's active attempts to self-regulate their emotions, and therefore struggle to self-regulate even when their parents are unavailable; further impacting their opportunities to gain mastery over their environment and increasing their tendency to react with distress.

Taken together, these findings support the notion that parenting characteristics related to an authoritative parenting style (characterised by making appropriate developmental demands and autonomy support as well as sensitivity and structuring, Baumrind, 1968) provides children the social context within which to practise emerging regulatory skills as well as impacts upon brain structures involved in executive functioning.

**Maternal sensitivity and attachment.** Extensive research demonstrates that the quality of mother-child attachment relationships is involved in children's development of emotional regulation and social competence (e.g., Biringen et al., 2014; Cole, Martin & Dennis, 2004; Grolnick & Farkas, 2002; Karreman, van Tuijl, van Aken, & Dekovic, 2006; Kochanska, Philbert, & Barry, 2009; LeCuyer & Houck, 2006). These studies suggest that sensitive mothers who are better attuned to their children's emotional states and who are able to respond contingently to their children's cues and model appropriate responses are more effective at encouraging the development of emotional competence. Moreover, by providing a secure environment children are able to practise their newly acquired skills and, eventually, developing social competence.

Research assessing the biological mechanisms underlying self-regulation offers persuasive evidence for the protective effect of the attachment relationship on self-regulation development in childhood. In a study with mothers and their five-month-old infants, mothers high in sensitivity had infants who turned to them for emotional support during a frustration task irrespective of their innate neurophysiological regulatory resources, which were assessed through baseline EEG readings (Swingler, Perry, Calkins, & Bell, 2014). In a longitudinal study, Kochanska et al. (2009) demonstrated that children who were biologically

vulnerable to self-regulatory development problems (with serotonin transporter gene 5-HTTLPR-short/short or short/long allele) demonstrated the same capacity to self-regulate on tasks at 25, 38, and 52 month-of-age as children without the vulnerability if they had a secure attachment relationship (assessed at 15 and 22 months). For children who were not at risk, secure attachment was less important. Findings from these two studies suggest that within frustrating contexts, an optimal mother-child relationship provides a safe and supportive regulatory option for infants regardless of their innate regulatory capacity; moreover, a secure attachment can buffer children who are biologically vulnerable.

Utilising Biringen's (2008) multi-dimensional Emotion Availability (EA) measure, two studies have identified links between dyadic EA and infant emotion-regulatory outcomes in divergent samples and within different contexts. Martins et al. (2012), examined the quality of the mother-child relationship in a low-risk sample and assessed how it influenced 10-month-old infants' regulatory style in a free-play interaction. As the authors predicted, both over- and under- regulation were associated with poorer quality of dyadic interaction. In another study, emotional availability was measured in a low socio-economic group of (mostly) African-American mother-infant dyads in the context of an emotional-challenge task. Researchers found that infants from dyads with higher EA (both mother and infant EA) demonstrated better emotion regulation after accounting for their level of reactivity. Specifically, greater levels of maternal hostility were significantly related to less infant emotion regulation during and after the challenge tasks when compared with infants from higher EA dyads (Little & Carter, 2005).

In the current study, the quality of the mother-child relationship was assessed through the construct of emotional availability (Biringen, 2008) and explored in relation to maternal psychological maturity (hardiness). In addition, maternal EA was examined in relation to toddlers' daytime napping and emotion regulation during a frustration task (Study

2). Maternal EA was also tested in relation to parenting stress, child EA and maternal report of toddlers' socioemotional competence (Study 3).

**Child Temperament and Emotion Regulation.** The relationships among child temperament, emotion regulation and social competence are complex. Models of temperament describe individuals as differing in their innate tendencies of reactivity (Eisenberg et al, 2007; Rothbart & Derryberry, 1981), surgency (Dolar & Stifter, 2012), inhibition (Kagan, Reznik, & Snidman, 1986) and the self-regulatory processes that modulate these tendencies, such as effortful control (Rothbart & Bates, 1998, Thompson, 1994). Children's social competence is thought to closely relate to their capacity for emotion regulation associated with their temperament (Stifter & Dollar, 2012).

As noted earlier, negative emotionality in infancy is moderately stable across the first five years of life (Kagan, Snidman, & Arcus, 1998), is concurrently associated with lower levels of attention and inhibitory control (Rothbart, Ellis, Rueda, & Posner, 2003; Rothbart, Sheese, Rueda, & Posner, 2011), and is thought to contribute to the development of more complex regulatory capacities involved with cortical maturation and executive functioning. There is also some evidence that highly reactive and inhibited children may experience emotional difficulties because they struggle to engage adaptively in challenging circumstances. For instance, frustration reactivity at five-months-of-age has been found to relate to the use of fewer emotion regulation behaviours at 10 month-of-age (Braungart-Rieker & Stifter, 1996).

However, not all children who are initially identified with high reactivity remain that way. Research demonstrates that children with high negative emotional reactivity at 15-month-of-age can develop high levels of executive function (more complex regulatory capacities) by four years of age if they also demonstrated high levels of regulation of their reactivity (effortful control) at 15 months (Ursache., Blair., Stifter, & Voegtline, 2013). Interestingly, these children are also more likely to have primary caregivers who exhibit high

levels of positive parenting behaviours in a parent–child interaction task. The researchers speculate that the impact of the quality of the caregiving environment on child development may be most pronounced among infants characterised by general negative emotionality (Belsky, Hsieh, & Crnic, 1998; Feldman, Greenbaum, & Yirmiya, 1999; van den Boom, 1994).

Similarly, Stifter and Dollar (2012) found that high surgency children with high levels of regulation were viewed as less aggressive by their parents while children with high levels of surgency who utilised strategies to regulate their emotions were viewed as more socially competent. These findings highlight the complex interrelationships amongst the separate processes involved in temperament, parenting and children’s emotion regulation.

Effortful control has been related to higher levels of emotion regulation (Rothbart, Ziaie, & O’Boyle., 1992), social competence (Calkins, Gill, Johnson, & Smith, 1999), sympathy and prosocial behaviour (Diener & Kim, 2004; Rothbart, Ahadi, & Hershey, 1994). Conversely, children who lack regulatory capacity (effortful control) at ages 22, 33, and 45 months are found to experience externalising problems at 73 months (Kochanska and Knaack, 2003).

Toddlers who demonstrate more temperamental persistence (a forerunner to effortful control) in challenging situations have been found to experience lower levels of internalising problems than children who avoid challenges, suggesting that these children acquire more complex and adaptive strategies to manage frustration through their capacity to persevere (Eisenberg et al., 2001; Kochanska, 1993). In the current research, to account for individual differences in self-regulation, concurrent maternal reports of temperament scores for toddler reactivity and persistence were considered in Study 2, which included a frustration task.

**Parenting Stress.** Parenting during toddlerhood can be challenging and stressful for some parents (Eisenberg et al., 2004; Kopp, 1982; Morris et al., 2007; Saarni et al., 1998) due



to toddlers' rapid development and emerging autonomy (Abidin, 1995; Edwards & Liu, 2002). Parents who report higher levels of stress and who perceive parenting as stressful due to a variety of personal (e.g., lack of confidence) social (e.g., sense of social isolation, not feeling supported by their partner) or child related factors (perceptions of the child as 'difficult', moody or demanding) have been found to demonstrate less optimal parenting behaviours (Abidin, 1992; Belsky, 1984; Crnic & Low). These include less consistent structure and discipline (Crnic & Greenberg, 1990; Pinderhughes, Dodge, Bates, Pettit, & Zelli, 2000), lower emotional availability (McMahon & Meins, 2012), and less warmth and responsiveness (Casalin et al., 2014; Crnic & Low, 2002) in their interactions with their children.

These findings suggestive of parenting difficulties related to parent perceptions of their own competence and the child's difficultness suggest that parents who are able to take a flexible perspective on their children's developmental shifts and challenging behaviours may experience parenting as less stressful, experience more parenting efficacy and perceive their children as easier, thereby enabling them to provide more optimal parenting. The current research predicts that psychologically mature mothers, who are posited to have the capacity to flexibly reappraise difficult circumstances, will perceive parenting as less stressful and have toddlers with more optimal socioemotional competence and fewer problem behaviours. Therefore parenting stress was considered along with emotional availability in evaluating toddlers' socioemotional competence in Study 3.

### **The Present Study**

Toddlerhood is defined by the transition from other- to self-regulation in the context of emerging autonomy and complex cognitive, emotional and behavioural development that requires parents to carefully balance supporting their children's needs while encouraging their autonomy. The primary focus of this study was to examine maternal psychological maturity,

characterised by high levels of hardiness and emotional availability, in relation to child self-regulatory development. The three studies included in this thesis explore determinants of toddlers' self-regulation development within everyday developmental domains: night-time sleep and daytime napping, frustration regulation and socioemotional functioning. In each study, maternal characteristics as well as characteristics of the child, including temperament, are examined. In the final study, the role of parenting stress was also considered.

### **Research Hypotheses**

As the context of the current research is nested within a larger study (mentioned in Chapter 1) which was concerned with first-time parenthood at an older age, there is an associated overrepresentation of women conceiving through assisted conception (AC). The equivocal findings concerning postnatal early parenting outcomes and child developmental regulatory capacities in this regard were considered in framing the research hypotheses for each study that comprises this thesis.

**Study 1. Maternal Psychological Maturity and Toddler Sleep.** The first study focused on toddler night-time sleep. The initial hypotheses tested that AC mothers might experience more problematic cognitions, demonstrate more bedtime involvement and have toddlers who sleep less than mothers who conceive spontaneously (SC). Then, a theoretically driven model which posits that a child's capacity for self-regulation is developed through early maternal interactions (Sander, 2000; Sroufe, 2000) that are predicted by maternal psychological maturity (Heinicke, Diskin, Ramsey-Klee, & Oates, 1986) was tested. It was hypothesised that mothers with a lower level of pre-birth hardiness would a) report more problematic cognitions; leading to b) more bedtime involvement; resulting in c) toddlers who slept less. To take account of the contribution of sleep patterns during infancy, associations amongst child sleep at 7 months, maternal bedtime cognitions, involvement at bedtime and sleep at 18 months were also tested.

## **Study 2. Maternal Psychological Maturity and Toddler Regulation in Frustrating**

**Contexts.** This study examined maternal and child factors associated with toddlers' daytime napping and capacity to cope with a frustrating task. Consistent with parenting models that identify the importance of maternal psychological resources and sensitivity for promoting optimal child development, it was first hypothesised that older mothers would have a higher level of hardiness as well as demonstrate a higher level of emotional availability. It was then hypothesised that the toddlers of mothers with higher hardiness and levels of EA would; a) spend more time napping during the day; b) demonstrate the use of more mature emotion-regulation strategies; c) therefore, engage in less maternal support-seeking; and, d) demonstrate less distress during the frustration task.

The aforementioned hypothesis relating to mothers with higher EA having toddlers who use less maternal support-seeking strategies may appear at first glance to be counterintuitive to principles of attachment theory which suggest that in a secure dyad children turn to their parent when distressed. However recent research suggests that sensitivity in combination with autonomy support, both of which are captured in the dyadic EA measure, play a pivotal role in children's self-regulatory development (Bernier et al., 2010). Therefore, it was hypothesised that children with mothers higher in EA would have a greater capacity to manage independently.

A wide range of maternal variables including maternal education, and child factors like gender, age, birth weight, childcare attendance, ongoing illnesses and average length of night-time sleep that might contribute to both parenting capacity and child regulation were also taken into account. In particular, and as noted previously, child temperament was considered. It was predicted that children with less optimal rhythmicity would nap less during the day, and that children with less optimal reactivity and persistence would demonstrate less emotion regulation maturity and therefore more distress. Finally, it was predicted that toddlers who napped less would show less mature emotion-regulation.

**Study 3. Maternal Psychological Maturity and Toddler Socioemotional Competence.**

This study examined relations among parenting stress, hardiness, emotional availability and child social emotional competence. It was hypothesised that older mothers would be more psychologically mature and would experience less parenting stress during toddlerhood. It was also proposed that both psychological maturity and lower parenting stress would, in turn, be associated with greater maternal emotional availability, resulting in more optimal toddler socioemotional functioning. The study also predicted that harder mothers would perceive their children as temperamentally easier and that infant temperament would be related to emotional and behaviour outcomes. Finally, due to the greater likelihood of assisted conception for older mothers and the equivocal outcomes associated with assisted conception and parenting, the role of mode-of-conception in relation to increased parenting stress, emotional availability and child socioemotional competence was also examined.

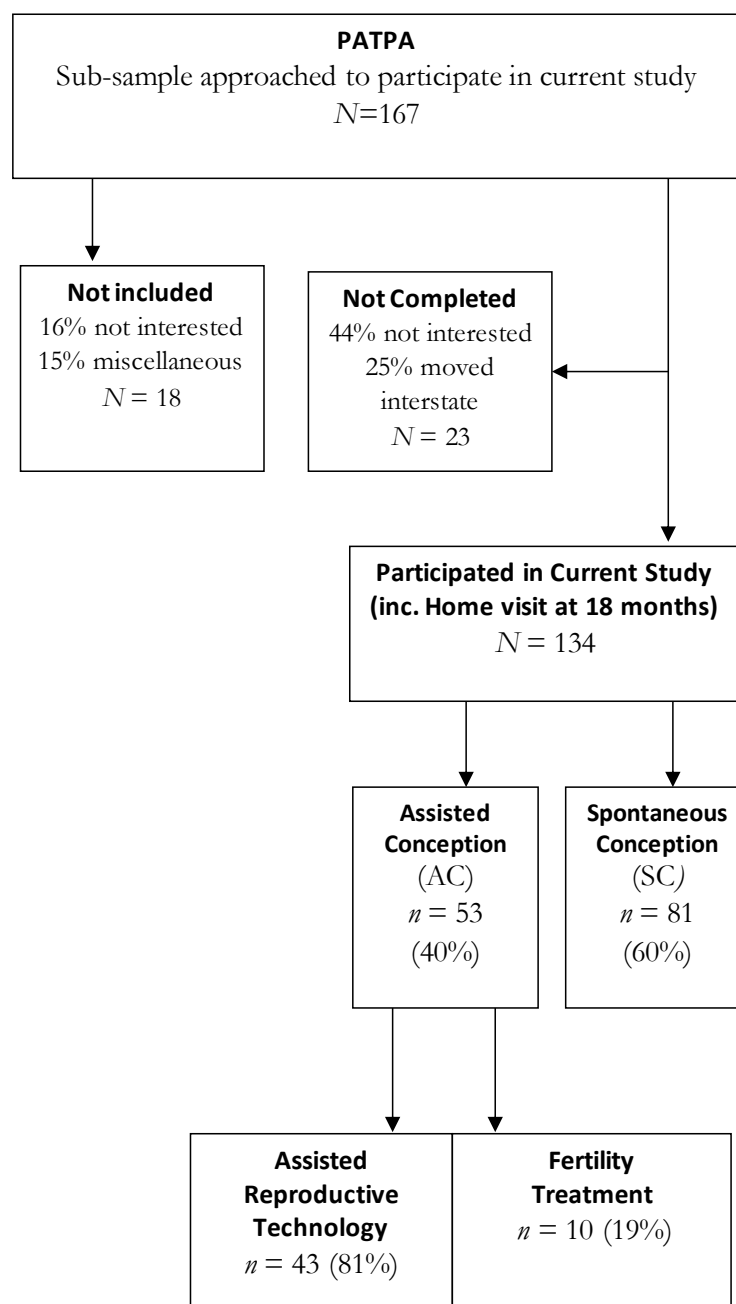
Table 1 summarises data collection from pregnancy through to 18 months postpartum including methods and measures utilised. Following the table is a participant flowchart (Figure 1) which describes characteristics of the sample.

**Table 1. Prospective Study Variables and Measures**

Maternal			Child		
Variable	Measure	Study	Variable	Measure	Study
<b>Pregnancy - Third Trimester</b>					
Maternal age, education, language, mode of conception	Telephone Interview	1, 2, 3			
Psychological Maturity	Hardiness Personal Views Survey 3 <sup>rd</sup> Edition <sup>1</sup>	1, 2, 3			
<b>4 - 6 months Postpartum</b>					
			Gender, birth weight, intensive care admission, ongoing illnesses	Telephone interview	1,2, 3
			Temperament	Short Temperament Scale for Infants <sup>2</sup>	1, 3
<b>7 months Postpartum</b>					
			Sleep Behaviour	Telephone interview	1
<b>18 months Postpartum</b>					
Anxiety	State Trait Anxiety Index <sup>3</sup>	1	Temperament	Short Temperament Scale for Toddlers <sup>8</sup>	2
Depression	Parenting Stress Index <sup>4</sup>	1	Sleep Behaviour	Sleep Chart- night/day naps* Actigraph data <sup>9</sup>	1, 2
Bedtime Cognitions	Maternal Cognitions about Infant Sleep Questionnaire <sup>5</sup>	1	Emotion Regulation/Distress	Recorded 10 min frustration task*	2
Bedtime Involvement	Parental Interaction Bedtime Behaviour Scale <sup>6</sup>	1			
Emotional Availability	Recorded 15 min Mother-child free-play interaction	2, 3	Emotional Availability	Recorded 15 min mother-child free-play interaction	3
Parenting Stress	Parenting Stress Index-Long form <sup>4</sup>	3	Socio-Emotional Functioning	Brief Infant Toddler Social Emotional Assessment <sup>10</sup>	3

<sup>1</sup>Maddi & Kosaba, 2001<sup>2</sup>Sanson, Prior, Garina, Oberklaid & Sewell, 1987<sup>3</sup>Speilberger, Goruch & Lushene, 1983<sup>6</sup>Morrell & Cortina-Borja, 2002<sup>4</sup>Abidin, 1995<sup>5</sup>Morrell, 1999<sup>7</sup>Biringen, 2008<sup>8</sup>Prior, Sanson, Smart, & Oberklaid, 2000<sup>9</sup>Mini Mitter Co. Inc<sup>10</sup>McGowan-Briggs, 2002

\*Measure designed by researcher



*Note:* PATPA = Parental Age and Transition to Parenting Australia, ART = Assisted Reproduction Technology.

**Figure 1.** Participation Flow Chart

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# Chapter 3

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## Paper 1

### Maternal Psychological Maturity, Parenting and Toddler Sleep

**Paper published** (see Appendix A):

Johnson, N., McMahon, C. A., & Gibson, F. L. (2014). Assisted conception, maternal personality and parenting: Associations with toddler sleep behaviour. *Journal of Paediatrics and Child Health*, 50 (9): 732-8.

## Abstract

**Aim.** To explore the role of maternal personality (hardiness), sleep-related cognitions and bedtime involvement in child sleep behaviour during the second post-natal year in a sample of spontaneous and assisted conception, first time mothers.

**Method.** Mothers ( $N = 134$  [spontaneous ( $n=81$ ); assisted ( $n=53$ ) conception]) reported on a resilience measure (hardiness) during pregnancy and child sleep at 7 and 19-months post-partum. At 19 months post-partum, mothers also reported on their cognitions and involvement around their child's bedtime; and half the sample used Actigraph monitors to validate maternal report of child sleep.

**Results.** No significant differences were found between spontaneous and assisted conception mothers on any of the study variables; therefore, assisted and spontaneous samples were combined. Structural equation modelling confirmed that lower pre-birth maternal hardiness was associated with more problematic sleep-related cognitions ( $\beta = .23$ ,  $p < .01$ ) and involvement at bedtime ( $\beta = .29$ ,  $p < .01$ ) and poorer child sleep outcomes ( $\beta = -.33$ ,  $p < .001$ ) during toddlerhood, even after considering concurrent maternal mood and child temperament.

**Conclusions.** Pre-birth maternal hardiness rather than mode of conception contributes to parenting cognitions and behaviour around child sleep and, ultimately, toddler sleep outcomes. Findings suggest that targeting negative maternal perceptions of control and efficacy through clinical interventions could benefit toddlers' sleep.

**Keywords.** toddlers, sleep, hardiness, cognitions, parenting, assisted conception.

**Abbreviations.** AC: Assisted conception, SC: Spontaneous conception.

## Introduction

Sleep problems during early childhood have been associated with emotional (Gregory et al., 2005), behavioural (Touchette et al., 2009) and cognitive (Sadeh, Gruber, & Raviv, 2002) dysfunction as well as ongoing sleep difficulties (Al Mamun et al., 2012). The purpose of this paper is to further investigate maternal characteristics that may contribute to early childhood sleep behaviour within the context of contemporary parenting trends.

Sleep consolidation, which begins between 9 and 12 months-of-age relies on behavioural organisation and adaptation which are important in the development of a child's self-regulatory system (Goodlin-Jones, Burnham, & Anders, 2000; Sroufe, 2000). Authoritative parenting interactions (Baumrind, 1968) that provide sensitive support for emotional distress (Leerkes, Blankson, & O'Brien, 2009) and encourage appropriate challenges and opportunities for mastery (Sadeh, Tikotzky, & Scher, 2010) are particularly important. Indeed, appropriate limit-setting and promotion of autonomy at bedtime play an important role in the development of adaptive sleep behaviour in preschool-aged children (J Morrell & Steele, 2003). Children who do not learn to self-soothe have been found to demand their parents' attention, resulting in increased night waking (Adair, Bauchner, Phillip, Levenson, & Zuckerman, 1991).

Heinicke (1984, 2002) argued that a higher level of maternal ego strength, or psychological maturity, was likely to underpin an authoritative parenting style and was the strongest predictor of adaptation to post-birth challenges as well as positive and responsive parenting. Psychologically mature parents have been described as being empathic (Kochanska, Friesenborg, Lange, & Martel, 2004), having a capacity for perspective taking (Gerris, Dekovic, & Janssens, 1997) and coping flexibly with life's challenges (Heinicke, 2002).

Hardiness, an index of personality functioning closely related to ego strength, encompasses adaptive flexible responsiveness to stress, and is characterised by commitment,

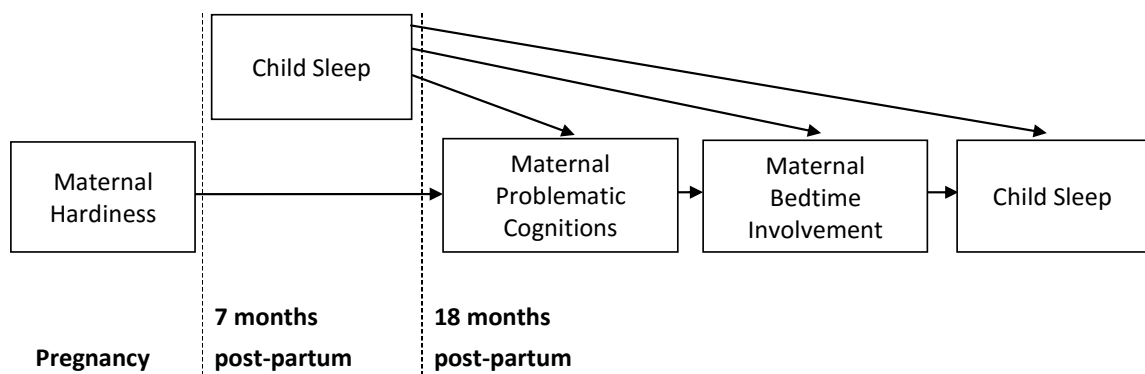
a sense of control and enjoyment of challenge (Maddi, 1999). Johnson and McMahon (2008) found that mothers of pre-schoolers with higher levels of hardiness reported fewer problematic bedtime cognitions and behaviours and more optimal child sleep outcomes.

More recently, in a study of older first-time mothers, hardiness was identified as the strongest predictor of positive psychological adjustment to pregnancy (McMahon et al., 2011). The trend to delay parenthood in developed countries and age-related fertility decline has meant larger numbers of women have required assisted conception (AC), including both ovulation stimulation and in-vitro fertilisation (IVF). Findings regarding parental adjustment after AC are equivocal (Golombok et al., 2002; Golombok, Cook, Bish, & Murray, 1995; Hammarberg, Fisher, & Wynter, 2008), and there is some evidence that AC mothers perceive their infants as more difficult (McMahon, Ungerer, Tennant, & Saunders, 1997) and vulnerable (Fisher, Rowe, & Hammarberg, 2012; Gibson, Ungerer, Leslie, Saunders, & Tennant, 1998; Hammarberg, Rowe, & Fisher, 2009). Indeed, an Australian audit study found that AC mothers were over-represented in admissions to residential support facilities for unsettled infant behaviour (Rowe, Holton, & Fisher, 2012). These findings, suggestive of problems with sleep and settling in the first postnatal year, warrant further investigation during toddlerhood, as does the role of maternal hardiness in predicting parenting and child development outcomes in early childhood. The current study aims to extend previous research by prospectively exploring the effect of pre-birth maternal hardiness on toddlers' sleep and offers a unique opportunity to investigate AC parenting within in this context in the second postnatal year.

Given equivocal findings, we first tested hypotheses that AC mothers may experience more problematic cognitions, demonstrate more bedtime involvement and have toddlers who sleep less than mothers who conceive spontaneously (SC). Then, using a theoretically driven model which posits that a child's capacity for self-regulation is developed via early maternal interactions (Sander, 2000) which are predicted by maternal psychological maturity,



(Heinicke, Diskin, Ramsey-Klee, & Oates, 1986) we tested the hypotheses that mothers with a lower level of pre-birth hardiness will report more problematic cognitions, leading to more bedtime involvement, resulting in toddlers who sleep less. To take account of the contribution of sleep patterns during infancy, we also tested associations amongst child sleep at 7 and 18 months and maternal bedtime cognitions and involvement (see Figure 1).



**Figure 1.** Model of prospective research design

## Method

### Participants

Participants for this study were recruited from an existing longitudinal study, Parental Age and the Transition to Parenthood Australia (PATPA). PATPA recruited first time mothers and women conceiving through assisted conception (AC) during their third trimester in metropolitan clinics and hospitals. Older mothers and AC mothers were oversampled relative to their representation in the community (see McMahon et. al., 2011). When children were 4 months old a sub-sample of mothers were invited to participate in the current study ( $N=167$ ); of these, 81 (60%) spontaneous and 53 assisted conception (ART  $n = 43$ , fertility treatment  $n = 10$ ) mothers agreed to participate in the current study which involved a home-visit when their child was a toddler.

No significant differences were found between those who did and those who did not participate ( $n=33$ ); nor were there significant demographic differences between AC and SC mothers, with the exception that AC mothers on average were significantly older than SC mothers. Participants were predominantly from an English speaking background, highly educated and in a married or de-facto relationship (see Table 1).

### Procedure

Following relevant ethics committees' approval, data collected by PATPA during participants' third trimester of pregnancy were used to ascertain mode of conception, maternal hardness and demographic information. Mothers reported on child temperament four months post-partum and on child sleep behaviour seven months post-partum. All other measures, including maternal sleep-related cognitions and bedtime involvement, were completed during the home-visit when children were approximately 19 months-of-age and in good health. Mothers were shown how to complete the sleep chart and a subgroup were

also shown how to use an Actigraph monitor. Participants returned the chart and monitor in a postage-paid envelope and received a children's book in acknowledgment.

### **Maternal Measures**

Maternal hardiness (psychological maturity) was assessed using the Personal Views Survey (PVSIII-R: Maddi & Khoshaba, 2001) which contains 18 items that cluster to form three distinct factors (commitment, control and challenge) which on average form an overall score—HardiAttitude. The authors recommend using the HardiAttitude score, as it reflects the conceptual uniqueness of hardiness—the balance of being involved (commitment); an initiator (control); and continually learning (challenge). Scores range from 18-48 (30-35 signifies an average capacity to cope effectively during stressful times). The scale has good internal consistency ( $\alpha=.88$ , Maddi & Khoshaba, 2001).

An abridged version of the Maternal Cognitions about Infant Sleep Questionnaire (MCISQ, J. Morrell, 1999) which included 15 of the original 20 items (Johnson & McMahon, 2008) was used to measure maternal cognitions. Items cluster to form three subscales: setting limits (e.g., 'I am able to let my child sleep on their own'); anger (e.g., 'If I try to resist my child's demands at night, I think, 'I might get very angry') and doubt (e.g., 'When my child doesn't sleep at night, I doubt my competence as a parent'). MCISQ has good discriminant validity, internal consistency and test-retest reliability over 1 month ( $\alpha = .82, r = .81, p < .001$  J. Morrell, 1999).

**Table 1.** Maternal and child characteristics by mode of conception

Characteristics	Total Sample	Mode of Conception	
	N=134	Spontaneous <i>n</i> =81	Assisted <i>n</i> =53
<b>Maternal</b>			
Age at giving birth			
Years ( <i>SD</i> )	33.84 (4.64)	32.23 (4.38)	36 (4.19) <sup>†</sup>
Marital Status			
Married or De Facto	132 (99%)	78 (96%)	54 (100%)
Cultural Influence			
English only currently spoken at home	115 (86%)	67 (83%)	42 (79%)
Education			
Secondary school	19 (14%)	10 (12%)	9 (17%)
Trade/Technical	22 (16%)	15 (18%)	7 (13%)
University	94 (70%)	56 (69%)	38 (70%)
<b>Child</b>			
Age at Home Visit			
Months ( <i>SD</i> )	19.06 (1.01)	19.12 (1.03)	18.97 (1.06)
Birth Weight			
Grams ( <i>SD</i> )	3418 (583)	3238.34 (526.85)	3397.10 (660.22)
Gender			
Boys	72 (54%)	44 (54%)	28 (53%)
ICU post-birth			
Days	14 (10.6%)	9 (11%)	5 (9%)
Ongoing Illnesses			
Mild Asthma/allergies ( <i>SD</i> )	9 (7%)	7 (8%)	2 (4%)

<sup>†</sup> Significant difference,  $p < .05$

Mothers completed the Parental Interaction Bedtime Behaviour Scale (PIBBJ Morrell & Cortina-Borja, 2002) to measure maternal behaviour around children's bedtime. The PIBB comprises 17 items that cluster to form five subscales: i. active physical comforting (e.g.,

stroke or pat part of your child); ii. encourage autonomy (e.g., leave your child to cry); iii. settle by movement (e.g., take your child for car rides); iv. passive physical comforting (e.g., stand near the cot/bed without picking your child up); and v. social comforting (e.g., read a story to your child). The PIBB has adequate internal validity (Cronbach's  $\alpha = .71$ ) for a measure tapping different but related strategies (Morrell & Cortina-Borja, 2002).

### **Child Measures**

When children were seven months old, mothers reported their average amount of sleep (hours and minutes) per night during the previous week as well as the average number of night waking.

When children were approximately 18 months old, mothers completed a four day sleep chart which included: a) time children were put to bed and time they awoke in the morning and b) number and duration of night waking. To validate the maternal report, 72 mothers (54%) attached an Actigraph monitor (Acitiwatch-16: Mini Mitter Co. Inc) to their child's non-dominant wrist or ankle at bedtime for four consecutive nights. Child movement during the night was scored as sleep or awake in 30-second epochs, using the Mini Mitter sleep algorithm. Actigraph variables in the current study were: a) total sleep duration—indexed by the first and last five minutes of consecutive sleep; and b) duration of time awake during sleep period.

### **Potential Confounding Variables**

During the home visit, maternal state anxiety (State Trait Anxiety Inventory: Spielberger, Gorsuch, & Lushene, 1970) and depression (Parenting Stress Index - Depression Subscale: Abidin, 1995) were assessed as potential covariates together with the mother's age at the time of giving birth and the language currently spoken at home.

Mothers reported on The Short Temperament Scale for Infants (Carey & McDevitt, 1978) when children were 4 months-of-age; easy-difficult scores (EDS) were used in the current study. To control for neonatal and developmental differences, gender, birth weight and admission to intensive care following birth and ongoing illnesses were also considered in preliminary analysis as potential covariates.

## **Results**

Both the maternal problematic cognitions and bedtime interaction behaviour measures required some modification (see details below). The remainder of maternal and child measures showed good variability and normal distributions (see Table 2 for descriptive statistics).

### **Maternal Measures**

On the maternal cognitions measure almost all mothers scored five items from the Anger subscale as never occurring, so these were removed (e.g., ‘When my child wakes at night, I think, I might lose control and harm them’). An unrotated Principal Component Analysis (PCA) with the remaining items demonstrated that an overall cognitions score was acceptable in the present sample (Cronbach’s  $\alpha = .68$ ) with higher scores reflecting more problematic sleep-related cognitions.

On the maternal bedtime behaviour measure, the majority of mothers reported that ‘they would never leave their child to cry’ and almost all reported that ‘they would read a book at bedtime’; so these items were removed. A more robust overall score using PCA and forcing a single factor solution found that ten of the items loaded onto one factor with higher scores, reflecting more maternal bedtime involvement (e.g., stroke or pat part of your child; lie with child. Cronbach’s  $\alpha = .76$ ).

### Child Sleep Behaviour

Mothers reported that toddlers slept 10.69 hours per night (range 8 - 12.73 hours,  $SD = .77$ ) on average and spent 12.32 minutes awake per night (range 0 – 112.50,  $SD = 18.74$ ) on average. Actigraph data validated maternal report of toddler sleep duration ( $r = .72$ ,  $n = 72$ ,  $p < .00$ ) but not time awake during the night ( $r = .16$ ,  $n = 72$ ,  $p > .10$ ), which is commensurate with previous findings (Sadeh, 2004). Twenty percent of children in this study were reported to sleep less than 10 hours per night. Maternal report of sleep duration was used in analyses.

### Potential Covariates.

Maternal age, language spoken at home, state anxiety and depression were not significantly related to any of the maternal predictor variables or child sleep (all  $ps > .10$ ).

Child temperament, gender, birth weight, admittance to ICU and ongoing illnesses did not significantly relate to any of the maternal factors or child sleep (all  $ps > .10$ ). None of the children had developmental problems or significant ongoing illnesses.

### Preliminary Hypothesis Testing

Hypotheses regarding mode of conception were unsubstantiated. Women who conceived using AC did not differ significantly from SC women on any maternal variables, and children of AC mothers were not reported to receive significantly less sleep at seven or 18 months (all t-tests,  $p > .10$ ). As differences were not identified the two samples were combined for further model testing (see Table 2).

### Model Testing and Path Analyses

Significant correlations amongst the maternal predictors and child sleep behaviour provided preliminary evidence for the proposed model (all  $rs > .23$ ,  $ps < .05$ ). However, child

sleep at 7 months was not significantly related to maternal cognitions or toddler sleep ( $ps > .05$ ), but was associated with more bedtime involvement at 19 months ( $r = .27, p < .05$ ) and was, therefore, retained in the final model.

**Table 2.** Descriptive statistics of maternal and child variables by mode of conception

Study Variables	Mode of Conception <sup>†</sup>						
	Spontaneous		Assisted		Total Sample		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	Range
Problematic	17.53	6.89	18.24	6.82	17.81	6.85	2 - 35
Bedtime Involvement	10.02	5.47	11.02	6.49	10.42	5.89	0 - 27
Child Sleep Duration	10.78	0.75	10.52	0.72	10.69	0.77	8 - 13
Child Sleep Duration	10.50	1.14	10.64	10.70	10.55	1.08	7 - 13

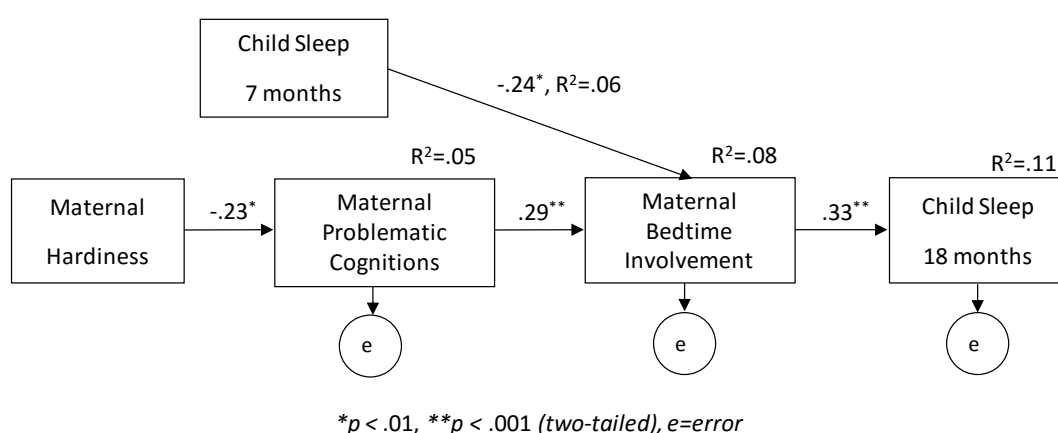
<sup>†</sup>Independent sample t-tests between spontaneous and assisted conception samples, all tests *NS*  $ps > .10$

A recursive path model based on developmental theories represents a direct causal link from maternal hardness to problematic cognitions to bedtime involvement and, finally, to child sleep at 18 months. A direct causal link from child sleep at 7 months to maternal involvement at 18 months represents the effect of early child sleep on ongoing maternal bedtime involvement (see Figure 2).

Structural equation modelling (Arbuckle, 2003) was performed and several measures indicated the data was a good fit to the proposed model:  $\chi^2(6) = 5.96, p = .43$ ; RMSEA = 0.000,  $< .08$  (Browne & Cudeck, 1992) and CFI /TLI = 1.000,  $> .95$  (Hu & Bentler, 1999). Furthermore, exhaustive alternative models were tested (e.g. toddler sleep predicting maternal cognitions and bedtime behaviour) but failed to fit the data, thereby, strongly supporting the proposed direction of the model.



As expected, mothers with lower levels of hardiness experienced more problematic cognitions,  $\beta = -.23$ ,  $p < .01$ , which were associated with increased bedtime involvement,  $\beta = .29$ ,  $p < .01$ ; which, in turn, related to less child sleep at 18 months,  $\beta = -.33$ ,  $p < .001$ . In addition, less child sleep at 7 months was associated with increased maternal involvement at 18 months,  $\beta = -.24$ ,  $p < .001$ . An interaction term (sleep at 7 months x maternal involvement) was tested but failed to fit the data.



**Figure 2.** Structural equation model of child sleep development with standardised parameter estimates. Associations amongst pre-birth maternal hardiness, problematic cognitions, bedtime involvement and child sleep at 7 and 18 months

## Discussion

This prospective study tested a theoretically derived model and found that maternal hardiness measured prior to birth predicted maternal bedtime cognitions, which, in turn, related to maternal bedtime behaviour and toddler sleep. Findings extend on a previous cross-sectional study that supported this model (Johnson & McMahon, 2008). A unique contribution was the inclusion of assisted conception (AC) mothers and the findings that they were not more over-involved with their children at bedtime, nor did their children

receive less sleep. These findings add to a growing body of evidence suggesting that maternal traits such as hardiness predict parenting outcomes rather than pregnancy related contextual factors such as age and mode of conception (McMahon et al., 2011). As no differences were found between the AC and SC participants on any study variables, the remaining discussion concerns the sample as a whole.

Contrary to expectation, child sleep at seven months did not predict child sleep or maternal problematic cognitions at 18 months, but was related to maternal bedtime involvement at 18 months. This suggests that while infant sleep behaviour does not predict how a mother will think about her child's sleep or directly relate to how well her child will sleep in the future, it may establish a habit of maternal over-involvement around bedtime that persists into toddlerhood.

A common limitation in childhood sleep research is interpreting direction of effects (Erath & Tu, 2011). Accordingly, in this study exhaustive models were tested, including sleep at 18 months as a predictor of maternal cognitions and bedtime involvement. However, the theoretical model proposed which posits maternal hardiness as the predictor of toddlers' sleep behaviour, was the best fit and proved to be robust.

Hardiness, included in the model because of its theoretical relevance to the constructs of psychological maturity and authoritative parenting (Baumrind, 1968), encompasses elements of commitment, control and challenge and is related to other known indices of positive adjustment, such as locus of control (Rotter, 1966). Parents with high levels of psychological maturity are significantly more likely to promote their children's autonomy and self-regulation (Belsky & Barends, 2002), and have a capacity to cope flexibly with life's challenges (Heinicke, 1984, 2002).

To date, hardiness has primarily been studied in high-stress contexts (Adler & Dolan, 2006; Bartone, 1999; Dion, Dion, & Pak, 1992; Pollock, 1986) where higher levels of hardiness are related to better outcomes for individuals. More recently, hardiness was

explored in the context of parenting around child sleep in a cross-sectional community sample of mothers and their pre-school-aged children (Johnson & McMahon, 2008). The current study tested a similar theoretical model prospectively and elicited a similar pattern of findings, even after controlling for a more comprehensive range of maternal (concurrent maternal depression and anxiety) and child (temperament, perinatal variables, health) factors often linked to childhood sleep problems. The current findings suggest that the proposed model of child sleep development is robust and that a mother's pre-birth ability to be adaptive, flexible and able to transform adversity into challenge is more predictive of the development of her child's self-regulatory capacity in the context of sleep than characteristics inherent to the child.

To date, research has primarily explored maternal problematic cognitions and bedtime involvement during infancy when sleep/wake patterns are heavily reliant on maternal regulation. In contrast, the current study examined the relationship of these factors during toddlerhood, when increased self-regulation would be expected in the child.

Parents who are more involved at their child's bedtime typically report experiencing more problematic sleep-related cognitions, including anger and doubt about parenting competence (Johnson & McMahon, 2008; Morrell, 1999; Tikotzky & Shaashua, 2012); which may explain an inability to set limits. In the present study, problematic cognitions were experienced significantly less by mothers with higher levels of hardiness, suggesting that maternal characteristics related to an authoritative parenting style (warmth, flexibility and an ability to set clear limits when appropriate) are important in the promotion of adaptive child sleep development in this age group.

Further, as more problematic cognitions were associated with increased involvement at toddlers' bedtime which, in turn, related to less child sleep. It is likely that maternal involvement acts to prolong bedtime, resulting in less time for children to obtain sleep. In this study many toddlers fell asleep as late as 10 pm each night, and 20% had less than 10

hours total sleep, which is significantly less than would be expected for children during this developmental stage (Teng, Bartle, Sadeh, & Mindell, 2012). These findings highlight that parenting beliefs and practices, which are potentially modifiable, are salient contributors to child sleep behaviour.

This study's prospective design and sample characteristics provide further evidence that inherent maternal characteristics appear to be influential in childhood sleep development over and above potentially more intractable child characteristics. Furthermore, this study established that mode of conception is not associated with poor sleep in the second post-natal year. The use of Actigraph to validate mother-reported child sleep and the inclusion of maternal mood and child variables as potential confounding variables are further strengths of this study. However, the sample composition limits generalisability of findings due to oversampling of AC mothers and a lack of cultural and socio-economic diversity. Additionally, maternal cognitions and bedtime involvement at 7 months were not collected, and fathers (cognitions and behaviours) were not included.

Findings from this study confirm that a mother's personality contributes to the extent to which she involves herself at her child's bedtime. Behavioural interventions, such as controlled-comforting, which require a parent to leave their child to fall asleep alone are safe (Price, Wake, Ukoumunne, & Hiscock, 2012) and effective for children over 6 months of age (Mindell, Kuhn, Lewin, Meltzer, & Sadeh, 2006). Yet it is not uncommon for some parents to struggle with this approach due to an inability to tolerate child distress (Reid, Walter, & O'Leary, 1999). Although a relatively stable trait, there is evidence that hardiness can be developed with encouragement to think and behave in more adaptive ways (Bartone, 2006). Consequently, mothers with a child experiencing sleep difficulties may benefit from interventions that include cognitive components specifically targeting negative maternal perceptions of control, and efficacy in the context of problematic sleep-related cognitions.

This combined approach should improve therapeutic engagement and, ultimately, child sleep outcomes.

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# Chapter 4

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## Paper 2

Maternal Psychological Maturity and Toddler Self-Regulation in  
Frustrating Contexts

### Abstract

**Aim.** To prospectively examine the effects of maternal psychological maturity (hardiness) and emotional availability as well as child temperament on toddlers' capacity to self-regulate in two challenging developmental domains: daytime napping and a frustrating situation.

**Method.** Nulliparous women (N=134) were recruited in their third trimester of pregnancy. During pregnancy, these women completed a questionnaire assessing hardiness. When their children were four months old, they completed a child temperament questionnaire. When their children were 18 months of age, they participated in two mother-child interactions recorded during a home-visit and later coded for child emotion-regulation strategies, distress and maternal emotional availability (EA). These mothers also completed a four-day sleep diary. Structural equation modelling was used to test hypotheses.

**Results.** Prenatal maternal hardiness predicted maternal sensitivity (EA) during toddlerhood, and this in turn predicted toddlers napping for longer during the day ( $p < .001$ ). Toddlers' emotion-regulation maturity was associated with child age and temperament; namely, persistence ( $p < .001$ ). Toddlers with mothers higher in hardiness and sensitivity used more maternal support seeking when frustrated ( $p < 0.1$ ).

**Conclusion.** Maternal psychological maturity and sensitivity contribute to toddlers' self-regulation during developmentally challenging tasks that require some level of maternal support.

**Keywords.** toddlers, sleep, frustration, regulation, hardiness, emotional availability, temperament.

### **Maternal and Child Factors associated with Toddlers' Self-Regulation**

Self-regulation is believed to be one of the most important and complex developmental processes to begin in early childhood (Bronson, 2000; DeGangi, Breinbauer, Roosevelt, Porges, & Greenspan, 2000; Kopp, 1982). Children's capacity to self-regulate is related to socio-emotional, behavioural and academic functioning across their lifespan (Cole, Michel, & Teti, 1994; Eisenberg et al., 2001; Eisenberg, Spinrad, & Smith, 2004; Lawson & Ruff, 2004). Those who fail to develop adequate self-regulatory skills demonstrate anger, poor social competence and ongoing socio-emotional difficulties.

In their first year of life, infants predominantly rely on their caregivers to support their physical and emotional needs (Bronson, 2000; Kopp, 1982). Although infants are capable of redirecting attention to regulate their emotional state from approximately three to four months of age (Berger, 2011; Calkins & Hill, 2007; Posner & Rothbart, 1998; Sroufe, 2000), it is during their second year of life that children begin to transition away from the parental anticipatory control that ensures their needs are met towards more varied strategies for independent regulation of cognitions, behaviour and emotions (Bronson, 2000; Grolnick & Farkas, 2002; Rothbart, Sheese, Rueda, & Posner, 2011; Sroufe, 1996). However, quality of parenting is crucial in supporting these developing self-regulatory capacities (Grolnick & Farkas, 2002; Karreman, van Tuijl, van Aken, & Dekovic, 2006; Kopp, 1982; LeCuyer & Houck, 2006; Spanglar, Schieche, Ilg, Maier, & Ackermann, 1994; Sroufe, 2000). Belsky (1984), in his seminal model of the determinants of parenting, proposed that a combination of parental psychological resources, contextual factors and characteristics of the child determined the quality of parenting, with parenting resources considered the primary determinant.

This paper examines parental influences and child characteristics involved in toddlers' capacity to regulate in two common but challenging contexts: daytime napping and

dealing with frustration. It has been suggested that common childhood sleep problems such as resisting bedtime and receiving too little sleep may adversely impact children's capacity to self-regulate during the day (Turnbull, Reid, & Morton, 2013). It is well established that healthy sleep behaviours are optimal for child development; however, napping, which is vital in early childhood, becomes a greater challenge for mothers during toddlerhood due to children's emerging autonomy. Likewise, toddlerhood is a period when children can become easily frustrated, especially, when lack of self-regulatory capacity is coupled with an emerging sense of autonomy, and possibly lack of sleep. The transition from other- to self-regulation in toddlerhood requires parents to balance supporting their children's needs with encouraging their autonomy. Therefore the focus of this study is the role of parental characteristics in the development of toddlers' self-regulatory capacities.

Theorists suggest that an authoritative parenting style that promotes autonomy, encourages adaptive responses in emotionally challenging situations (Feldman, 2007) and sets appropriate limits and boundaries (Baumrind, 1978; Sroufe, 2000) while remaining sensitive to the child's needs (Eisenberg & Sheffield Morris, 2003) is optimal for the development of a child's self-regulatory capacities and long-term self-regulatory functioning (Shoda, Mischel, & Peake, 1990). Evidence suggests that primary caregivers who are more psychologically mature (Johnson & McMahon, 2008; Johnson, McMahon, & Gibson, 2014) and more sensitively attuned to their child (Braungart-Rieker, Garwood, Powers, & Wang, 2001; Calkins & Johnson, 1998; Graziano, Keane, & Calkins, 2010) may be better able to provide authoritative parenting (Sroufe, 1996).

Psychologically mature parents are described as being empathic (Kochanska, Friesenborg, Lange, & Martel, 2004); coping flexibly with life's challenges (Heinicke, 2002); having a capacity for perspective taking (Gerris, Dekovic, & Janssens, 1997); and, having warm and close relationships (van-Bakel & Risken-Walraven, 2002). In the current study, we explore whether maternal psychological maturity, measured during pregnancy, relates to

maternal emotional availability during toddlerhood and, ultimately, to children's capacity to self-regulate in two challenging developmental domains of toddlerhood (daytime napping and managing frustration) while accounting for potential maternal and child covariates that may affect parenting and the quality of parent-child interaction (Bornstein, 2006 ).

Psychological maturity is conceptualised here through the personality construct of hardiness, characterised by commitment, a sense of control and an enjoyment of challenge (Maddi, 1999) as well as through association with indices of psychological maturity such as Locus of Control (Rotter, 1966) and Ego Resiliency (Block & Block, 1980). Hardiness, which has primarily been assessed in relation to high-stress workplaces (Abdollahi, Talib, Yaacob, & Ismail, 2014; Adler & Dolan, 2006; Bogden, 2015; Maddi, 2002; Orme & Kehoe, 2014), has only recently been operationalised in relation to the challenges of parenting in non-clinical samples. Mothers with higher levels of hardiness have reported more adaptive cognitions about their pre-schoolers' sleep; less involvement at their children's bedtime; and, more optimal sleep outcomes for their pre-school aged children (Johnson & McMahon, 2008). In recent work with the current sample, these findings relating to child night time sleep were replicated in toddlers (Johnson et al., 2014) and this study seeks to extend these findings by exploring whether maternal hardiness is also associated with maternal emotional availability; children's daytime sleep behaviour; and; the effective teaching of adaptive and flexible emotion-regulatory skills during toddlerhood.

Sensitivity (emotional warmth and accurate reading of the child's cues) is widely viewed as crucial to optimal parenting; however, supporting the child's emerging capacities to self-regulate (providing autonomy support) is also important (Bernier, Carlson, & Whipple, 2010; Bernier, Matte-Gagne, Bélanger, & Whipple, 2014). One large meta-analysis study found that pre-schoolers' self-regulation behaviours were associated with authoritative parenting styles (limit-setting, guidance and instructional behaviour) rather than parental sensitivity (Karreman et al., 2006). Using the multidimensional construct of Emotional

Availability (see, Biringen, Derscheid, Vliegen, Closson, & Easterbrooks, 2014) allows consideration of other aspects of parenting, along with sensitivity, that are relevant to an authoritative parenting style. Maternal emotional availability has been described as the ‘emotional climate’ (Easterbrooks, Bureau, & Lyons-Ruth, 2012) of the dyadic mother-child relationship. By capturing four dimensions of parenting (i.e., sensitivity, structuring, non-hostility and non-intrusiveness), Emotional Availability reflects a mother’s capacity to appropriately read and react to her child’s cues with warmth and reliably and offer assistance without being threatening or over-directing (Biringen & Easterbrooks, 2012). While maternal emotional availability measured in a free-play task during the day does not appear to be related to infants night-time sleep (Scher, 2001) when measured at bedtime, it has been associated with more optimal infant sleep quality (Teti, Kim, Mayer, & Countermine, 2010). However, as yet, emotional availability has not been explored in relation to daytime napping.

Individual child temperament differences in relation to sleep have been more widely explored and, to date, outcomes are equivocal. While many researchers have found no relationship, others have found that young children with sub-optimal sleep patterns during both day (Ward, Gay, Anders, Alkon, & Lee, 2008) and night (Wilson et al., 2014) are more temperamentally ‘difficult’ than those who sleep well in the daytime. Daytime sleepers are perceived as more rhythmic and adaptable (Spruyt et al., 2008b). Surprisingly, Spruyt and colleagues (2008) found that 12-month old children who napped less were assessed objectively as having better emotional regulation. These findings highlight the need for further exploration of the role of temperament in early sleep behaviour.

In relation to children’s capacity to regulate their emotions, it is widely accepted that in addition to learning and socialisation there is also a developmental component. While older children with more evolved cortical functioning utilise more complex or sophisticated regulatory strategies (see, Gross & Thompson, 2007 for a review), individual temperamental differences in reactivity (emotional and motor reactivity; Rothbart & Bates, 1998) and



persistence (a precursor for executive functioning that emerges during toddlerhood and enables perseverance in challenging contexts) also play a role in toddlers' emotion regulatory development. Indeed, frustration reactivity at five months of age has been found to relate to the use of fewer emotion regulation behaviours at 10 months of age (Braungart-Rieker & Stifter, 1996), suggesting that highly reactive children may not effectively engage with challenging tasks. Parenting and child characteristics were examined in relation to toddlers' capacity for regulating emotion during a frustrating situation when the child's mother was otherwise occupied. To assess influences on toddler daytime napping, maternal factors as well as child rhythmicity were considered.

Developing well regulated sleep patterns is a common developmental challenge for children and parents during early childhood (Adair & Bauchner, 1993; El-Sheikh, 2011; Erath & Tu, 2011) and is related to children's self-regulatory and emotional processing capacities (Spruyt et al., 2008a; Turnbull et al., 2013). Typically, toddlers are expected to sleep 11 to 14 hours out of 24, including at least two to three hours during daytime (Hiscock, 2008; Iglowstein, Jenni, Molinari, & Largo, 2003; Matricciani, Olds, Blunden, Rigney, & Williams, 2012). Toddlers who receive less sleep have been reported to have more emotional and behavioural problems (Reid, Hong, & Wade, 2009), poor language development (Dionne et al., 2011) and ongoing sleep difficulties (Al Mamun et al., 2012). Furthermore, research demonstrates that young children who are restricted from napping are significantly less positive; more negative; less likely to adaptively engage in emotionally challenging contexts (R. Berger, Miller, Seifer, Cares, & Lebourgeois, 2012); and, more likely to experience accidental injuries (Boto et al., 2012). However, differences in sleep regulation are not only attributed to children's capacity for self-regulation (DeGangi et al., 2000) but also to mothers' psychological well-being (Goodlin-Jones, Burnham, E, & Anders, 2001) and the quality of parental interactions (Bélanger, Bernier, Simard, Bordeleau, & Carrier, 2015; Bordeleau, Bernier, & Carrier, 2012). In fact, childhood sleep regulation has been associated more

broadly with emotional regulation (Dahl, 1996) and behavioural control (Bates, Viken, Alexander, Beyers, & Stockton, 2002). In the current study, toddlers' daytime napping will be examined in relation to maternal characteristics. Whether or not toddlers' napping behaviour influences their capacity to regulate emotion during a frustration task will also be examined.

As previously noted, toddlerhood is characterised by children pushing boundaries and resisting parental control, and this commonly leads to emotional outbursts and tantrums (Kopp, 1982; Prior, Sanson, Smart, & Oberklaid, 2000). The process of testing out their emerging autonomy allows toddlers to begin to learn to manage their negative affect and control their behaviour by persisting in difficult or uncertain circumstances (Berger, 2011; Sroufe, 2000). Children need to learn to independently manage negative emotion in order to successfully engage in interactions with peers and adults, and cope with cognitively and socially demanding situations (Saarni, Mumme, & Campos, 1998; von Salisch, 2001).

Like sleep, developing the capacity to regulate emotions relies primarily on learning and socialisation provided by caregivers (El-Sheikh, 2011; Karreman et al., 2006). Indeed, a recent study with five month old infants identified an association between infants' use of mother-orientation regulation during a frustration task and maternal sensitivity, irrespective of infants' neurophysiological regulatory resources, which were assessed through baseline EEG readings (Swingler, Perry, Calkins, & Bell, 2014). The second objective of the study reported here was to explore how maternal characteristics (psychological maturity, emotional availability) are related to infants' capacity to regulate negative affect during a frustration task.

### **Study Context**

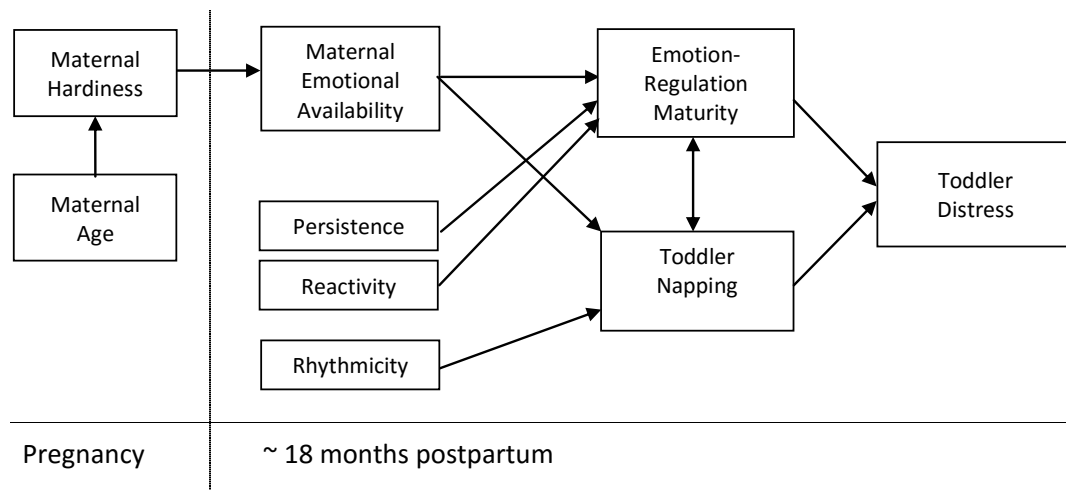
This study, in the context of a well-established Western trend to delay parenthood with its associated greater likelihood of medically assisted conception (Li, Zeki, Hilder, & Sullivan, 2013), examines whether there are benefits to having a baby at an older age,

particularly in relation to psychological maturity. Prior research with the larger cohort from which this sample is drawn has demonstrated that older mothers (37 years and over) reported less depression and anxiety, and received higher hardiness scores during pregnancy if they had conceived spontaneously (McMahon et al., 2011). Mothers with higher levels of psychological maturity (conceptualised as a latent variable including hardiness, ego-resilience and ego strength) experienced a more optimal transition to parenthood, regardless of a history of infertility or mode of conception (Camberis, McMahon, Gibson, & Boivin, 2014). Moreover, compared with their younger counterparts, older mothers demonstrated that they were more attuned (sensitivity and mind-mindedness) to their seven months old infants; explained by higher levels of maternal hardiness.

Thus, this study explored whether psychological maturity confers further benefits for parenting in the second year of life, and whether there are also demonstrable benefits for the developing child. Consistent with parenting models that identify the importance of maternal psychological resources and sensitivity for promoting optimal child development, it is firstly hypothesised that older mothers will have a higher level of hardiness as well as demonstrate a higher level of emotion availability. It is then hypothesised that the toddlers of these mothers will a) spend more time napping during the day; b) demonstrate the use of more mature emotion-regulation strategies; and c) therefore, need less maternal support seeking and d) therefore, demonstrate less distress during the frustration task.

A wide range of maternal and child variables that may contribute to both parenting capacity and child regulation were taken into account. Further potentially confounding factors associated with older maternal age were accounted for, including mode of conception and maternal education as well as a range of child factors (gender, age, birth weight, childcare attendance, ongoing illnesses and average length of night-time sleep). In particular, child temperament is considered. It is predicted that children with less optimal rhythmicity will nap less during the day, and children with less optimal reactivity and persistence will

demonstrate less emotion regulation maturity and therefore more distress. Finally, it is predicted that toddlers' napping and emotion-regulation maturity will be significantly associated (see Figure 1 for a graphical representation).



**Figure 1.** Model of prospective research design

## Method

### Participants

Participants were recruited from an existing longitudinal study, Parental Age and the Transition to Parenthood Australia (PATPA). Nulliparous women who conceived spontaneously or with medically assisted conception from metropolitan fertility clinics and hospital antenatal classes were recruited during the third trimester of pregnancy. Older mothers and those using assisted conception were oversampled relative to their representation in the community. When children were approximately four months old, a sub-sample of mothers ( $N=167$ ) of singleton infants from one of two participating cities (Sydney) were approached to participate in the current study. Of the 134 mothers who agreed, 81 (60%) had conceived spontaneously (SC) and 53 used assisted conception (AC: assisted reproductive technology,  $n = 43$ ; fertility treatment - ovulation induction and/or donor sperm,  $n = 10$ ). No demographic differences were found between the thirty-three (19%) women who did not participate (incomplete,  $n = 14$ , moved interstate,  $n = 8$ , not interested,  $n = 5$ , miscellaneous,  $n = 5$ ) and those who did.

Overall, mothers were predominantly married or in a de-facto relationship and highly educated. There were no differences according to mode of conception on demographic variables, with the exception that SC mothers were significantly younger than AC mothers. The majority of children attended childcare and had no ongoing health problems (see Table 1 for details).

### Procedure

Following approval from relevant ethics committees, during participants' third trimester of pregnancy, mode of conception, maternal hardiness and demographic information (maternal age, marital status, level of education) were collected. At four months

post-partum, mothers reported on child gender and birth weight. All other measures were completed during a home-visit when children were approximately 18 months of age and in good health. At the home-visit, mothers and their toddlers were video-recorded participating in two interactions and the researcher demonstrated how to complete the four-day sleep chart, which was subsequently mailed to the researcher in a return postage-paid envelope.

**Table 1.** Maternal and child demographic characteristics

Demographics	<i>n</i>	%	<i>M</i>	<i>SD</i>
Mother Age –Years <sup>a</sup>			33.84	4.64
Mode of Conception				
Spontaneous - Mother Age <sup>b</sup>	81	60%	32.20	4.38
Assisted - Mother Age	53	40%	36.20	4.01
Marital Status - Married/De Facto	132	99%		
Highest Level of Education				
Secondary School	18	13%		
Higher Education	116	87%		
Child Birth Weight – Grams			3441.83	510.34
Child Gender – Male	72	54%		
Child Age – Months			19.06	1.02
Attending Child-care – Hours	108	81%	22.69	1.36
Ongoing Health Problems – 18mths <sup>c</sup>	16	11%		

<sup>a</sup> Mothers' age at time of birth; <sup>b</sup> Assisted conception mothers were significantly older than spontaneous conception mothers,  $p = .00$ ; <sup>c</sup> Health problems included mild asthma, severe allergies, ear, nose and throat problems

## Recorded Observations

**Free-Play Task.** The first recorded interaction was a mother-child free-play task using a selection of toys supplied by the researcher. After 10 minutes, mothers were instructed to ask their child to help pack away the toys. Recording ceased when all the toys had been packed away in the toy basket or when recording reached 15 minutes. Later, this interaction was coded for maternal emotional availability by a trained coder using the Emotional Availability Scales, 4th edition.

**Frustration Task.** After the free-play task, a large Perspex box with a lid (120 x 60 x 60cm) was positioned in the centre of the room. The researcher placed a colourful toy with flashing lights into the box, and the lid was locked in front of the child. If the child had favoured a specific toy in the previous interaction it was also placed into the box. To potentially activate child frustration, the box had a large hole in one end allowing the child to reach inside. However, the distance to the toy meant children of this age could not reach it. In addition, the lid of the box was locked with D-rings and brightly coloured tactile fabric tabs that could not be opened by a child of this age.

Children were left for five minutes to interact with the locked box while mothers were instructed to complete a questionnaire on the researcher's laptop in the same room. Mothers were told to respond to their child's advances as though they were engaged in an important phone call, or needing to complete an urgent task before joining their child. After five minutes, mothers were asked to join their child at the box. Later, this task was coded separately by two coders for child emotion-regulatory strategies and distress (see measures for details).

Mothers were debriefed after the completion of both tasks and informed that they would receive a DVD of the interactions and a toddler information booklet in the mail.

## Measures

**Maternal Hardiness.** Maternal hardiness was assessed using the Personal Views Survey (PVSIII-R; Maddi & Khoshaba, 2001) when mothers were 30 weeks pregnant. The PVSIII-R contains 18 items that cluster to form an overall score of HardiAttitude and three distinct factors: Commitment (e.g., 'Trying your best at what you do usually pays off in the end'), Control (e.g., 'Most of what happens in life is just meant to be') and Challenge (e.g., 'I like a lot of variety in my work'). Responses are on a 4-point scale from Not at all true to Very true. The authors recommend using HardiAttitude because it reflects the conceptual uniqueness of hardiness: the balance of being involved (Commitment); being an initiator (Control); and continually learning (Challenge). Scores range from 0 to 54 (30-35 range signifies an average capacity to cope effectively with stressful times). Reliability for the total scale was satisfactory (Cronbach's  $\alpha = .79$ ).

**Maternal Emotional Availability Scales.** Maternal emotional availability (EA) was assessed using the Emotional Availability Scale Version IV (Biringen, 2008). Mother-toddler free-play interactions were coded by a trained EA coder (based in Dr Biringen's lab) as recommended by the scales' author (Biringen & Easterbrooks, 2012). The EA includes four maternal scales to assess: sensitivity (mother's ability to read accurately and respond contingently to child signals with warmth and emotional connectedness), structuring (mother's capacity for appropriate scaffolding of child activities and setting appropriate limits), non-intrusiveness (reverse-scored, reflecting parent's capacity to respect the child's autonomy and personal space), and non-hostility (reverse-scored, assessing mother's ability to interact with the child without signs of covert or overt irritability/anger). Scoring on all EA scales relies on global judgments by trained coders to infer the appropriateness of parent and child behaviours during the interaction on a scale of 0 – 7 rather than tallying the presence or absence of discrete behaviours (Biringen, Robinson, & Emde, 2000). The



construct validity of the EA is well established (Biringen et al., 2014). There is extensive evidence that higher levels of maternal EA are associated with secure infant–mother attachment relationships (Biringen, 2000, 2004). EA has also demonstrated short-term and long-term stability (Biringen et al., 2014). Inter-rater reliability was established in the current study on all four EA dimensions on 20 mother–infant free-play observations. Intraclass correlations (IC) for absolute agreement on maternal sensitivity, structuring, nonintrusiveness, and nonhostility were .83, .55, .94, and .88, respectively.

**Toddler Daytime Napping.** On four consecutive weekdays, mothers completed a basic sleep chart that included the duration of their child’s daytime naps in minutes (carers completed the diary on days when children attended day-care).

**Toddler Temperament.** Mothers also reported on The Short Temperament Scale for Toddlers (Fullard, McDevitt & Carey., 1984), a 30-item scale derived from the Thomas and Chess’ (1977) theory of temperament. Only three of the five scales were included in the current analysis. Persistence and Reactivity have previously been found to relate to self-regulatory capacity in early childhood (Eisenberg et al., 2001), while Rhythmicity may account for sleep differences. Higher scores on all three scales are more problematic; for example, they reflect a less persistent, more reactive and less rhythmic child.

**Child Responses to Frustration Task.** Two indices were used to assess toddlers’ capacity to regulate emotion during the frustration task: Toddler Distress and Toddler Emotion-Regulation Maturity. Both indices were coded by different people and were mutually exclusive (i.e. if distress was present, emotion regulation maturity was not scored in that 10 second interval). Twenty-percent of the frustration task observations ( $n = 27$ ) were double-coded for reliability (reported below).

**Toddler Distress.** Based on the infant distress scale developed by (Braungart-Rieker, Garwood, Powers, & Notaro, 1998), toddlers' distress was coded in 30 x 10 second intervals on a four-point scale that incorporated intensity and duration of distress: 0 (no distress), 1 (mild distress, e.g., first signs of frustration or distress such as an angry grunt or whinge, a stomp of the foot or small jumping action), 2 (moderate distress, e.g., persistent crying but with some variation in intensity, able to be placated by mother's voice) or 3 (extreme distress, e.g., screaming, gasping for air, having a tantrum, crying persistently with consistent or increasing intensity, hitting the box or mother while crying). If a child demonstrated both mild and moderate distress in one interval, only the highest level of distress (moderate) was coded. Distress scores were calculated by adding points across the four scales and had a possible range of 0 to 90. If a child was distressed, they were only coded for distress, not any of the regulation strategies. Intra-class correlation coefficients based on absolute agreement for distress scores (0.91) was high.

**Toddler Emotion-Regulation Maturity.** An emotion-regulation coding protocol was developed for this study based on Gross' (2007) model of emotion regulation because it provided a coherent theoretical framework for the developmental hierarchy of emotion-regulation strategies. Specific regulatory behaviours based on a previous coding protocol (Calkins & Johnson, 1998) were arranged into three scales reflecting least mature to most mature regulatory strategies (Gross & Thompson, 2007). Least mature regulation strategies were those that emerge during infancy, such as averting one's gaze or turning away from the source of frustration. Most mature regulation strategies were those that allow children to engage with situations that are initially frustrating and transform them into being tolerable. These mature strategies emerge with increased autonomy and cortical capacity. Toddlers were only coded for using an emotion-regulation strategy if they were not simultaneously

distressed; it was posited that regulatory attempts without distress reflected toddlers' adaptive and effective bids to self-regulate.

Attentional Deployment (the least mature strategy emerging in infancy) was coded when toddlers diverted their attention away from the stressful situation without trying to change the situation in any way (e.g., gazing away from the box; turning away from the box without taking up an alternative task). Situation Modification was coded for behaviours that altered the situation in order to reduce the likelihood of a negative reaction or increase the likelihood of a positive reaction (e.g., walking away from the box; leaving the room or taking on another task such as looking at a book or playing with another object). Cognitive Change (the most mature form of emotion-regulation) was coded when toddlers demonstrated behaviours that indicated that they had altered the way in which they perceived the source of frustration (cognitive reappraisal) or they had adaptively reassessed their capacity to manage the demands of the task. Behaviours that indicated cognitive change included trying different strategies to open the box, engaging with the box in a different way (e.g., pushing it around the room like a train engine; tapping on the box to make a noise), playing with an alternative toy on top of the box, or sitting on the box. In addition, to reflect the developmental shift during toddlerhood from extrinsic maternal regulation towards internalised self-regulation, children who sought assistance, acknowledgment or comfort from their mothers were coded for Maternal Support Seeking. As with other emotion-regulation strategies, toddlers were only coded for maternal support seeking when they were not demonstrating distress.

The frustration task was coded in 30 x 10 second intervals (five minutes duration). In every interval, each strategy was marked as present or absent. If a child spent half the task pushing the box around the room like an engine and half the task reading a book without any distress, he would receive 15 points for cognitive change and 15 points for situation modification; whereas a child who cried on and off for half of the task, then, played with an

alternative toy and approached his mum over a period of three intervals without distress would receive 15 points for situation modification and 3 points for maternal support seeking. Scores for all regulatory scales ranged between 0 (strategy not used at all) and 30 (strategy used in every interval). The intra-class correlation coefficients based on absolute agreement for Cognitive Change, Situation Modification, Attentional Deployment and Maternal Support Seeking were high (range .84 - .92). The three self-regulatory strategies were factor analysed to form a composite score reflecting emotion-regulation maturity (see preliminary data analyses for details).

**Potential Covariates.** To control for factors related to older maternal age, mothers' level of education (dichotomous: up to secondary schooling, higher education) and mode of conception (dichotomous: assisted conception, spontaneous) were included in the analyses. To account for child neonatal, developmental and child-care differences, birth weight, age, gender, hours spent in day-care per week and ongoing illnesses were also considered. To account for the effect of night-time sleep on daytime napping, the average hours of sleep children received each night was ascertained from the parent-report sleep diary.

### **Data Analysis**

Preliminary analyses were undertaken to identify missing data and test for normality of continuous variables. Factor analysis of the child emotion-regulation strategies was performed and a composite emotion-regulation maturity score was created. T-tests, zero-order and point biserial correlations assessed bivariate relationships amongst all study variables in order to determine which covariates to retain in the model. Finally, path analyses based on the proposed research model were conducted using the structural equation modelling program AMOS (Version 21; Arbuckle, 2010).

## Results

### Preliminary Analyses

Less than 5% of all questionnaire items were missing. Mean substitution was used on scales where fewer than 10% of items were missing (hardiness).

**Maternal Variables.** As previously mentioned, mothers in this study were older than typical first-time mothers in the community, and assisted conception mothers were significantly older than spontaneous conception mothers,  $t(132) = -5.30, p = .00$  (see Table 1). However, as maternal age did not relate to any of the maternal variables ( $ps > .32$ ) and no differences were found between assisted and spontaneous conception mothers on any other study variable (all  $ps > .24$ ), the two samples were combined for further exploration of the relationships amongst maternal age, hardiness, emotional availability, toddler napping, emotion-regulatory maturity and distress. The maternal hardiness and emotional availability scores demonstrated good variability and normal distributions. Maternal structuring, non-hostility and non-intrusiveness were not associated with maternal hardiness or with any of the child variables. Therefore, structuring ( $M = 4.94$   $SD = .53$ ), non-intrusiveness ( $M = 5.04$ ,  $SD = .73$ ) and non-hostility ( $M = 5.59$   $SD = .73$ ) were not included in further analyses.

**Child Variables.** Attention Deployment (the most immature emotion-regulatory scale)  $M = 3.70$ ,  $SD = 4.23$ , range 0 to 17 was positively skewed (skewness statistic = .20), indicating that most toddlers rarely used this strategy. The other two scales: Situation Modification,  $M = 4.67$ ,  $SD = 4.36$ , range 0 to 20; and Cognitive Change,  $M = 9.58$ ,  $SD = 7.13$ , range 0 to 28 were normally distributed, as were the Maternal Support Seeking scores,  $M = 6.45$ ,  $SD = 5.17$ , range 0 to 21. Two toddlers failed to use any emotion-regulatory or maternal support seeking strategies during the frustration task and, therefore, received a score of zero on all strategies but scored extremely high on distress. They did not differ

significantly on any of the regulatory measures from children who spent a limited amount of time using emotion-regulation strategies.

To create a composite score of Emotion-Regulation Maturity, an exploratory factor analysis with the three emotion-regulatory scales and maternal support seeking scale was initially performed to examine the underlying theoretical construct of emotion-regulation maturity. As expected, attentional deployment, situation modification and cognitive change formed three distinct factors with eigenvalues  $> 1$ . Together they explained 79.95% of the variance of emotion-regulation maturity, while maternal support seeking loaded weakly and negatively onto all three factors. Subsequently, each of the three self-regulation scales were weighted to reflect increasing maturity and then combined to form a composite emotion-regulation maturity score (i.e., Emotion-Regulation Maturity score =  $1 \times \text{Attentional Deployment} + 2 \times \text{Situation Modification} + 3 \times \text{Cognitive Change}$ ). Emotion-Regulation Maturity scores were normally distributed and correlated negatively with Maternal Support Seeking ( $r = -.269, p = .00$ ), which was retained as a separate regulatory factor.

All mothers reported that their child napped, and the time spent napping was normally distributed. Distress scores were positively skewed, signifying that a majority of toddlers demonstrated mild rather than high levels of distress during the frustration task. Twenty-two toddlers demonstrated no distress but were retained since comparative SEM analyses demonstrated that including them did not significantly alter the fit of the model. All mothers reported that their child napped and time spent napping was normally distributed. Child persistence, reactivity and rhythmicity scores were all normally distributed. Means, standard deviations and range of scores for study variables are shown in Table 2.

**Table 2.** Descriptive Statistics of Study Variables †

Variable	Mean	SD	Range
Maternal Age (years)	33.84	4.64	25 - 43
Maternal Hardiness	40.61	5.00	25-48
Maternal Sensitivity	4.92	0.76	3-7
Day Nap (minutes)	112.58	32.67	30 - 196
Regulation Maturity	48.42	24.33	0 - 95
Support Seeking	6.45	5.17	0 - 21
Child Persistence	3.36	0.56	2.25-4.75
Child Reactivity	2.78	0.62	1.25 -4.63
Child Rhythmicity	2.49	0.78	1.25-4.75
Child Distress	18.20	21.08	0-87
Child Age (months)	19.06	1.02	18-22.50

† Descriptive statistics for other study variables can be found in Table 1.

## Hypothesis Testing

**Bivariate Associations.** Correlations of all study variables are shown in Table 2. Note that more problematic temperament is reflected in higher scores; therefore, positive correlations involving persistence indicate a less persistent child, while positive correlations involving reactivity reflect a child who is more reactive (temperamentally difficult).

Maternal hardiness was significantly (positively) associated with maternal sensitivity, and maternal sensitivity was significantly associated (positively) with daytime napping and toddlers seeking maternal support during the frustration task. Maternal sensitivity was negatively correlated with hours in child-care and positively with maternal education. Maternal age was associated (negatively) with the amount of time toddlers napped. Child persistence correlated significantly (negatively) with emotion-regulation maturity, indicating that children with more optimal scores (lower scores) for persistence used more mature emotion-regulation strategies; and child reactivity was significantly (positively) correlated with distress, indicating that more reactive children demonstrated more distress. Maternal

hardiness was associated with more optimal child rhythmicity. However, rhythmicity was not related to any of the child outcomes. As expected, both emotion-regulation maturity and maternal support seeking correlated negatively with distress because both strategies were coded only in the absence of distress.

Correlations also indicated that boys spent less time napping than girls and older toddlers were more persistent. Consequently child gender, child age, persistence and reactivity were included in further analyses. These preliminary findings provided support for the conceptual research model but indicated that child factors (age and gender) that were not forecast to be associated with child outcomes were required to be incorporated in the statistical model. Two path models were proposed and tested.

### **Path Analyses**

Model specifications for two recursive path models were based on theories of self-regulation development. Parameters found above each pathway represent standardised regression coefficients and bootstrapping was used to test the proposed indirect effects. To ascertain the fit of the data to the proposed models, chi-squared goodness-of-fit index and other suggested indices and criteria that indicate a good fit were assessed:  $\chi^2/df < 2$  (Wheaton, Muthen, Alvin, & Summers, 1977); RMSEA  $< .08$  (Browne & Cudeck, 1992) and CFI /TLI  $> .95$  (Hu & Bentler, 1999).

**Maternal and Child Influences on Toddlers' Daytime Napping.** The first path model offered an explanation for individual differences in toddler daytime napping. Specifically the model tested the proposition that maternal hardiness would directly predict maternal sensitivity, and this in turn would predict the time toddlers spent napping. Based on the preliminary analyses child gender and maternal age were also included.



**Table 3.** Correlations of study variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1 Maternal Age (years)																
2 Maternal Hardiness	.14															
3 Maternal Sensitivity	.02	.26**														
4 Day Nap (minutes)	-.20*	.01	.21*													
5 Regulation Maturity <sup>†</sup>	.05	.12	-.09	-.01												
6 Support Seeking	-.03	-.07	.22*	.11	-.27**											
7 Child Persistence <sup>1</sup>	.06	-.13	-.00	.06	-.28**	.08										
8 Child Reactivity	-.08	.00	.07	.02	-.12	.07	.20*									
9 Child Rhythmicity	-.07	-.20*	-.05	.10	-.13	.01	.12	.20*								
10 Child Distress	-.14	-.05	.01	-.04	-.76**	-.30*	.16	.08	.14							
11 Child Age (months)	.01	.14	.14	.02	.13	-.10	-.22*	.02	.07	-.11						
12 Child Gender	.02	-.05	.15	-.24**	-.08	.01	-.15	.05	-.02	.17	.04					
13 Birth Weight (grams)	-.13	.02	-.04	.03	.04	.18	-.03	.00	.01	-.08	.07	-.05				
14 Night Sleep (minutes)	-.10	-.02	-.03	-.07	.05	-.10	-.01	.06	-.06	-.03	-.01	.09	-.14			
15 Child-care	.20*	-.03	-.25**	-.08	.10	-.10	-.17	.05	-.07	-.10	.01	.01	-.08	-.07		
16 Child Health <sup>2</sup>	-.10	.08	.11	.16	.14	-.05	-.14	-.15	.00	-.10	.14	-.10	.02	-.02	-.04	
17 Maternal Education	.02	.23**	.18*	-.03	-.06	.06	.06	.12	-.01	.08	.01	-.03	.02	.05	-.11	.07

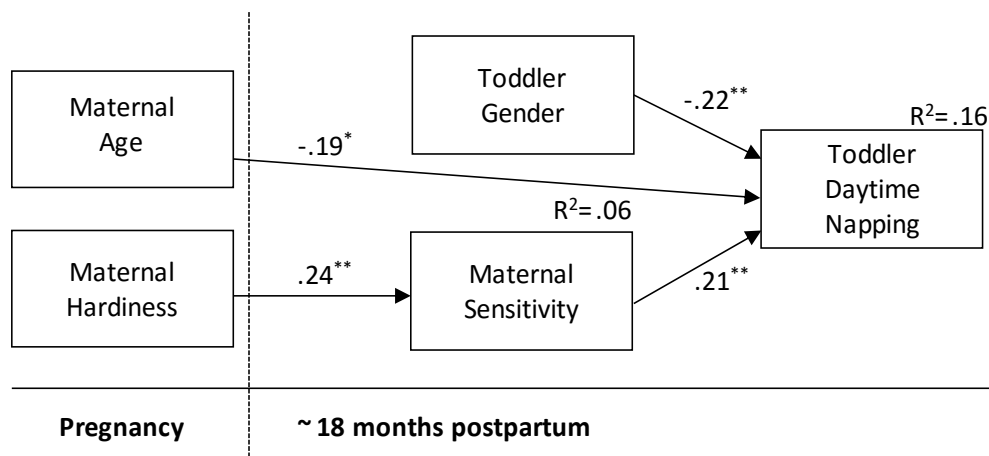
<sup>1</sup> Mothers reported on child persistence, reactivity and rhythmicity when children were 18 months old. High scores on persistence and reactivity are more problematic.

<sup>2</sup> Child health problems include mild asthma, severe allergies, ear, nose and throat problems and developmental disorder ( $n = 1$ ).

Note. <sup>†</sup> Emotion-regulation maturity composite score. \*\*  $p < .01$ , \*  $p < .05$

As illustrated in Figure 2, the proposed links from prenatal maternal hardiness to postnatal sensitivity to daytime napping at 18 months were all significant (positive), indicating that mothers with higher hardiness scores during pregnancy were more sensitive with their children at 18 months and had children who napped for longer. Links from maternal age and child gender to daytime napping were also significant (negative), indicating that male toddlers and toddlers of older mothers napped for less time. Maternal hardiness accounted for a significant but small amount of variance in maternal sensitivity ( $R^2 = 6\%$ ); and maternal hardiness, sensitivity, maternal age and child gender together explained 16% of the time toddlers spent napping.

The goodness-of-fit indices indicated that the data was a good fit to the proposed model:  $\chi^2(6) = 3.99, p = .68$ ;  $\chi^2/df = .66 < 2$ , RMSEA = .000,  $< .08$  and CFI = 1.000 / TLI = 1.33,  $> .95$ , providing evidence that the theoretical model designed to explain toddlers' napping in this study was appropriate for the data collected.



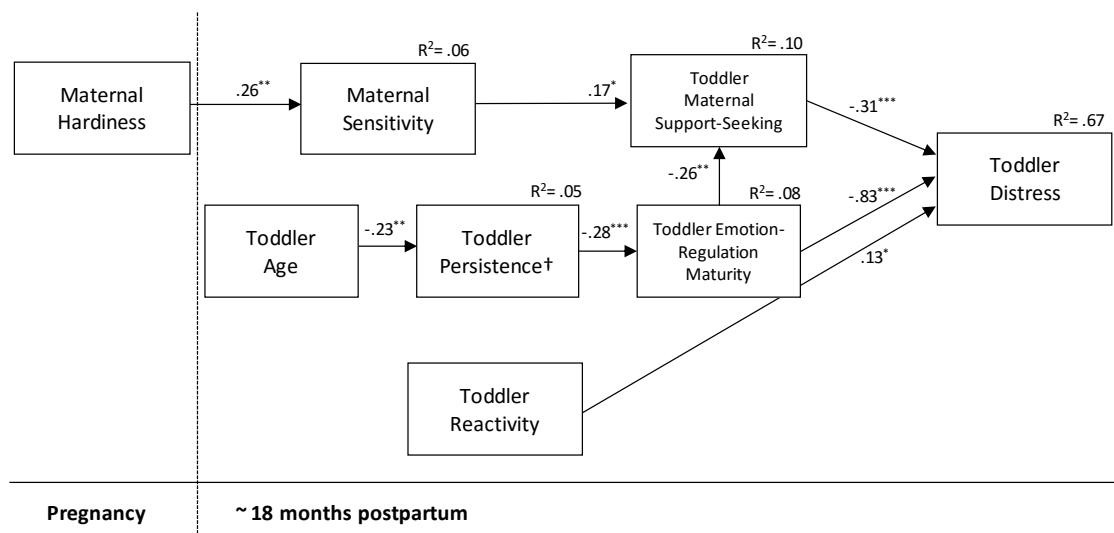
**Figure 2.** Structural equation model showing standardised estimates of significant paths among prenatal maternal hardiness, post-natal maternal sensitivity, maternal age, child gender and toddlers' daytime napping,  $*p < .05$ ,  $**p < .01$ .

### Maternal and Child Influences on Toddlers' Emotion-Regulatory Maturity

The second model proposed an explanation for differences in toddlers' use of regulatory strategies during a frustration task and their associated level of distress. This model included several proposed paths based on theory and on the preliminary analyses. The first path suggested direct causal links from hardness to sensitivity to maternal support seeking to distress. The second path proposed direct causal links from child age to persistence to emotion-regulation maturity to distress. The final path was represented by a direct causal link from child reactivity to distress.

As shown in Figure 3, the model revealed two significant explanatory pathways to toddler distress: one related to parent characteristics and the other to child characteristics. The parental pathway included two positive significant paths between maternal hardness and maternal sensitivity, and maternal sensitivity and maternal support seeking, followed by a negative path from maternal support seeking to toddler distress. This indicates that toddlers of mothers with higher levels of hardness and sensitivity used more maternal support seeking when frustrated, and this reduced their distress. Together, maternal hardness and sensitivity explained 10% of the variance in toddler maternal support seeking.

The child pathway that included negative paths between child age and persistence, persistence and emotion-regulation maturity, and emotion-regulation maturity and toddler distress indicates that older children who were more persistent used more mature regulatory strategies and experienced less distress. In addition, a significant indirect effect from persistence to distress ( $\beta = .22, p = .02$ ) through emotion-regulation maturity was also found; thus, explaining 22% of the variance in distress. Together, child age and persistence explained 8% of variation in emotion-regulation maturity.



**Figure 3.** Structural equation model showing standardised paths among prenatal maternal hardiness, postnatal maternal sensitivity, toddler emotion-regulation maturity, maternal support seeking, toddler temperament and toddler distress.

† High scores on toddler persistence reflect less persistence.

\* $p > .05$ , \*\* $p < .01$ , \*\*\* $p < .001$

Toddlers' use of maternal support seeking was related to emotion-regulation maturity. To ascertain the direction of the effect, the model was analysed with the path leading from maternal support seeking to emotion regulation maturity but was found to be not significant ( $\beta = .03$ ,  $p = .14$ ). The model was reanalysed with the path in the other direction and was found to be significant ( $\beta = -.26$ ,  $p < .01$ ), indicating that toddlers who used more mature regulatory strategies were less likely to use maternal support seeking.

Several measures indicated that the data was a good fit to the modified model:  $\chi^2(20) = 22.81$ ,  $p = .298$ ;  $\chi^2/df = 1.14 < 2$ ; RMSEA =  $.03 < .08$  (Browne & Cudeck, 1992) and CFI =  $.98$  / TLI =  $.97 > .95$  (Hu & Bentler, 1999).

## Discussion

The current prospective study tested a theoretically driven model that posited that maternal psychological maturity (conceptualised in this study by the personality trait,

maternal hardiness) would predict observed maternal emotional availability during toddlerhood and, in turn, toddlers' capacity to self-regulate in two contexts: daytime napping and response to frustration. Of the four emotional availability dimensions tested only maternal sensitivity was associated with maternal hardiness or child variables. It was hypothesised that toddlers' daytime napping would be related to their capacity to regulate emotions during a frustration task, however, as this association was not found two separate path models were tested: one to explain contributions to toddler napping and the other to emotion regulation maturity.

As expected, the model of toddler napping indicated that mothers with higher hardiness scores (assessed during pregnancy) demonstrated more maternal sensitivity (assessed when toddlers were 18 months old) and in turn had toddlers who napped for longer. In addition, male toddlers and toddlers with older mothers napped for significantly less time during the day.

The model relating to toddlers' emotion regulation maturity and distress included two significant explanatory pathways: a path including parental characteristics and a path relating to child factors. The parental path indicated that toddlers with mothers who were higher in hardiness and sensitivity were more likely to adaptively seek maternal support (without distress) in a frustrating context even when their mothers were not fully available to them. This was also associated with toddlers demonstrating less distress. The child path indicated that older toddlers who had been rated as more temperamentally persistent by their mothers demonstrated more emotion-regulation maturity (i.e., used more mature regulatory strategies) and demonstrated less distress. Toddlers with more emotion regulation maturity used less maternal support seeking and demonstrated less distress than those toddlers who solely relied on maternal support seeking.

Moreover, toddlers whose mothers reported them as having a higher level of temperamental reactivity demonstrated higher levels of distress, in the current study; this was

expected. This finding validates the distress measure in the current study and supports findings from previous studies that have shown that children with high levels of reactivity during infancy have less social competence in later years due to difficulties in learning to self-regulate (Braungart-Rieker & Stifter, 1996; Calkins & Howse, 2004).

Together these findings suggest a developmental model including child temperament and the mother-child dyadic relationship in the transition from other-regulation to self-regulation during toddlerhood. They also suggest that highly temperamentally reactive children struggle to use effective strategies to regulate their emotions.

### **Maternal Psychological Maturity and Sensitivity**

Hardiness was included in this study because it encompasses elements of commitment, control and challenge (Maddi, 2002) and is related to other known indices of positive adjustment such as locus of control (Rotter, 1966). Maternal hardiness has previously been found to predict young children's night-time sleep behaviour via adaptive maternal cognitions and less involvement at bedtime (Johnson & McMahon, 2008; Johnson et al., 2014) and was therefore posited to also predict effective self-regulatory development in toddlers' daytime sleep and their emotion regulation capacities. Based on theory (Bornstein, 2006) and previous studies that included the current sample (Camberis et al., 2014; Camberis, McMahon, Gibson, & Boivin, in press), it was expected that older mothers would have higher levels of hardiness; however, this relationship was not found, possibly, due to sample size differences.

Maternal sensitivity comprises maternal warmth, expression of positive emotions and reciprocity of positive emotions between mother and child (Biringen et al., 2014) and is believed to be a critical factor in the development of secure attachment relationships (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1973; Garwood, 1998). And a secure attachment relationship is theorised to be a key contributor to children's self-regulation

development (Sroufe, 1988, 2000). It was found that a mother's level of hardiness prior to giving birth predicted her level of sensitivity in her child's second year, and toddlers of more sensitive mothers napped for longer during the day and used more maternal support seeking when challenged during a frustration task. Taken together these findings provide support for the notion that maternal psychological maturity plays a significant role in toddlers' early self-regulation development; possibly, because psychologically mature mothers are better able to support their children's developmental needs with sensitivity and flexibility even in emotionally challenging contexts. These findings also extend on a recent study that identified a positive association between parental EA at bedtime and infant sleep outcomes (Teti et al., 2010). Specifically, the current study's finding that toddler's daytime nap duration was associated with maternal EA (measured independently of toddler naps) suggests that maternal emotional availability is involved in child sleep outcomes throughout early childhood and also that maternal presence at toddler's nap-time is not necessary for maternal EA to be influential. These findings are commensurate with principles of attachment theory that posit that infants who are accustomed to having their mothers respond sensitively and consistently to their cues form an attachment representation of security and safety (Ainsworth & Bell, 1970; Goodlin-Jones, Burnham, & Anders, 2001).

### **Daytime Napping**

Adequate sleep in childhood is important for children's emotional and physical wellbeing as well as for the development of self-regulatory capacity. However, successfully encouraging toddlers to nap during the day is challenging for most parents due to toddlers' changing sleep needs and emerging autonomy. The finding that mothers with higher levels of hardiness and higher maternal sensitivity had toddlers who napped for longer at 18 months is novel and suggests that mothers who are more flexible, in control, and sensitively attuned to their toddlers are better equipped to assist and support their toddlers to sleep

during the day. However, observations of maternal behaviour around nap time would be required to confirm whether this applied even when a child was disinclined to sleep. These findings also extend previous cross-sectional (Johnson & McMahon, 2008) and prospective (Johnson et al., 2014) findings that have shown that higher levels of hardness are associated with more adaptive bedtime behaviour and fewer problems with children's sleep at night. In the previous studies, hardness was related to more optimal toddler sleep outcomes (Johnson & McMahon, 2008; Johnson et al., 2014) through more effective limit setting at bedtime, so it is surprising that no associations between maternal hardness, EA maternal structuring and toddlers' napping were identified.

Surprisingly, older maternal age predicted toddlers napping for less time during the day. It is difficult to interpret this finding, and further exploration of maternal age, psychological maturity, parenting practices and possibly contextual factors (e.g. lifestyle, work-life balance) might help clarify the association. It is also surprising that male gender predicted less napping during the day, as there is limited evidence of gender differences in early childhood night and day sleep behaviour (for example, Byars, Yolton, Rausch, Lanphear, & Beebe, 2012; Fisher, van Jaarsveld, Llewellyn, & Wardle, 2012; Germon, Goldberg, & Keller, 2009; Goodlin-Jones et al., 2001; Touchette et al., 2005). Furthermore, the difference between the amount of time male and female toddlers spent napping was independent of maternal hardness and sensitivity. One possibility is that male toddlers are more active and therefore require less sleep during the day, or that their activity level leads them to resist napping. The research findings suggest the need for further exploration of gender differences and sleep behaviour in early childhood.

The three temperament traits included in the study, reactivity, persistence and rhythmicity did not relate to how long toddlers napped. This is consistent with previous research findings which show that maternal perception of temperament and subsequent



sleep problems are not connected (Halpern, Anders, Garcia Coll, & Hua, 1994; Hayes, McCoy, Fukumizu, Wellman, & Dipietro, 2011).

### **Maternal Support Seeking and Distress**

Mothers with higher levels of psychological maturity and sensitivity were expected to have provided optimal socialisation to support their toddlers in the transition to more autonomous emotion regulation maturity. It was therefore posited that their toddlers would rely primarily on their own strategies and seek less maternal support when confronted with a challenging task. Whilst this study's findings are not as expected, they are theoretically and developmentally coherent. Two pathways to explain toddlers' regulation of frustration were identified and both were effective in reducing negative affect.

Although maternal hardiness and sensitivity were not related to toddlers' emotion regulation maturity, they did predict toddlers' use of maternal support seeking and that, in turn, significantly reduced distress. These findings suggest that mothers who are flexible, adaptive and sensitively attuned to their children are better able to provide effective regulatory support to their toddlers. And toddlers who are confident with the emotional availability of their mother are likely to turn to them even though a split attention task limited their mother's availability. These findings are suggestive of a secure-base relationship (Bowlby, 1973) where children are confident that their parent will predictably provide a haven of safety, enabling them to explore their environment. It would be interesting to see how these toddlers would have responded to the same frustration if their mothers had not been in the room. In the current study, the mother's presence in the room, albeit with some constraint on interaction with her child, largely mitigated arousal of the attachment behavioural system.

According to attachment theory, toddlerhood is a period when children begin to internalise mental representations of the secure-base figure, making the physical proximity

of the attachment figure less necessary; thereby, promoting the adaptive growth of autonomous self-regulatory capacity (Sroufe, 1988). However, it is possible that children who internalise self-regulatory strategies earlier do so because their parent is not predictably emotionally available with respect to their distress needs. This is consistent with what is known about avoidant attachment patterns. Children with an insecure-avoidant attachment defend themselves against feelings of anger and associated maternal rejection by shifting their attention from their non-responsive parent to the surrounding environment; thus, demonstrating a reduction in the expression of distress and an increase in self-reliance (Crugnola et al., 2011). However, in the absence of a measure of attachment, these interpretations are speculative.

### **Toddler Age, Persistence, Emotion-Regulation Maturity and Distress**

Child factors (age and temperament) contributed to toddlers' emotion-regulation maturity as operationalised in this study. Specifically, older toddlers who were reported by their mothers to be more persistent; and, more persistent toddlers demonstrated more emotion-regulation maturity and less distress. These findings are commensurate with developmental theories of temperament, which posit that persistence (Rothbart & Derryberry, 1981), which typically emerges between two and three years of age, relates to an individual's ability to self-regulate emotions and behaviour. The findings also align with more recent revelations that executive functioning (persistence being a precursor), which is involved in self-regulatory processing and goal-directed behaviours, develops as early as toddlerhood along with cortical maturation. The current study does not establish a significant relationship between either hardiness or sensitivity and toddler's emotion-regulation maturity. This contrasts with findings that parental sensitivity, mind-mindedness and, in particular, autonomy support at 15 months of age influence executive functioning in children at 18-20 months of age (Bernier et al., 2010).

Attentional orienting is thought to aid regulation of emotion early in life, and in particular it can modulate reactivity (Rothbart et al., 2011). Whereas executive attention processes that serve the development of effortful control are seen to develop mostly from toddlerhood onwards (Rothbart et al., 2011). The frustration paradigm utilised in the current study to examine toddler's use of emotional regulation strategies per se, most likely elicited the attentional orienting system in the first instance rather than early emerging executive attentional skills (e.g. problem solving, planning). Unlike persistence, maternal reports of child temperament reactivity were directly associated with higher levels of observed toddler distress but not with emotion-regulatory maturity or maternal support. These findings suggest that highly reactive toddlers have a limited capacity to self-regulate. Their reactive style interferes with their capacity to interact flexibly and adaptively with the source of frustration, and to effectively use maternal support to reduce their level of distress. These findings therefore align with the knowledge that the orienting attentional network is influenced more by underlying temperament traits than by maternal characteristics (Rothbart et al., 2011).

Seeking maternal attention while distressed was a typical response from reactive toddlers in this study. However, bids for mother's attention while the child was distressed were not coded as maternal support seeking because this was not regarded as adaptive or effective emotion regulation but as a response similar to the interaction style observed in children classified as insecure-ambivalent (Crugnola et al., 2011; Nachmias, Gunnar, Mangelsdorf, Parritz, & Buss, 1996). Eliciting counter-productive methods such as demonstrations of high levels of distress to gain parental attention is believed to be a response to unpredictable, non-responsive parents. Though neither toddler persistence nor reactivity were associated with maternal sensitivity, it is possible that toddlers who experienced extreme distress in the current study, and who were unable to use any adaptive strategies may have had insecure attachment relationships. Findings suggest, as previously

mentioned, that future research may benefit from the examination of the mother-child attachment relationship and emotional availability using the toddler frustration task paradigm. Such investigations would lead to a greater understanding of the mechanisms involved in children's emotion-regulation development.

A strategy of cognitive change or reappraisal of a source of frustration is suggested to be the most mature and effective method for regulating emotions and reducing distress (Gross, 1998; Gross & Thompson, 2007). In the current study, toddlers utilised a range of strategies that allowed them to interact positively with the source of frustration (e.g., pushing the Perspex box around the room like a train engine or playing drums on the box).

Children who demonstrated greater emotion-regulation maturity (the effective use of strategies to autonomously modulate negative emotions) also used some maternal support seeking, suggesting that toddlers who have the capacity to problem solve independently will continue to utilise maternal support, though to a lesser extent. This finding highlights the fact that toddlerhood is a period of developmental transition from external- to internal-regulation (Edwards & Liu, 2002). It would be worthwhile for future research to assess the relationships between maternal psychological maturity, maternal sensitivity, toddler emotion-regulation maturity, and maternal support seeking in older children (two-year olds) to more fully understand the point at which a child internalises self-regulatory capacities.

Since regulation strategies and distress were both the confounding of these measures. The use of different coders did offset this to some extent. However, as the distress coding reflected intensity and duration and not simply the presence or absence of distress, it can be concluded that the use of more mature emotion-regulation strategies is more effective at reducing distress than maternal support seeking. The fact that maternal-report of toddler reactivity, completed prior to the home-visit session, related significantly to distress offers support for the validity of the distress measure designed for this study.

### **Strengths and Limitations**

The prospective design of this study has allowed cause and effect conclusions to be drawn about prenatal hardiness and post-natal sensitivity. But, as with all correlational research, caution must be taken when interpreting the direction of cross-sectional results collected at 18 months. Furthermore, the mixed methodology utilised in this study (telephone interviews, maternal report, observational measures as well as a range of potential parent and child covariates) add to the rigor of the findings.

Although home-visits were booked when toddlers were in good health and at their best time of day (and night-time sleep was recorded over a four-day period), a limitation of this study is that information about when children last napped or how they slept the night before the home-visit was not collected; and these may have impacted on the children's capacity to regulate emotions during the frustration task.

Finally, participants in this study were predominantly partnered, English speaking, tertiary educated, first time mothers with a higher than usual rate of medically assisted conception; thus, limiting generalisability of our results to a broader maternal population. Nevertheless, the homogeneity of the sample reflects the socio-demographic status of older mothers (e.g., Roberts, 2012) and will therefore contribute to the growing literature concerned with the consequences (for mothers and their children) of the contemporary trend in developed countries to delay parenthood.

### **Clinical Implications**

The findings from this study suggest that mothers with higher levels of maternal psychological maturity (hardiness) and sensitivity were able to effectively commit to challenging developmental tasks in a flexible and sensitive manner and thereby were able to promote optimal developmental outcomes for their toddlers. Moreover, these mothers appear to be more effective in contexts that require some structuring (daytime napping) or

might yield frustration. The parental factors identified in the current study as contributing to toddlers' development of regulation suggest that early intervention parenting programs that develop and enhance the mother-child dyadic relationship and promote effective authoritative parenting would benefit mothers who demonstrate less capacity for sensitivity, flexibility and structuring.

Maternal ratings of toddler temperament traits of persistence and reactivity were validated to some extent by observed child emotional regulatory behaviours in the face of frustration. The interactional or transactional nature of temperament (for example, Sameroff, 2009) remains a point of discussion and research. However, intervention that inform parents concerning the range of toddler emotional capacities, individual differences and the developmental trajectory of emotional regulation in early childhood might also facilitate a greater sense of parental efficacy to support and scaffold their children's socio-emotional development. Thus programs that nurture the developing mother-child relationship, raise parental awareness and have the ability to promote emerging child self-regulation might offer a more efficacious approach to early intervention in this area.

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# Chapter 5

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## Paper 3

Maternal Psychological Maturity, Parenting Stress and Toddler  
Socio-Emotional Competence

**Article prepared and submitted to Social Development**

Johnson, N., McMahon, C. A., & Gibson, F. L. (2014). Maternal Psychological Maturity, Sensitivity and Parenting Stress: Associations with Toddler's Socio-Emotional Competence.

### Abstract

**Aim.** Toddlerhood can be challenging for parents due children's rapid developmental shifts and emerging autonomy. Parenting stress is associated with poorer child outcomes. Theorists suggest that older mothers may bring protective factors to parenting, yet the risks involved with delaying parenthood are also widely known and research outcomes are equivocal.

**Method.** This prospective study examined maternal age, psychological maturity (operationalised through hardiness) and emotional availability (EA) in the second post-natal year in relation to parenting stress and child socioemotional outcomes. Nulliparous mothers ( $N = 128$ ,  $M = 33.84$ ,  $SD = 4.64$ ), who conceived with assisted (40%) or spontaneous conception reported on hardiness during pregnancy; and infant temperament. When children were 18 months old, mothers reported on parenting stress, toddler socio-emotional competence and behaviour and participated in an filmed free-play interaction which was later coded for EA.

**Results.** Path analyses demonstrated that prenatal hardiness positively related to all indices of toddler socio-emotional competence via two distinct pathways—less parenting stress (all  $ps < .01$ ) and more maternal sensitivity (all  $ps < .01$ ). Hardier mothers also perceived their toddlers as less difficult during infancy ( $p < .001$ ), which related to less parenting stress during toddlerhood. Assisted and spontaneous conception mothers only differed on age.

**Conclusion.** Regardless of mode of conception, more psychologically mature mothers have cognitive and behavioural capacities to effectively meet their toddlers' emotional needs; and, thereby, positively influence their socio-emotional development.

**Keywords.** toddlers, socio-emotional competence, hardiness, emotional availability, problem behaviour, parenting stress.

## Introduction

Toddlerhood is a challenging and stressful period for many parents (Abidin, 1995; Edwards & Liu, 2002) due to emerging autonomy struggles and rapidly developing social-emotional, cognitive and behavioural capacities of their infants at this age (Eisenberg, Spinrad, & Smith, 2004; Kopp, 1982; Morris, Silk, Steinberg, Myers, & Robinson, 2007; Saarni, Mumme, & Campos, 1998), often resulting in tantrums, parent-child conflict and parenting stress (Edwards & Liu, 2002). Research shows that mothers who perceive parenting as more stressful due to personal, spousal, social and/or child factors demonstrate poorer parenting behaviours (Abidin, 1992; Belsky, 1984), and their children's socio-emotional development may be compromised (Cappa, Begle, Conger, Dumas, & Conger, 2011; Coon & Fine, 2008; Crnic, Gaze, & Hoffman, 2005; Crnic & Low, 2002).

For toddlers to develop the capacity to regulate their emotions and behaviour so that they meet age-appropriate social-developmental milestones that include the ability to express appropriate emotions, delay gratification and engage in self-regulatory behaviours (Briggs-Gowan & Carter, 2002; Saarni et al., 1998; Sroufe, 1996) is a crucial learning process. Children who develop these social competencies during toddlerhood are less likely to have ongoing emotional and behaviour problems and are more resilient to the negative effects of stress (Eisenberg et al., 2001; Eisenberg, Spinrad, & Eggum, 2010). On the other hand, those who fail to develop adequate socio-emotional capacity have been found to exhibit problems related to impulsivity, inattention and aggression (Briggs-Gowan & Carter, 2002; Briggs-Gowan, Carter, Irwin, Wachtel, & Cicchetti, 2004; Kochanska, Murray, & Harlan, 2000; Murray & Kochanska, 2002).

It is widely accepted that the socio-emotional development process, like many others, relies primarily on parenting (Bowlby, 1973; Bronfenbrenner, 1979; Eisenberg et al., 2004); and, therefore, is vulnerable to stress and its consequent disruptions to the reciprocal

mother-child relationship (Anthony et al., 2005; Belsky, Woodworth, & Crnic, 1996; Biringen, Derscheid, Vliegen, Closson, & Easterbrooks, 2014a; Bornstein et al., 2012; Casalin, Tang, Vliegen, & Luyten, 2014; Ostberg, 1998). Parents who report higher levels of stress and who perceive their children as ‘difficult’, moody or demanding (Ostberg, 1998; Ostberg & Hagekull, 2000) have been found to demonstrate a more authoritarian parenting style (Belsky et al., 1996; Deater-Deckard, 1998; Lerner, 1993) and to provide less consistent discipline (Crnic & Greenberg, 1990; Pinderhughes, Dodge, Bates, Pettit, & Zelli, 2000), and less warmth and responsiveness (Casalin et al., 2014; Crnic & Low, 2002) in their interactions with their children. Conversely, parents who report their children as having an easier temperament are more likely to have an authoritative parenting style (van den Akker, Deković, Prinzie, & Asscher, 2010) that involves sensitivity to their children’s cues as well as the capacity to set limits, encourage autonomy, model appropriate emotional responses and teach effective emotion-regulation strategies (Baumrind, 1978). This authoritative style of parenting is posited to be optimal for the development of toddlers’ socio-emotional competence and to reduce negative emotions and behaviours (Denham, Renwick, & Holt, 1991; Towe-Goodman & Teti, 2008). Certainly, maternal constructs related to an authoritative parenting style such as warmth, sensitivity, responsivity and emotional availability have been documented in relation to positive child socio-emotional outcomes (Biringen, Derscheid, Vliegen, Closson, & Easterbrooks, 2014b; Deater-Deckard, 1998, 2005; Denham, Mitchell-Copeland, Strandberg, Auerbach, & Blair, 1997; Sutherland, Altenhofen, & Biringen, 2012; Zhou et al., 2002).

Emotional availability (EA) is a multidimensional framework that captures the quality of exchanges between a mother-child dyad by evaluating the level of responsiveness, emotional communication and connectedness between them (Biringen, 2008; Biringen & Easterbrooks, 2012). Emotional Availability evaluates four parent and two child dimensions, which, though correlated, are viewed as discrete constructs (Biringen et al., 2014b). As well

as the primary component of a secure attachment relationship (Bowlby, 1973), maternal sensitivity, which is typically defined as a mother's awareness, accurate interpretation and appropriate response to infant signals (Ainsworth, Blehar, Waters, & Wall, 1978), and is widely viewed as the crucial component of effective parenting and optimal child socio-emotional outcomes (Biringen et al., 2014a; Braungart-Rieker, Garwood, Powers, & Wang, 2001; Leerkes, Blankson, & O'Brien, 2009; Spangler, Schieche, Ilg, Maier, & Ackermann, 1994; Sroufe, 1996). In the emotional availability approach, emphasis is given in evaluating sensitivity to the emotional connection between the mother and child and the congruence of affect. Structuring assesses the extent to which a mother guides, scaffolds and mentors her child's activities. The level of maternal intrusiveness and non-hostility are also considered.

A key contribution of the emotional availability approach is the focus on the bidirectional nature of dyadic exchanges (i.e., maternal sensitivity being contingent on a child responding appropriately). Child behaviours that involve initiative to draw the parent into the interaction are also assessed. More optimal scores for emotional availability (both mother and child) have been associated with greater emotional control during infancy (Little & Carter, 2005) and an increased child capacity for empathy at four years of age (Moreno, Klute, & Robinson, 2008). However, higher levels of parenting stress have been found to have a direct negative effect on maternal emotional availability (Casalin et al., 2014; McMahon & Meins, 2012), and this may in turn compromise healthy socio-emotional development.

While it is widely recognised that parenting stress compromises child developmental outcomes, there is limited evidence that parenting behaviour mediates the relationship between stress and child development (e.g., Crnic & Gaze, Hoffman, 2005). Of particular interest to the current research is a recent study in a high-risk sample of mostly single mothers, the majority of whom were under 30 years of age. The study found that higher levels of maternal sensitivity (observed during a home-visit) completely mediated the

negative effect of parenting stress on child socio-emotional outcomes (Whittaker, Harden, See, Meisch, & Westbrook, 2011); and furthermore, older mothers, in their sample, (which did extend to 51 years of age) demonstrated more sensitivity. The authors concluded that parenting stress itself was likely to impact children through negatively influencing maternal sensitivity. They suggested that the age-effect they found may reflect a gradual improvement in parenting as mothers-at-risk mature (Whittaker et al., 2011). Others have also found that older mothers may demonstrate greater resilience in the face of parenting stress and a greater capacity for sensitive parenting (Bornstein, 2006)(e.g., Bornstein & Putnick, 2007; Moore & Brooks-Gunn, 2002): the so-called 'maturity hypothesis' (Hofferth, 1987). Nonetheless, older first-time motherhood in contemporary societies can also be associated with a history of infertility and the need for assisted conception; and outcomes regarding assisted conception parenting adjustment during the first post-natal year are equivocal (see Hammarberg, Fisher, & Wynter, 2008). However, few studies consider the independent contribution of both maternal age and mode of conception.

Belsky (1984) argued that parental psychological factors were the most influential determinant of parenting quality, as stable personality traits were likely to influence parents' perceptions of themselves and of their child as well as more broadly influence the quality of their marriage, occupation and social support. These are all factors that can impact on a parent's perceived level of stress. Psychological maturity is a multi-faceted construct that has no accepted single definition; however, it is believed to be a reasonably stable personality trait. Parents who are more psychologically mature have been described as having greater capacity for perspective taking (Gerris, Dekovic, & Janssens, 1997), empathy (Kochanska, Friesenborg, Lange, & Martel, 2004), flexibility when coping with life's challenges (Heinicke, 2002), and warmth and closeness in relationships (van-Bakel & Risken-Walraven, 2002). Prior research with the sample in the current study has shown that mothers who are more psychologically mature report more optimal psychological adjustment during both pregnancy



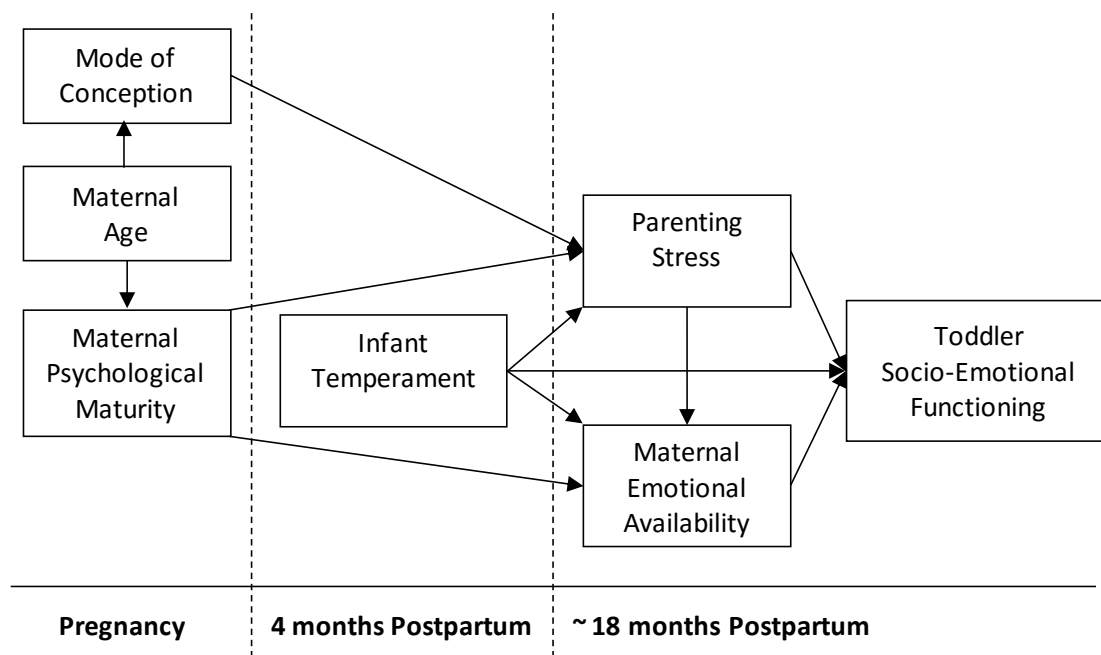
and the transition to parenthood (Camberis, McMahon, Gibson, & Boivin, 2014), and they have a greater capacity to encourage their toddlers' self-regulation at bedtime (Johnson, McMahon, & Gibson, 2014). In a home visit that included a behavioural observation when infants were seven months old, older maternal age was indirectly related to observed maternal sensitivity and maternal mind-mindedness (a mother's capacity to appreciate her child's internal experiences) through an association with psychological hardiness, which predicted healthier cognitions regarding parenting (i.e., an internal locus of control; Camberis, McMahon, Gibson, & Boivin, in press). Psychological maturity has been operationalised in the current prospective study through the personality construct of hardiness (Maddi, 2002): a composite of interrelated attitudes of commitment, control and challenge that is believed to enable perspective taking, flexibility and the motivation to transform life stresses into opportunities for personal growth and advancement (Maddi, 1994, 1999, 2002). In a range of contexts (workplace, health) research has demonstrated that hardy individuals can experience enhanced wellbeing in the face of adversity (Khobasa, 1979; Maddi & Kobasa, 1984). On the other hand, those who lack hardiness and the capacity to turn stresses into meaningful challenges are reported to experience increased symptoms of anxiety and depression (Maddi, 1994).

The investigation of hardiness in a parenting context is relatively novel; however, these findings suggest that mothers with higher levels of hardiness should have the capacity to perceive the day-to-day challenges inherent in childrearing as less stressful; they should perceive their children as less difficult; and, they should have more adequate psychological resources to flexibly manage the challenges associated with parenting and child development.

The overarching aim of the current study is to examine parent characteristics associated with more optimal toddler socio-emotional functioning, with a particular focus on older maternal age and psychological maturity. It is hypothesised that older mothers will be more psychologically mature and will experience less parenting stress during toddlerhood.

We propose that both psychological maturity and lower parenting stress will in turn be associated with greater maternal emotional availability resulting in more optimal toddler socio-emotional functioning.

Based on previous research, this study will also explore the effect of maternal age on emotional availability via psychological maturity. In addition, the study will consider the contribution of infant temperament because evidence suggests it may be a precursor to later emotional and behaviour outcomes (Putnam, Sanson & Rothbart, 2002). Finally, due to the greater likelihood of assisted conception for older mothers, and the equivocal outcomes associated with assisted conception and parenting, the role of mode-of-conception in relation to increased parenting stress, emotional availability and child socio-emotional development will be examined. See Figure 1 for a schematic representation of the proposed model.



**Figure 1.** Model of prospective research design

## Method

### Participants

Participants for this study were recruited from a longitudinal study, called 'Parental Age and the Transition to Parenthood Australia, (PATPA)'. During the third trimester of pregnancy, nulliparous women who conceived spontaneously or with medically assisted conception were recruited from metropolitan fertility clinics and hospital antenatal classes. Older mothers and those using assisted conception were oversampled relative to their representation in the community (see McMahon et. al., 2011 for full details). When children were approximately four months old, a sub-sample of mothers ( $N=167$ ) from one participating city (Sydney) was approached to participate in a home visit when their toddlers were approximately 18 months old: 128 (77% of those invited) completed all requirements of this study (see Table 2 for demographic characteristics). No demographic differences were found comparing those who did and did not participate (incomplete,  $n = 19$ , moved interstate,  $n = 8$ , not interested,  $n = 5$ , miscellaneous,  $n = 5$ ).

Almost half the mothers who participated conceived using assisted conception (either with assisted reproductive technology,  $n = 42$ , or fertility treatment involving ovulation induction and/or donor sperm,  $n = 11$ ). There were no differences according to mode-of- conception on demographic variables, with the exception that assisted conception mothers were significantly older than spontaneous conception mothers,  $t(126) = -5.14, p = .00$ . Overall, mothers were predominantly married or in a de-facto relationship, highly educated and engaged in some paid part-time work during the second postnatal year. Only seven mothers had given birth to a second child at the time of the home-visit. A small number of mothers reported that their child experienced ongoing illnesses.

## **Procedure**

Following approval from relevant ethics committees, mothers in their third trimester of pregnancy completed a questionnaire that included a measure of maternal hardiness, and they participated in a telephone interview that included questions relating to their mode-of-conception and demographic information (maternal age, marital status, level of education). At four months post-partum they received a postal questionnaire in which they were asked to report on their infant's gender, birth weight and temperament. When their children were approximately 18 month-of-age, mothers completed an on-line survey regarding hours spent in paid work, birth of subsequent children and parenting stress as well as their child's socio-emotional competence and problem behaviour. Soon after, and only if children were in good health, a home-visit was undertaken, and a mother-child free-play interaction was recorded.

**Table 1.** Correlations of Study Variables

		<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>	<b>14</b>	<b>15</b>
<b>1</b>	Maternal age	16	-.10	-.13	-.07	.02	-.07	-.15	.09	-.02	-.06	-.23**	.00	-.13	.01
<b>2</b>	Maternal Hardiness	-	-.42*	-.36**	-.26*	.30**	.05	.14	.04	.07	.23*	-.13	.14	-.05	-.33**
<b>3</b>	Parenting Stress Index		-	.95**	.90**	-.15	-.01	-.04	-.03	-.19*	-.27*	.53**	-.12	-.05	.37**
<b>4</b>	Parent Stress Domain			-	.71**	-.15	.04	-.05	-.03	-.07	-.21*	.41**	-.12	-.03	.37**
<b>5</b>	Child Stress Domain				-	-.10	-.03	.01	-.08	-.23**	-.29**	.53**	-.08	-.05	.37**
<b>6</b>	EA Sensitivity					-	.53**	.62**	.50**	.39**	.16	-.08	.13	-.04	-.06
<b>7</b>	EA Structuring						-	.42**	.41**	.24**	.12	-.01	.00	.05	.08
<b>8</b>	EA Non-hostility							-	.54**	.29**	.21*	-.12	.11	-.12	.08
<b>9</b>	EA Non-intrusiveness								-	.14	.03	-.13	-.02	-.06	.16
<b>10</b>	Toddler EA <sup>†</sup>									-	.21*	-.06	.12	-.19*	-.01
<b>11</b>	Child Competence <sup>1</sup>										-	-.13	.26**	.07	-.17
<b>12</b>	Problem Behaviour <sup>2</sup>											-	-.07	-.05	.20*
<b>13</b>	Child age												-	.07	-.16
<b>14</b>	Birth weight													-	-.04
<b>15</b>	Temperament 4 mths														-

*Note.* <sup>†</sup> EA = Emotional Availability; <sup>1</sup>higher scores = optimal socio-emotional competence; <sup>2</sup>higher scores = more problematic behaviour

**Recorded Observation.** Mothers were asked to play for 10 minutes with their toddler using a selection of toys supplied by the researcher and, then, to ask their toddler to help pack away the toys. Recording of the interaction ceased when all the toys were packed in the toy-basket, or when the task had reached 15 minutes. The interaction was later coded for maternal and child interactive behaviours, with different coders coding mothers' and toddlers' behaviours.

## Measures

**Maternal Hardiness.** During the third trimester of pregnancy, participants were asked to complete the Personal Views Survey (PVSIII-R; Maddi & Khoshaba, 2001) as a measure of psychological maturity. The PVSIII-R contains 18 items which cluster to form three distinct factors: Commitment (e.g., 'Trying your best at what you do usually pays off in the end'), Control (e.g., 'Most of what happens in life is just meant to be') and Challenge (e.g., 'I like a lot of variety in my work'). These three factors combine form an overall HardiAttitude score. The authors recommend using HardiAttitude as it reflects the conceptual uniqueness of hardiness: the balance of being involved (commitment); an initiator (control); and continually learning (challenge). Responses are on a 4-point scale from Not at all true to Very true. Scores range from 0 to 54 (30-35 range signifies an average capacity to cope effectively with stressful times). Reliability for the total scale was satisfactory (Cronbach's  $\alpha = .79$ ).

**Parenting Stress.** Mothers reported on the Parenting Stress Index-Long Form (PSI; Abidin, 1995) when children were 18 months old. The 120-item PSI was developed to identify parents of children aged one to 12 years of age who may be experiencing excessive stress due to psychological, social and/or physical stressors in the parent-child dyadic relationship. Each item is answered on a Likert scale from 1 (strongly agree) to 5 (strongly

disagree). The scale produces two sub-scales (child domain and parent domain) which together form a total stress score (see Table 2 for child and parent domain sub-scales, item examples and associated Cronbach  $\alpha$  coefficients for the current sample).

Higher scores on the parent domain suggest that maternal, contextual and/or relationship factors may be underlying parent stress. Higher scores on the child domain, however, reflect parents who perceive attributes of their child as the cause of their parenting difficulties. The PSI is widely used in research and clinical settings and has extensive normative reference data and very good construct validity and reliability (Abidin, 1995). In the current sample, internal consistency for both child and parent scales was generally good, with all Cronbach's Alpha scores  $> .70$ : see Table 2.

**Maternal Emotional Availability.** Maternal emotional availability (Maternal EA) scores were derived from the recorded free-play interaction using the Emotional Availability Scales, 4th edition (EAS; Biringen, 2008), a dyadic coding protocol. The EAS includes four maternal scales: sensitivity (mother's ability to offer congruent emotional and behavioural sensitivity and appropriate responsiveness to her child's emotional cues), structuring (mother's capacity for appropriate scaffolding of child's activities and setting appropriate limits), non-intrusiveness (reflecting parent's capacity to respect the child's autonomy and personal space) and non-hostility (assessing mother's ability to interact with the child without signs of covert or overt irritability/anger). Scoring on each of the four continuous scales relies on the coder's global judgments of parent and child behaviours during the interaction (scores range from 0 - 7) rather than a tally of discrete behaviours (Biringen, 2008). Higher scores on all scales reflect more optimal emotional availability. Twenty-percent of the free-play observations ( $n = 28$ ) were double-coded and the intra-class correlation coefficient based on absolute agreement was adequate (Sensitivity = .92, Structuring = .55, Non-Intrusiveness = .68, Non-Hostility = .70). Both coders were certified by Biringen (the

primary coder was from her laboratory) and were blind to all sample demographics, maternal-stress ratings and hardiness scores.

**Toddler Socio-Emotional Functioning.** Toddler's socio-emotional functioning was assessed both objectively (via coding of the mother-child interaction) and subjectively (via maternal-report, when children were 18-months old).

**Toddler Emotional Availability.** The recorded free-play interaction was also coded by an independent coder for toddler emotional availability (Toddler EA) using the Emotional Availability Scales, 4th Edition (Biringen, 2008). Toddler EA captures the appropriateness, consistency and emotional and behavioural quality of children's responsiveness to their parent (child responsiveness) as well as children's ability to initiate and involve their parent in activities with positive involving behaviours (child involvement). As with maternal EA, scoring for toddler EA relies on a coder's global judgments of child and parent behaviours during the interaction (on a scale 0 – 7). Higher scores reflect toddlers with greater emotional availability, suggesting optimal emotional connection and capacity to involve their parent. Twenty-percent of the observations ( $n = 28$ ) were double-coded and the intra-class correlation coefficients based on absolute agreement were acceptable: Involvement = .89; Responsiveness, = .95.



**Table 2.** Parenting Stress Index - Parent and Child Domain Items and Reliability Coefficients

PSI Sub-scale	Example Item	Cronbach's $\alpha$
<b>Parent Domain</b>		
Sense of Competence	I often have a feeling that I cannot handle things well	.75
Social Isolation	I often have the feeling that other people my own age do not particularly like my company	.71
Attachment	I expected to have closer and warmer feelings for my child than I do and that bothers me	.70
Parent Health	Physically I feel good most of the time	.70
Depression	I find myself giving up more of my life to meet my child's needs than I ever expected	.82
Role Restriction	When my child misbehaves or fusses too much, I feel responsible as if I didn't do something right	.79
Spousal support	Since having a child, my spouse has not given me as much help and support as I expected	.72
<b>Child Domain</b>		
Distractibility/Hyperactivity	When my child wants something, my child usually keeps trying to get it	.73
Adaptability	My child reacts very strongly when something happens that my child doesn't like	.74
Reinforces Parent	My child rarely does things for me that make me feel good	.78
Demandingness	There are some things that my child does that bother me a lot	.74
Mood	My child seems to fuss or cry more often than other children	.71
Acceptability	My child is not able to do as much as I expected	.73

PSI; Abidin, 1995

**Toddler Socio-Emotional Competence and Problem Behaviour.** Mothers reported on the Brief Infant and Toddler Social Emotional Assessment (BITSEA; Briggs-Gowan & Carter, 2002) prior to the home visit. The BITSEA is a 42-item questionnaire that captures a mother's perception of her child's socio-emotional competencies and problematic behaviour and is answered on a 3-point Likert scale (0 = Not True/Rarely; 1 = Somewhat True/Sometimes; 2 = Very True/Often). The competence scale reflects the socio-emotional competencies and social relatedness that children are expected to have developed during early childhood, including compliance with adults, mastery and motivation, emerging empathy and connectedness with peers (e.g. 'My child follows rules'; 'My child is affectionate with loved ones'; 'Points to show you something far away'). Higher scores reflect a more socio-emotionally competent and compliant child. The problem behaviour scale addresses issues relating to internalising (e.g., 'My child worries a lot or is very serious') and externalising (e.g., 'My child is destructive. Breaks or ruins things on purpose') problem behaviours as well as indices of emotional dysregulation (e.g., 'My child has trouble falling asleep and staying asleep'). Higher scores represent more problematic behaviour overall and indicate risk to socio-emotional competencies during childhood (Briggs-Gowan & Carter, 2002). Internal consistency in the current sample was adequate (Competence  $\alpha = .71$ ; Problem behaviour  $\alpha = .74$ ).

**Infant Temperament.** Mothers reported on the Short Temperament Scale for Infants (STSI; Sanson, Prior, Garino, Oberklaid, & Sewell, 1987) at four- months postpartum. The scale includes 30 items describing infant behaviours which mothers score on a 6-point Likert scale from 1 (almost never) to 6 (almost always). A composite Easy-Difficultness score (EDS) that is calculated by averaging scores across three temperament sub-scales: Approach-withdrawal (e.g., 'For the first few minutes in a new place or situations the baby is fretful'), Co-operation (e.g., 'The baby continues to fret during nappy change in spite of efforts to

distract’) and Irritability (e.g., ‘The baby continues to cry in spite of several minutes of soothing’) was also included. Higher scores represent an infant with a more ‘difficult’ temperament. Internal consistency in the current sample was adequate ( $\alpha = .71$ ).

There is evidence that Toddler Easy-Difficultness scores relate significantly to a range of concurrent toddler behaviour problems (sleep, temper tantrums, crying, mood swings; Prior et al, 1989). Therefore, prospective four month temperament ratings gathered during infancy were used in analyses to overcome potential shared method variance.

**Potential Covariates.** To control for factors related to older maternal age, mothers’ level of education (dichotomous: up to secondary schooling, higher education) and mode-of-conception (dichotomous: assisted conception, spontaneous conception) were also considered in the analyses. To account for other potential parenting stressors, current hours in paid work (per week) and subsequent births were also included. The contribution of child neonatal and developmental differences (birth weight, age and the presence of ongoing illnesses) were also considered.

### **Data Analysis**

Preliminary analyses were undertaken to test for normality of continuous variables and to identify missing data. Zero-order and point biserial correlations assessed bivariate relationships amongst all study variables. Structural equation modelling based on the preliminary analysis and the research model was conducted using AMOS (Version 21; Arbuckle, 2010).

## **Results**

### **Preliminary Analyses**

Less than 5% of all questionnaire items were missing. Mean substitution was used on scales where fewer than 10% of items were missing (hardiness). Means, standard

deviations and the range of scores are displayed in Table 3. Correlations amongst the study variables and potential covariates are displayed in Table 4.

**Maternal Variables.** Maternal hardiness, emotional availability and parenting stress scores demonstrated good variability and normal distributions. As previously mentioned, mothers in this study were older than would be expected in the community, and assisted conception mothers were significantly older than spontaneous conception mothers (see Table 1 for means,  $t(132) = -5.30, p = .00$ ). Parenting stress did not differ significantly according to mode of conception nor did any other mother or toddler variables; therefore, assisted and spontaneous conception mothers were combined into one sample for further exploration of the relationships amongst hardiness, maternal EA, parenting stress, toddler competence, toddler problem behaviour and toddler EA.

Parent and Child Domain as well as total parenting Stress Index (PSI) scores were comparable to the PSI normative sample (Abidin, 1995). Overall, 11% ( $n = 14$ ) of mothers scored in the extreme range on the PSI total score. No differences on total parenting stress scores were found between mothers who had given birth to a second child at the time of the 18 month home-visit ( $N = 7$ ) and the remaining sample,  $t(126) = .74, p = .46$ .

**Toddler Variables.** Toddler Emotion Availability scores were normally distributed ( $M_{\text{RESPONSIVENESS}} = 5.25, SD = .83, \text{range} = 3 - 7; M_{\text{INVOLVEMENT}} = 4.72, SD = .75, \text{range} = 3 - 6$ ) and highly correlated ( $r = .77, p < .001$ ). Consequently, a composite Toddler EA score was calculated by adding the two scales together. Higher scores are representative of children who demonstrate a greater capacity to be emotionally receptive and engaged with their mother (see Table 3 for descriptive statistics).

The BITSEA Socio-Emotional Competence and Problem Behaviour scales were normally distributed. In contrast to normative data (McGowan-Briggs), no significant difference was found between the boys' and girls' scores on either scale. On the problem

behaviour scale, 24% of toddlers' ( $n = 31$ ) fell within the clinical range of problem behaviours, and, on average, mothers of these toddlers reported significantly more parenting stress than other mothers  $t(126) = -3.25, p = .001$ . No other differences were identified according to problem behaviour.

Infant 'easy-difficultness' temperament scores were normally distributed and were comparable to an Australian normative sample with children the same age.

Hours of paid work per week, level of education, mode-of-conception, toddler gender and health, and birth of subsequent children did not significantly relate to parenting stress, the maternal emotional availability scales, or to toddler socio-emotional variables: all  $r$ s  $< .1$ , all  $p$ s  $> .10$ . Consequently, these potential covariates were omitted from further analyses (not included in Table 3 or 4).

**Bivariate Associations.** As shown in Table 4, maternal age was not significantly correlated with maternal hardiness but was significantly negatively associated with toddler behaviour problems. Maternal hardiness was associated with less difficult infant temperament, less parenting stress, more maternal sensitivity and greater child socio-emotional competence. Hardiness was not related to any other maternal or child EA variables.

**Table 3.** Descriptive Statistics for Study Variables

<b>Study Variables</b>	<b><i>M</i></b>	<b><i>SD</i></b>	<b><i>Range</i></b>
Maternal age - years	33.84	4.64	26 - 43
Maternal Hardiness	40.57	5.09	25 - 54
Parenting Stress Index	218.00	36.22	143 - 353
Parent Stress Domain	124.58	22.24	80 – 205
Child Stress Domain	96.46	16.82	64 -159
EA Sensitivity	4.89	0.73	3 - 6
EA Structuring	4.94	0.53	3 - 6
EA Non-hostility	5.04	0.73	3 - 6
EA Non-intrusiveness	5.59	0.73	3 - 7
Toddler EA	9.97	1.48	5 – 13
Child Competence	17.42	2.28	11 - 22
Problem Behaviour	10.67	5.50	2 – 32
Child age - months	19.38	1.67	18 – 22
Birth weight - grams	3446.00	508.00	1900 - 5350
Temperament EDS - 4 mths	2.38	0.48	1 – 4

Maternal sensitivity, structuring and non-hostility were all significantly positively associated with each another and with the toddler EA composite score. Moreover, toddler EA (observed) and toddler socio-emotional competence (maternal report) were significantly positively correlated. Maternal non-hostility was positively correlated with toddler socio-emotional competence. Infant temperament was also significantly positively related to problem behaviour and parenting stress at 18 months.

The Parenting Stress Index's Parent Domain score, representing stress related to maternal and spousal relationship factors, and Child Domain score indicating parenting stress attributed to child factors were highly correlated. Total parenting stress was not significantly associated with any of the maternal EA scales but did correlate negatively with toddler EA. Total parenting stress, however, was also associated negatively with toddler socio-emotional competence and positively associated with problematic behaviour at 18 months. It is worth noting that child-related stress scores correlated with all three socio-

emotional measures; whereas, parent-related stress scores correlated negatively only with socio-emotional competence. However, for reasons of parsimony and due to the high correlation between child and parent stress, and the significant findings among total parenting stress and child outcomes the total parenting score was used in all further analyses.

Of the potential covariates, toddler age correlated significantly with socio-emotional competence, and birth-weight was significantly associated with the toddler EA composite. Since neither maternal non-intrusiveness nor structuring related to any variable outside the other emotional availability measures, these two EA scales were removed from the final analyses. These preliminary bivariate findings, however, provide support for the proposed research model.

### **Path Analyses**

The path model proposed in Figure 1 was adapted to include significant bivariate associations found in the preliminary analyses (see Figure 2). The adapted model proposed that maternal hardiness (measured prenatally) would predict maternal parenting stress, and this in turn would predict child socio-emotional competence and problem behaviour as well as child emotional availability at 18 months of age. The model also proposed that prenatal hardiness would predict maternal sensitivity, which would predict observed child emotional availability at 18 months. Based on preliminary findings, the following paths were also included: prenatal hardiness to temperament at four months; temperament to parenting stress; temperament to toddler problem behaviour; maternal non-hostility to toddler socio-emotional competence; child birth-weight to child EA; toddler age to toddler socio-emotional competence; and, maternal age to toddler problem behaviour.

**Table 4. Correlations among Study Variables**

	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>1</b> Maternal age	16	-.10	-.13	-.07	.02	-.07	-.15	.09	-.02	-.06	-.23**	.00	-.13	.01
<b>2</b> Maternal Hardiness	-	-.42*	-.36**	-.26*	.30**	.05	.14	.04	.07	.23*	-.13	.14	-.05	-.33**
<b>3</b> Parenting Stress Index		-	.95**	.90**	-.15	-.01	-.04	-.03	-.19*	-.27*	.53**	-.12	-.05	.37**
<b>4</b> Parent Stress Domain			-	.71**	-.15	.04	-.05	-.03	-.07	-.21*	.41**	-.12	-.03	.37**
<b>5</b> Child Stress Domain				-	-.10	-.03	.01	-.08	-.23**	-.29**	.53**	-.08	-.05	.37**
<b>6</b> EA Sensitivity					-	.53**	.62**	.50**	.39**	.16	-.08	.13	-.04	-.06
<b>7</b> EA Structuring						-	.42**	.41**	.24**	.12	-.01	.00	.05	.08
<b>8</b> EA Non-hostility							-	.54**	.29**	.21*	-.12	.11	-.12	.08
<b>9</b> EA Non-intrusiveness								-	.14	.03	-.13	-.02	-.06	.16
<b>10</b> Toddler EA <sup>†</sup>									-	.21*	-.06	.12	-.19*	-.01
<b>11</b> Child Competence <sup>1</sup>										-	-.13	.26**	.07	-.17
<b>12</b> Problem Behaviour <sup>2</sup>											-	-.07	-.05	.20*
<b>13</b> Child age												-	.07	-.16
<b>14</b> Birth weight													-	-.04
<b>15</b> Temperament 4 mths														-

Note. <sup>†</sup> EA = Emotional Availability; <sup>1</sup>higher scores = optimal socio-emotional competence; <sup>2</sup>higher scores = more problematic behaviour

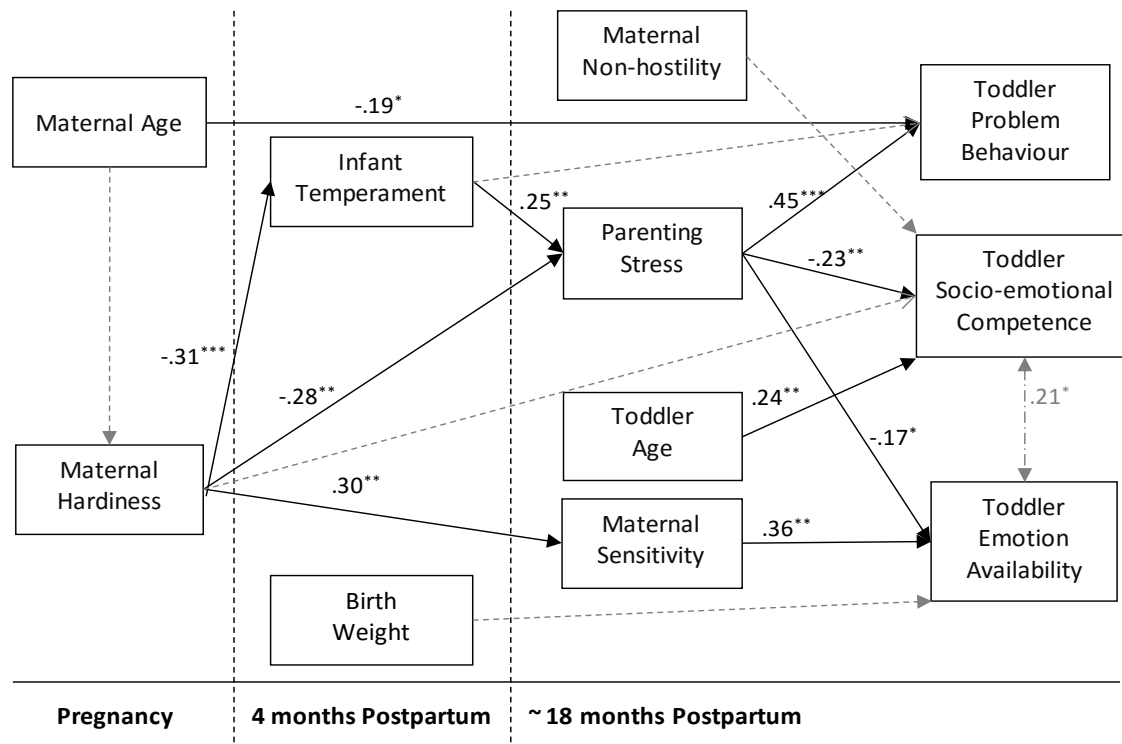


To test the proposed direct and indirect effects, bootstrapping was performed. The initial analysis of the model revealed that the paths from prenatal hardness and maternal non-hostility to toddler socio-emotional competence, and the paths from birth-weight to child EA and infant temperament to toddler behaviour problems were all non-significant. Consequently, these paths were removed from the model prior to re-running the final analysis (represented by grey dashed lines in Figure 2).

Parameters shown above each pathway in Figure 2 represent standardised regression coefficients. As illustrated, prenatal maternal hardness was associated with reports of easier child temperament at four months ( $\beta = -.31, p < .001$ ), less parenting stress ( $\beta = -.28, p < .01$ ) and greater maternal sensitivity ( $\beta = .30, p < .01$ ) at 18 months. Maternal sensitivity was associated with more optimal toddler EA ( $\beta = .36, p < .001$ ), while increased parenting stress was associated with poorer outcomes on all three measures of toddler socio-emotional functioning: poorer toddler emotional availability ( $\beta = -.17, p < .05$ ); more problem behaviours ( $\beta = .45, p < .001$ ); and, less socio-emotional competence ( $\beta = -.23, p < .01$ ).

In addition, infant temperament was associated with greater parenting stress ( $\beta = .25, p < .05$ ) at 18 months. Older child-age was associated with greater socio-emotional competence ( $\beta = .24, p < .01$ ), while older maternal-age was associated with less child problem behaviour ( $\beta = .19, p < .05$ ).

Significant indirect effects of prenatal hardness on all three toddler socio-emotional measures add considerable strength to the model proposed in this study. Specifically, hardness was associated with greater maternal sensitivity and (via maternal sensitivity) more optimal child emotional availability ( $\beta = .17$ , CI: .08–.26,  $p = .01$ ). Hardiness was also associated with less parenting stress at 18 months and (via less parenting stress) fewer child problem behaviours ( $\beta = -.18$ , CI: -.28 – -.05,  $p = .01$ ) and greater child socio-emotional competence ( $\beta = .09$ , CI: -.03 – .18,  $p = .01$ ).



**Figure 2.** Structural equation model showing standardised estimates of significant paths amongst maternal age, prenatal maternal hardiness, infant temperament, parenting stress, maternal sensitivity, toddler age and toddler socio-emotional capacity at 18 months postpartum.

*Note.* Grey dotted arrows indicate non-significant paths that were removed prior to the final analysis. The grey dashed line depicting a correlation between toddler socio-emotional competence and toddler EA is included for illustrative purposes only.

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

Goodness-of-fit indices indicated that the data was an acceptable fit to the proposed model:  $\chi^2(26) = 32, p = .17$  (ns);  $\chi^2/df = 1.25 (< 2)$ ; RMSEA = .02; 90% CI (.00 -.08) ( $< .08$ ; Browne & Cudeck, 1992) and CFI = .97 / TLI = .96 ( $> .95$ ; Hu & Bentler, 1999).

## Discussion

This study examined how older maternal age and greater psychological maturity assessed during pregnancy were associated with socio-emotional development in toddlers. Results offer support for the theoretically driven model proposed and highlight the relevance of examining psychological maturity in relation to parenting and child development. Specifically, higher levels of maternal psychological maturity (assessed during pregnancy and conceptualised in this study by the personality construct hardiness) indirectly predicted all three indices of optimal child socio-emotional development via two distinct pathways: associations with less parenting stress and more maternal sensitivity during toddlerhood. Further, prenatal maternal hardiness was associated with child temperament in early infancy and subsequent maternal stress in toddlerhood. Finally, older children were reported to be more socio-emotionally competent. This may simply reflect increased cognitive and language ability relative to younger toddlers (Vallotton & Ayoub, 2011).

Findings contribute to a growing evidence-base regarding the positive effect of maternal psychological maturity on adaptation during pregnancy (McMahon et al., 2011), the transition to parenthood, parenting during the first postnatal year (Camberis et al., 2014) and children's early development (Johnson & McMahon, 2008; Johnson et al., 2014; Sroufe, 1996). There is some evidence that older mothers may be hardier (Maddi, 2014; Maddi et al., 2006). Though this association was hypothesised in the current study, it was not significant. This is contrary to previous findings with the larger sample from which the current subsample was drawn (Camberis et al., 2014; McMahon et al., 2011). However, the size of the correlation was comparable; suggesting that lack of statistical power may explain the apparently null results. Moreover, older maternal age was directly associated with reports of less problematic toddler behaviour, possibly signify a more mature appraisal process characteristic of increased psychological maturity.

**Maternal Hardiness, Parenting Stress and Child Social-Emotional Competence**

Hardiness (Maddi, 2002) is an aspect of personality that encompasses attitudes of commitment, control and challenge and has been associated with positive indices of psychological adjustment (Kobasa, Maddi, & Kahn, 1982). To date, the majority of hardiness research has been conducted within highly challenging workplaces and with individuals living and working in stressful circumstances such as war zones (Bartone, 1999, 2006; Kelly, Matthews, & Bartone, 2014). Across these settings, hardiness effectively differentiates those who manage well despite hardship and those who struggle physically and emotionally. It is only recently that hardiness has been explored in relation to parenting and child development (Camberis et al., in press; Johnson & McMahon, 2008; Johnson et al., 2014).

A harder mother is posited to take responsibility for her decisions; appraise the difficulties related to parenting as necessary challenges that lead to personal development; understand her child's unique needs; and, thereby, manage the day-to-day exasperations of parenting while meeting her child's developmental needs. Results indicated that mothers who scored higher for hardiness in pregnancy perceived parenting as less stressful when their toddlers were 18 months old. Associations between hardiness and ratings of less difficult infant temperament at four months suggest that this more positive experience of parenting may begin earlier; with child temperament at four months also predictive of later parenting stress. Given the transactional nature of the mother-child relationship (Sameroff, 2009) it is plausible that more optimal infant or toddler temperament could contribute to lower maternal stress and vice versa. In fact, several studies have demonstrated that difficult child temperament and parenting stress are related (Gelfand, 1992, Osteberg & Hagekull, 2000). Some shared method variance also needs to be acknowledged since certain subscales within the child domain of the Parenting Stress Index contain items that could be viewed as overlapping with infant temperament ratings: such as distractibility, adaptability and

demandingness. There has been a longstanding debate about the extent to which temperament reflects biological predispositions and reactive styles (Werner et al., 2007) verses parent perceptions that may or may not be objective. In the absence of observed temperament ratings, it is not possible to draw clear conclusions about this. However, current prospective findings do suggest that a hardier disposition may ameliorate parenting stress because hardy parents might be more able to contextualise their child's behaviour and take their child's perspective.

Further, lower parenting stress was related concurrently with ratings of fewer child behaviour problems (perhaps not surprising, given the shared method variance discussed previously), higher child social competence and higher observed emotional availability; albeit, with a small effect size. These findings provide objective evidence that parental stress can impact directly on child emotion regulation and interactive behaviour, and this suggests that children of highly stressed mothers may use emotional withdrawal to cope. Further, these outcomes, suggesting a direct link between maternal stress and child outcomes (as opposed to a mediated relationship via parental sensitivity), are consistent with previous research (Crnic et al., 2005; Crnic & Low, 2002). Indeed, although theoretically proposed, there is a dearth of evidence demonstrating that the relationship between parenting stress and child outcomes is mediated by parenting behaviour. In the current study it was hypothesized that a direct link would be found based on recent studies that have identified this relationship, however, in these studies samples had included a majority of low socio-economic, single mothers, (Whittaker, Harden, See, Meisch, & Westbrook, 2011) or mothers with high levels of maternal depression (McMahon & Meins, 2012). Suggesting the current study's divergent findings may be due to sample differences: mothers in the current study were older, mostly educated and married.

**Hardiness, Maternal Sensitivity and Child Social-Emotional Competence**

Mothers with higher hardiness scores in pregnancy demonstrated more sensitivity during free-play with their toddlers, but no expected associations were found between hardiness and other indices of emotional availability. Maternal sensitivity was based on affective congruence and accurate reading of the child's cues. These findings, therefore, suggest that greater psychological maturity enhances the capacity of mothers to read their child's emotional and behavioural cues and take the perspective of their child. This interpretation is consistent with earlier findings in the first postnatal year in the current sample where hardiness was found to directly relate to maternal mind-mindedness, a mothers' proclivity to attribute intentionality and meaning to her child's behaviour (Camberis et al., in press).

Taken together, these findings support the notion that hardiness is a stable personality trait that contributes to a mother's capacity to understand, interpret and respond appropriately to her child's cues. Moreover, higher maternal sensitivity was related to higher toddler emotional availability. Thus confirming that those children whose mothers are emotionally attuned and appropriately responsive to them and their cues are able to reciprocate emotionally with more involved and responsive behaviours, and these elicit even further connection with their mothers. While an association is expected for the two EA measures due to the dyadic coding protocol (Biringen, 2008), mothers and toddlers were coded separately in this study and coders were not privy to any information regarding the other subject in the interaction.

That maternal structuring did not relate to maternal hardiness or to toddlers' socio-emotional developmental outcomes is somewhat surprising. Setting appropriate limits and boundaries are vital aspects of authoritative parenting as they provide the scaffolding for children to develop the skills to become more emotionally self-regulated. It is possible, that

structuring is less crucial than sensitivity in the low-stress, free-play task utilised in the current study. By using more challenging tasks, future studies could consider whether structuring is related to hardiness as well as child social-emotional competence.

Maternal non-intrusiveness and non-hostility were also unrelated to hardiness or child socio-emotional outcomes in this study. This may be due to the fact that these two scales were intended to capture specific types of negative behaviours that may be uncommon in low-risk samples (Bornstein, 2009). However, it is noteworthy that child emotional availability, which was objectively measured, and maternal-reports of child socio-emotional competence were significantly associated in this study, contributing to the construct validity of both measures as well as providing additional strength to the study's findings.

To date, findings relating to assisted conception parenting outcomes in the first post-natal year are equivocal (Hammarberg et al., 2008). This study had the unique opportunity to explore whether mothers who conceived with assisted conception experienced parenting during toddlerhood differently to naturally conceiving mothers, while controlling for age, education and number of children. No differences in parenting stress or on any of the maternal or child variables according to mode of conception were identified. This suggests that older-age women who conceive their first child with assisted conception do not differ from those who conceive spontaneously in these respects.

### **Strengths and Limitations**

In order to reduce measurement error and account for the transactional nature of the mother-child relationship and the associated difficulty interpreting direction of findings, this study gathered data prospectively from pregnancy through to toddlerhood, relying on a mixture of self-report and maternal-report measures as well as objective observations. Although maternal-report measures may affect reliability in the case of child temperament, child socio-emotional behaviour and competence, it is arguable that maternal perceptions

may be more meaningful than objective measures because they inform how mothers will respond to their child. Nevertheless, the child socio-emotional measure used in the current study that relied on maternal-report is well validated with observations of child behaviour and clinical diagnoses (Briggs-Gowan & Carter, 2002; Kruizinga, Jansen, Mieloo, Carter, & Raat, 2013), adding rigor to the outcomes. To overcome possible measurement error, future studies could include other observational measures of child socio-emotional behaviour and competency as well as father or child-caregiver report of temperament.

However, with self-report measures of personality traits such as maternal hardiness, construct validity is more essential. Recent research has demonstrated that hardiness is not related to underlying neuroticism or social desirability (Maddi & Khoshaba, 1994), suggesting that outcomes in this study are indicative of underlying maternal characteristics. Indeed, findings from the current prospective study suggest that hardiness is a stable, enduring trait that enhances parent and child outcomes. In future studies to gain a greater understanding of the underlying cognitions related to mothers' experiences of their children and parenting as well as parenting behaviours and child socio-emotional development outcomes, it may be advantageous to look at constructs related to hardiness, such as locus of control and self-efficacy .

One of the strengths of the current study is the inclusion of an observed mother-child free-play interaction during toddlerhood that was coded for maternal and child emotional availability. It was encouraging to find that maternal hardiness measured prenatally was directly related to sensitivity at 18 months; and sensitivity was related to child emotional availability. Possibly, more discriminating ratings of individual differences in maternal structuring, intrusiveness and hostility would have been found had the play interaction been longer. It is also feasible that sensitivity was the only EA scale to relate to hardiness due to the non-challenging nature of the task. The task did not effectively draw



out the other components of EA, especially structuring, which is thought to be related to an authoritative parenting style.

The prospective design of the current study allowed various biological and developmental child factors, maternal factors and contextual factors to be considered and, thereby, contributed to the strength of the study's outcomes. Moreover, the older sample, which reflects the current trend to delay parenthood, including assisted as well as spontaneous conception mothers is consistent with this demographic and allows more reliable inferences to be made regarding parenting at older ages. However, the generalizability of the findings beyond this small but growing demographic is limited. Therefore it would be interesting for future research to test the current study's model in a more diverse and representative sample of first-time mothers.

### **Conclusions and Clinical Implications**

Findings from the current study suggest that mothers who are more psychologically mature view their children as 'easier', perceive parenting as less stressful and are more capable of meeting their children's emotional needs; and, thereby, positively influence their toddlers' socio-emotional competency. Psychological maturity, conceptualised through hardiness in this study, is characterised by having a strong sense of personal control and the capacity to appraise circumstances as less stressful (Khobasa, 1979; Maddi & Kobasa, 1984). Therefore parenting interventions which include an element of cognitive behavioural therapy that will assist mothers to view parenting and their child from a more adaptive perspective as well as to gain a sense of personal control and agency through acknowledging parenting capacities and strengths, and encouraging effective authoritative parenting (i.e. sensitively scaffolding child exploration and growth while encouraging autonomy) could lead to more realistic parenting expectations; and, thus, less parenting stress.

In addition, parenting programs that establish and enhance the mother-child dyadic relationship and facilitate a greater sense of parental efficacy through teaching mothers the range of toddler emotional capacities to accurately read their toddler's cues and respond with sensitivity is likely to provide the scaffolding necessary for their toddler's optimal socio-emotional development.

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# Chapter 6

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Discussion

## General Discussion

Learning to self-regulate is a crucial and complex developmental process beginning in early childhood (Bronson, 2000; Degangi, Breinbauer, Roosevelt, Porges, & Greenspan, 2000; Kopp, 1982), one that is reliant on the early caregiving environment (Kopp, 1982; Sameroff, 2009; Sroufe, 1988, 1996). This prospective study explored children's socio-emotional development during toddlerhood; a developmental phase characterised by the transition from dyadic co-regulation to the emergence of autonomous self-regulation. Several pathways were identified in relation to maternal influences on children's social-emotional wellbeing across a range of domains that included sleep (night and daytime naps), capacity to deal with frustration, and more general social-emotional competence. Maternal hardiness, assessed in pregnancy, was related to indices of child adjustment across domains as well as to parenting cognitions and parenting behaviour.

Several developmental theories informed the research. Firstly, theories regarding determinants of parenting capacity that posit that stable psychological resources of the parent are a key determinant of parenting quality (Belsky's, 1984, Heinicke, 1984), in particular recent work suggesting that psychological maturity may be associated with more optimal parenting (Bornstein, 2006). Secondly, Baumrind's (1966) typologies of parenting styles and her proposition that an authoritative style characterised by high warmth as well as appropriate limit-setting provides an optimal framework for children's development. And finally, seminal work on the primacy of the mother-child attachment relationship, and the importance of early sensitive interactions for the development of infant emotion regulation and healthy relationships (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1973).

Accordingly, child socio-emotional development was explored across a number of contexts in this study with a primary focus on the influence of prenatal maternal psychological maturity and maternal emotional availability (Biringen, Derscheid, Vliegen,

Closson, & Easterbrooks, 2014; Emde & Easterbrooks, 1985). The study was nested in a larger prospective study examining adaptation to pregnancy and early parenthood in relation to older maternal age. Older first time mothers were over-represented in the study sample relative to population studies. Further, in keeping with associations between maternal age, infertility and the need for assisted reproductive technology to conceive, 40% of the mothers in the subsample studied had conceived with medical assistance. While the primary focus was on psychological maturity, because of the sample characteristics, maternal age and mode of conception were also considered in all analyses. The prospective design also enabled consideration of early biological variables that might influence child regulation (birth weight, gender, infant temperament, child health, and sleep problems in the early months). Where appropriate, social and contextual factors (e.g., childcare, maternal paid work, education, language spoken in the home, birth of siblings) were also taken into account. A multi-method approach that included questionnaire data, maternal interviews, sleep diaries and videotaped observations of child behaviour and parent-child interaction was used.

Each separate study within this thesis represents a developmental step towards socio-emotional competence. An initial marker of behavioural organisation and adaptation is the sleep-wake system which involves physiological regulation and relies heavily on parenting influences (Sadeh & Anders, 1993). Thus, the first study explored differences in toddlers' sleep consolidation. The second study examined daytime naps (often a challenging issue for parenting toddlers) as well as toddlers' emerging capacity to tolerate frustration. The final study assessed toddlers' demonstration of socio-emotional functioning in a mother-child interaction as well as maternal perceptions of toddlers' socio-emotional competence in the context of parenting stress.

### **Psychological Maturity**

The central construct explored across the three studies was psychological maturity operationalized here as maternal hardiness. Hardiness is a personality trait characterised by cognitive flexibility; the capacity to tolerate ambiguity and negative affect; and a capacity to take others' perspectives. In addition, resourceful adaptation and a sense of internal control are believed to enable decisive action in the face of challenging or stressful circumstances (Kobasa, 1982; Maddi & Kobasa, 1984). To date, hardiness has primarily been studied in relation to individual coping and physical well-being within universities, corporate and high-stress workplaces such as the military (Abdollahi, Talib, Yaacob, & Ismail, 2014; Adler & Dolan, 2006; Bogden, 2015; Maddi, 2002; Maddi, Harvey, Khoshaba, Fazel, & Resurreccion, 2012; Orme & Kehoe, 2014; Pollock, 1986).

Hardiness has only recently been examined in the context of everyday parenting. Attributes of hardy individuals (commitment, flexibility, self-regulation, an ability to take the perspectives of others) are congruent with those identified in longitudinal research as key determinants of effective parenting (Baumrind, 1966; Belsky, 1984). Camberis, McMahon, Gibson, and Boivin (2014) tested a latent-model of maternal psychological maturity (hardiness, ego resilience and ego strength) in the larger cohort from which this thesis's sample was drawn and identified that hardiness loaded most strongly. Psychological maturity predicted more optimal adaptation to pregnancy (Camberis et al., 2014; McMahon et al., 2011) and adjustment to early motherhood (Camberis et al., 2014a), regardless of a history of infertility or mode of conception. When infants were seven months old, higher hardiness scores and older maternal age were associated with greater maternal attunement (sensitivity and mind-mindedness; Camberis, McMahon, Gibson, & Boivin, In Press).

Moreover, findings from a cross-sectional study with mothers and preschool-aged children suggest that maternal hardiness continues to promote adaptive development



throughout early childhood. Johnson and colleagues (2008) found that mothers with higher levels of hardiness thought more adaptively about their children's sleep, were less involved at their children's bedtime (encouraging autonomy) and, consequently, had children who were reported as receiving more optimal amounts of night time sleep.

The thesis presented here extended this work by prospectively assessing prenatal maternal hardiness in relation to parenting and child development outcomes during toddlerhood.

### **Toddler Regulation**

Toddlers' capacity to self-regulate was assessed across several typically challenging domains of toddlerhood: daytime napping, night time sleep and during a frustration task. Toddler socio-emotional competence was evaluated within a mother and child free-play interaction and via maternal report. To account for the influence of temperament in self-regulation development (Rothbart & Derryberry, 1981; Rothbart, Sheese, Rueda, & Posner, 2011), child temperament was considered across all three studies.

Toddlers who do not receive adequate sleep (11 to 14 hours out of 24 hours) experience more emotional and behavioural problems (Reid, Hong, & Wade, 2009), poor language development (Dionne et al., 2011) and ongoing sleep difficulties (Al Mamun et al., 2012). Furthermore, young children who are restricted from napping are significantly less positive, more negative and less likely to adaptively engage in emotionally challenging contexts (R. Berger, Miller, Seifer, Cares, & Lebourgeois, 2012). The current study was interested in exploring why some toddlers sleep more than others. Data relating to the amount of time children slept at night and napped during the day was collected in maternal-report sleep diaries, which were validated with actigraph monitors in half of the sample.

Toddlers' regulation of emotion has been described as the central component of socio-emotional development during toddlerhood (Kopp, 1982, 1989) and is a complex

multifaceted process which has been studied from varying developmental domains (Stifter, 2002). As infants, children rely almost completely on their parents for their emotional needs to be met; but during their second and third years of life, toddlers' capacity to self-regulate their behaviour, cognitions and emotions emerge (Sroufe, 1996). Individual differences in toddlers' regulatory capacity during toddlerhood were explored in this thesis through a construct developed for this study. Emotion-regulation maturity reflects a cognitive developmental perspective, and therefore the use of language and executive functioning capacities to gain desired outcomes. A coding system derived from Gross's (2007) process theory of emotion regulation and Calkins and Johnson's (1998) coding protocol was created. Toddlers' level of emotion-regulation maturity was ascertained from a frustration task where mothers were required to remain in the room but requested to complete a split-attention task.

Regulatory strategies were grouped into the following three families: Attentional Deployment (diverting attention away from the source of frustration); Situation Modification (leaving the room, reading a book or playing with alternative object); and Cognitive Change (engaging with the source of frustration). Toddlers who used more cognitive change strategies, which were considered the most sophisticated or mature as they suggest a higher-order process of cognitive re-appraisal or flexibility, received higher emotion-regulation maturity scores. Whereas toddlers who used more attentional deployment strategies, which emerge during infancy and are considered the least sophisticated or mature strategies, received lower emotion-regulation maturity scores. Although less mature strategies assist toddlers to regulate emotions in the moment, they are unlikely to alter the underlying source of negative emotion. Whereas more mature strategies that employ reappraisal of the circumstances are likely to be more effective in reducing distress.

Toddlers who sought assistance from their mother (or close proximity to her) while not distressed during the frustration task were coded for maternal support seeking (external

regulation). Following the proposition by Gross (2007) that the regulatory strategies included in this research occur prior to an expression of emotion, regulation strategies were coded only at times when the child was not expressing negative affect. In other words, the strategies effectively regulate or offset the negative affect. Toddler distress was coded independently of the coding of regulatory strategies.

To assess toddlers' overall socio-emotional competence and problem behaviours, mothers completed a well validated measure designed for infants and toddlers (Briggs-Gowan & Carter, 2002). Toddlers' capacity to regulate emotions in a relationship context was derived from a mother-child interaction that was coded for emotional availability (Biringen, 2008). Emotional availability, derived from attachment theory, has been utilised widely in developmental research and more recently in intervention studies (Biringen & Easterbrooks, 2012). Emotional availability can be assessed across a range of emotions (Emde, 1980) and encompasses two child dimensions: responsiveness to the mother (conceptually similar to secure/insecure attachment), and; involvement of the mother. Optimally, child responsiveness is congruent to the mother's invitations to join her and demonstrates the capacity to autonomously engage the mother using positive-involving behaviours. Non-optimal responsiveness and involvement is exemplified by a child being evasive or expressing negative affect towards a parent, being excessively responsive when a parent is disengaged, or using negative affect or behaviours to gain maternal involvement. A combined score reflecting both child responsiveness and involvement was used in the current research.

In addition, given the potential involvement of traits that are thought, in part, to be more biologically determined in the development of self-regulation (Rothbart et al., 2011), temperament was considered across all three studies presented. Mothers completed a widely validated questionnaire when their child was 4 and 18 months old (Sanson, Prior, Garino, Oberklaid, & Sewell, 1987; Sanson, Smart, Prior, Oberklaid, & Pedlow, 1994). Ratings of

temperament at four months were used in cases where concurrent measures may have conceptually overlapped with primary toddler outcome measures such as sleep in Study 1 and socio-emotional competence and problem behaviours in Study 3. Concurrent reports of toddler persistence, reactivity and rhythmicity were considered in Study 2 as reactivity and persistence (viewed as a developmental precursor to executive functioning) have been previously identified as contributing to young children's self-regulatory development (Braungart-Rieker & Stifter, 1996; Putnam & Stifter, 2008; Rothbart & Derryberry, 1981). Toddlers' rhythmicity was considered in relation to daytime napping.

In summary, this thesis's objective was to establish whether mothers with higher levels of prenatal hardiness demonstrated a greater capacity to encourage their toddlers' self-regulatory development across a number of challenging contexts by assisting their toddlers to independently and adaptively manage their emotions and behaviours. A brief overview of the thesis's major findings is presented, followed by a more detailed consideration of the unique contributions and unexpected and equivocal findings of this research in the context of the broader body of extant literature. Finally, strengths and limitations of the research as well as directions for future research and clinical implications are presented.

### **Overview of Findings**

The first study examined toddlers' sleep consolidation and found that mothers with higher levels of hardiness in pregnancy experienced more adaptive parenting cognitions around their toddlers' sleep (less doubt and anger) and in turn spent less time with their toddlers at bedtime (encouraging autonomy), and this related to toddlers sleeping more at night. The prospective research design allowed the examination of the possibility that child sleep problems in the first year might be predictive of less adaptive maternal cognitions about bedtime and increased maternal involvement at bedtime at 18 months, leading to poorer toddler sleep outcomes. However, sleep during infancy did not relate to sleep during

toddlerhood but was associated with more maternal bedtime involvement in toddlerhood, suggesting that involved at bedtime may have evolved into a routine for some mothers rather than as a result of self-doubt or anger.

The second study explored individual differences in toddlers' capacity to independently regulate emotion during a frustration task. The study also examined how well toddlers napped during the day and whether napping was implicated in emotion-regulation maturity. A novel finding was that mothers with higher levels of hardiness demonstrated higher levels of maternal sensitivity when their children were 18 months old, and this in turn was related both to toddlers' emotion-regulation maturity and more optimal daytime napping. Contrary to prediction, toddlers' daytime napping was not associated with their capacity to regulate emotions, so two separate models were analysed. The first offered an explanation for daytime napping and the second, emotion regulation maturity.

In relation to daytime napping, mothers with higher levels of hardiness and who were more sensitive reported that their toddlers napped for longer during the day. Contrary to expectation, maternal structuring (which signifies parenting that appropriately guides, scaffolds and mentors a child's activities) was not related to hardiness or toddler napping. However, child gender and maternal age were related to napping: boys and toddlers of older mothers had shorter naps.

Analysis of determinants of toddlers' responses in the frustration task in Study 2 revealed two unexpected but coherent regulatory paths that were both associated with lower levels of toddler distress. The first pathway related to maternal characteristics and revealed that toddlers of mothers who had higher levels of hardiness and showed higher levels of maternal sensitivity at 18 months were more likely to turn to their mothers for emotional support when confronted with a task that was impossible for them to manage. While adaptive and effective, this response can also be viewed as less autonomous. The second pathway related to developmental and child characteristics and involved the temperament

trait of persistence. Older toddlers, reported by their mothers as being more persistent, demonstrated more emotional-regulation maturity (i.e., adaptive use of self-regulating strategies, and not turning to the parent for assistance) and less distress. As might be expected, concurrent parent-reports of greater temperamental reactivity were directly related to higher levels of toddler distress. Taken together these findings suggest a developmental model of the transition from other- to self-regulation during toddlerhood that is related in complex ways to both the quality of parenting and toddler temperament.

The final study examined toddlers' overall social-emotional functioning whilst considering the impact of parenting stress. Two separate paths, both of which included maternal characteristics were identified to explain toddler socio-emotional outcomes. The first path showed that maternal hardiness was related to more adaptive representations of the child and of parenting. Results revealed that more psychologically mature mothers viewed their babies as less difficult in the early months after birth and also viewed parenting as less stressful during the toddler period. Toddlers who were rated as temperamentally 'easier' during infancy were reported to demonstrate fewer problem behaviours during toddlerhood, indirectly via lower levels of parenting stress. Further, lower parenting stress was related to more optimal outcomes on all measures of toddler socio-emotional competence (observed and maternal report). The second path indicated that mothers with higher levels of hardiness demonstrated a greater capacity to sensitively and accurately perceive, and congruently respond to their toddlers' emotional cues, and this was positively related to their toddlers' capacity to reciprocate (higher toddler emotional availability). Contrary to predictions, parenting stress was not associated with lower maternal sensitivity. However, parenting stress was directly related to lower toddler emotional availability, suggesting that toddlers of stressed parents may use emotional avoidance strategies to maintain their emotional equilibrium. There is a difficulty in assigning directional affects

since both parenting stress and emotional availability were assessed at 18 months, and it is possible that a less responsive and involving child may contribute to parenting stress.

Overall, findings from the three studies within this thesis offer a coherent framework for understanding the benefits of maternal psychological maturity and maternal sensitivity for toddlers' self-regulatory and socio-emotional development. As expected, prenatal maternal psychological maturity was related to all toddler outcomes across the studies, highlighting the stable and positive influence of maternal psychological resources on child development (Belsky, 1984; Belsky & Barends, 2002).

Moreover, the findings support the notion that mothers with higher levels of psychological maturity may have a more adaptive cognitive style, associated with greater capacity for perspective taking, a more positive view of infant behaviour, and also a greater capacity to parent using an effective authoritative style (setting limits and encouraging autonomy) around important developmental challenges such as night and day-time sleep. Powell, Cooper, Hoffman, and Marvin (2014) captured this balance in their 'Circle of Security' approach to parenting: "Wherever possible follow the child's lead; whenever necessary take charge".

This research has also demonstrated that mothers with higher levels of psychological maturity also have a greater capacity to sensitively meet their toddlers' emotional needs in the second post-natal year. And this is related to toddlers' adaptive socio-emotional competence across a number of challenging contexts during toddlerhood. Findings not only add further support to the notion that maternal sensitivity is pivotal to child development (Ainsworth et al., 1978) they also present novel outcomes regarding the relationship between maternal psychological maturity and the capacity for sensitivity. Taken together, the findings add to a small but growing body of evidence that maternal psychological maturity is adaptive during the transition to parenthood and the early years of childhood.

**Novel Contributions**

**Mode of Conception.** This study offered a unique opportunity to assess potential parenting and child development differences during the second postnatal year in a sample of older first-time mothers who conceived spontaneously or through assisted conception. With the exception of maternal age, no differences between spontaneous and assisted conception mothers or their toddlers were identified on any study variable (Adamson et al., 2006; Macaldowie, Wang, Chambers, & Sullivan, 2013). These findings are encouraging given the demographic shift to older first-time motherhood which is associated with age-related fertility decline (Collins & Crosignani, 2005), and an increasing reliance on assisted conception technologies. Especially as outcomes regarding assisted conception parenting adjustment during the first post-natal year are equivocal (see Hammarberg, Fisher, & Wynter, 2008). McMahon et al., (2011) noted that women who had required assisted conception experienced a more complex emotional journey during pregnancy due to higher pregnancy-specific anxiety and more intense maternal–fetal attachment, but this was offset by lower levels of depression and general anxiety symptoms. The current findings suggest that despite some emotional challenges in pregnancy, mothers who have conceived with assisted conception are as capable of sensitively meeting their children’s needs in the second post-natal year, as spontaneous conceiving mothers.

**Maternal Psychological Maturity.** This research identified that hardiness, a relatively stable personality trait, positively influences mothers’ perceptions of their child and parenting experiences and is involved in optimal child development during toddlerhood. Specifically attributes of hardiness that were posited to promote an authoritative parenting style (i.e., a sense of internal control, ability to think flexibly and perspective take, to perceive challenges as opportunities for growth and to act adaptively) appear to be beneficial for the development of toddlers’ self-regulation around night time sleep and daytime napping, socio-



emotional competence and behaviour (maternal-report) as well as more optimal observed socio-emotional functioning. Although maternal hardiness was not involved with toddlers' emotion-regulation maturity, maternal hardiness and sensitivity did play an adaptive and effective role in toddlers' emotion regulation during the frustration task which will be considered in more detail later.

In relation to toddlers' sleep outcomes, findings suggest that mothers with higher levels of hardiness may have been more aware of the broader benefits of sleep during childhood, more confident in their ability to take charge and therefore capable of accepting the challenge of settling their children to sleep, even if their child resisted. When daytime napping was examined, both maternal hardiness and sensitivity were associated with better outcomes. This finding suggests that mothers who had a clear perception of their toddler's emotional need and were attuned to the timing and rhythm of their child may have been able to read their child's 'tired signs' more accurately and respond congruently (Biringen, 2008; Hiscock & Jordan, 2004 ) by encouraging them to down regulate, despite their toddlers' possible protestations.

Mothers with higher levels of prenatal hardiness reported less parenting stress during toddlerhood and perceived their toddlers as temperamentally 'easier' during infancy. Lower parenting stress was also related concurrently with maternal ratings of fewer child behaviour problems, higher child social competence and higher observed child emotional availability; albeit, with small effect sizes and some overlap of shared method variance as there are some items relating to child behaviour problem on the parenting stress index. These findings add to the extant literature demonstrating the link between parenting stress and child outcomes (Cappa, Begle, Conger, Dumas, & Conger, 2011; Coon & Fine, 2008; Crnic, Gaze, & Hoffman, 2005; Crnic & Low, 2002) and extend findings by establishing that more hardy mothers report experiencing their children and parenting as less stressful. This may be due to their capacity to be flexible and take alternative perspectives, including their child's;

enabling them to reappraise their circumstances, even when they are challenging, and act adaptively. Thereby ensuring a more hopeful view of their situation and understanding of their child's behaviour.

**Hardiness and Sensitivity.** A unique finding from this research was that mothers with higher levels of prenatal hardiness were also more capable of sensitively meeting their toddler's needs at 18 months; although, it should be noted that the effect size between hardiness and sensitivity was small. While the origins of hardiness among the mothers was not considered; nor were the intergenerational factors in maternal sensitivity, as many have done previously (e.g., Pederson, Gleason, Moran, & Bento, 1998; Whipple, Bernier, & Mageau, 2011), there does appear to be a conceptual overlap between these two important parenting constructs.

A hardy person is posited to perceive stressful events as meaningful and interesting (commitment), changeable (control), an aspect of everyday life, and an opportunity for growth (challenge; Maddi & Kobasa, 1984). Kobasa, Maddi, and Kahn (1982), conceptualised that these 'inter-related attitudes' developed through an existential process of overcoming adversity, and in their research found some support for this notion (D. Khoshaba & Maddi, 1999). Specifically they identified that hardiness developed when an adverse childhood was coupled with family expectations for a child to improve the family's circumstances. This expectation was expressed through emphasizing the child's aptitude and capacity for achievement. Alternatively, hardiness developed in children who placed pressure on themselves to improve their family's adverse situation. In theory, the process of seeking improvement compels the child to find meaning and purpose in life and by doing so they develop cognitive flexibility to effectively adapt stressful circumstances into learning experiences. Conversely, children who grow up in adverse circumstances but are not pushed

or supported fail to develop these skills (D. M. Khoshaba & Maddi, 2001; Maddi & Kobasa, 1984).

Although the theoretical origins of hardiness specifies overcoming adversity and parental influence, there is some evidence that through targeted training hardiness may be acquired later in life regardless of early childhood experiences (Jameson, 2013; Macedo et al., 2014; Maddi et al., 2012). Like hardiness, maternal sensitivity also encompasses the need for flexibility and adaptability (Biringen, 2008). While affective congruence expressed warmth, love and affection are crucial to sensitivity; the construct also accounts for a mother's acceptance of her child, and a clear perception and accuracy in reading her child's cues so she can be appropriately responsive to her child which requires flexibility and attunement to the child's timing and rhythm (Biringen, 2008).

Theory and research suggest that a mother's capacity to be sensitively attuned with her child is related to her 'state of mind' with respect to her attachment relationship. It may also be related to her current mental representation of her childhood attachment relationship (Biringen et al., 2000; Main, 2000; Whipple et al., 2011) rather than to her actual childhood experiences or to the quality of her early childhood relationship with her primary caregiver (Ainsworth & Bell, 1970; Biringen et al., 2000; Bowlby, 1973; Main, 2000; Pederson et al., 1998).

Women classified as having a secure/autonomous state of mind believe that their early attachment experiences played a key role in their development (van IJzendoorn & Bakermans-Kranenburg, 1996 ) and describe and evaluate their early attachment-related experiences coherently and collaboratively. These women are likely to have securely-attached children (Hesse & Main, 2000; Main, 2000; van IJzendoorn & Bakermans-Kranenburg, 1996 ) and demonstrate more responsive parenting (Biringen et al., 2000; Pederson et al., 1998). Reassuringly, women who have had a less optimal attachment history can earn a secure/autonomous state of mind status if they demonstrate the capacity to recount and

reconstruct their past with a degree of acceptance and forgiveness in a coherent and collaborative manner (Main, 2000; Zaccagnino, Cussino, Cook, Jacobvitz, & Veglia, 2011). Main (2000) suggests the capacity for women to effectively reconstruct the past requires flexibility of attention. Importantly, mothers who have earned secure/autonomous status have been found to be as sensitive and responsive with their children, even under high levels of stress, as mothers with more optimal childhood experiences (Pearson, Cohn, Cowan, & Cowan, 1994; Phelps, Belsky, & Crnic, 1998).

In summary, sensitivity is believed to follow from a mother's capacity for a coherent and autonomous state of mind regarding her own early care-giving experiences. In the case of earned-secures there is a need to reframe perceptions about early attachment relationships through forgiveness, flexibility and perspective taking. In the case of earned-secures there are parallels with the proposed origins of hardiness, whereby a child has been required to compensate for less than perfect circumstances which have led to flexibility and adaptability in order to manage and grow through the stress. The maternal characteristics, hardiness and sensitivity, both appear to be based on a learned capacity for flexible appraisal and re-appraisal of experiences, relationships and events as well as a capacity to act adaptively to transform experiences: even difficult ones, into meaningful opportunities for learning. It is conceivable that hardiness, which is not specifically a maternal trait, develops through similar process to maternal sensitivity. Interestingly in the current research, prenatal hardiness, not sensitivity, predicted less parenting stress suggesting that elements of hardiness may explain women's capacity to adaptively recount and reappraise difficulties and challenges in their lives.

This combination of theory in the light of the current findings proposes a dynamic interplay between the constructs of hardiness and sensitivity through highlighting the important implications of a woman's capacity to take multiple perspectives and flexibly adapt

and transform perceptions of relationships and events. Even those which are less optimal, in order to confidently and sensitively meet their child's needs.

Future research could further explore the origins of maternal hardiness as to whether maternal state of mind of childhood attachment relationships is related; and, if so, whether hardiness, a straightforward trait to measure, could possibly act as a proxy for appraising readiness for parenting. This is especially interesting in light of recent propositions that broader appraisals of parenting that take account of both sensitivity and autonomy support are needed to understand the transmission from a mother's attachment state of mind to her child's security of attachment (Bernier, Matte-Gagne, Bélanger, & Whipple, 2014).

### **Unexpected and Equivocal Findings**

**Hardiness and Emotional Availability.** Emotional Availability (EA), the 'temperature' of a parent-child relationship has been associated with optimal parenting and child development outcomes in many studies internationally, over the past 20 years (see, Biringen et al., 2014). In the present study, maternal and child EA were assessed during a mother-child free-play interaction when children were 18 months old. Emotional availability encompasses maternal (sensitivity, structuring, non-intrusiveness and non-hostility) and child (responsiveness and involvement) dimensions and was considered in this study due to its theoretical relevance to an authoritative parenting style and child socio-emotional development.

Consequently it was surprising to find that of all the EA dimensions only maternal sensitivity was associated with hardiness and toddlers' daytime napping and emotion-regulation. It might have been expected that maternal structuring and non-intrusiveness, which have attributes akin to an authoritative parenting style, also may have been involved in toddlers' napping and emotion regulation. Structuring has been described as providing appropriate limits, following the child's lead and promoting the child's sense of autonomy

while also encouraging the child's development of internal standards and rules. Whereas, higher levels of non-intrusiveness reflect a parent who is involved but not overbearing or intrusive and is therefore analogous to the notion of autonomy support (Biringen, 2008). However, three of the maternal EA dimensions, sensitivity, structuring and non-hostility related to child EA (a composite of the two child dimensions with higher scores reflecting a responsive and involving child).

The type and length of mother-child interaction observed in this study may explain the lack of associations identified amongst hardiness and the other maternal EA dimensions and child socio-emotional outcomes. It is possible that structuring is less crucial than sensitivity in the low-stress, free-play task which was utilised in the current study. A challenging or stressful context has recently been recommended as being more effective for examining interactive child self-regulatory development (Biringen et al., 2012). In addition, it appears from previous studies that longer observations produce richer data (Biringen, 2005). While the length of the interaction in current research of 10 to 15 minutes was within the recommended, it is possible that a longer observation might have more effectively discriminated ratings of maternal structuring, non-intrusiveness and non-hostility (see, Biringen et al., 2014). Finally, it is possible that maternal non-intrusiveness and non-hostility were unrelated to hardiness or child socio-emotional outcomes since these two scales aim to capture specific types of negative interactional behaviours that may be uncommon in low-risk samples (Bornstein, 2009).

**Emotion-Regulation Maturity and Maternal Support Seeking.** To ascertain toddlers' emotion-regulation maturity, toddlers were left with a favourite toy locked in a large Perspex box for 5 minutes. The mother remained in the room to ensure that toddlers' attachment systems weren't activated; however, mothers were instructed to complete a split-attention task so essentially they were unavailable. Two unexpected yet coherent regulatory paths to

explain reductions in toddler distress during the frustration task were identified. In addition, Study 2 found a direct relationship between parent reports of greater toddler temperamental reactivity and observed levels of distress.

The construct of emotion-regulation maturity was created and utilised in this study to gauge differences in toddlers' emerging self-regulatory capacities and examine how this development related to maternal characteristics. The higher end of the emotion-regulation scale scores reflected more cognitive maturity (e.g. transforming the source of frustration into another activity such as pushing the box like a train engine) and at the lower end, scores reflected more attention orienting or innate (e.g., gazing away) strategies. Maternal support seeking (when toddlers were not distressed) was viewed as the least mature regulatory strategy as this did not rely on self-regulatory capacity.

The first pathway was based on maternal characteristics and revealed that toddlers turned to their mothers for emotional support if their mothers had higher levels of prenatal hardiness and maternal sensitivity; this reduced distress. It was expected that these children would have utilised adaptive self-regulatory strategies during the frustration task (reflecting increased emotion-regulation maturity) due to the notion that harder and more sensitive parents would have modelled and encouraged more autonomous behaviour. However, it is possible that toddlers who are accustomed to having their mothers respond with emotional congruence to their cues are more likely to turn to them for support when frustrated or challenged. This is suggestive of secure-base behaviour in accordance with theories of attachment (Bowlby, 1973). It would therefore be interesting to re-examine self-regulatory capacity in slightly older children also taking into account the attachment relationship.

Likewise, alternate explanations need to be considered for those children who demonstrated high levels of emotion regulation maturity (second path identified). It is possible that toddlers who were very self-sufficient and autonomous in their coping had internalised self-regulatory strategies because their mother was not predictably emotionally

available with respect to their distress needs. Consistent with what is known about avoidant attachment patterns children can defend themselves against feelings of anger and associated maternal rejection by shifting their attention from their non-responsive and rejecting parent to the surrounding environment; thus, demonstrating a reduction in the expression of distress, and an increase in self-reliance and competence (Crugnola et al., 2011). Indeed, the notion of emotional over regulation seen as a maladaptive regulatory style involving minimisation of emotional expression (which co-occur with strong task focus) is considered under studied and underrepresented in the emotional regulation literature (Martins, Soares, Martins, Tereno, & Osorio, 2012). Martins et al. (2012) found that an avoidant attachment relationship discriminated over- from under-regulation (but not adaptive regulation) in 10-month old infants when faced with a difficult to solve task that involved maternal guidance. Some doubt as to the directionality of the findings remained, since child emotional regulatory capacity was assessed at 10 months and attachment security was evaluated at 12 or 16 months.

Interestingly, Martins and colleagues also examined the influence of mother-child dyadic emotional availability using a combined mother-child interaction score derived from EA sensitivity, child involvement, and responsiveness scales (3rd Edition). As the authors predicted, both over and under (maximising emotional expression) emotional regulation was associated with poorer quality of dyadic interaction at 10 months. The discrete contribution however of maternal and child emotional availability to emotional regulatory capacity in the infant is not reported. Thus in the current research, in the absence of a measure of attachment, any interpretation around the quality of the mother-child attachment remains speculative; especially, as no relationship was identified between maternal sensitivity and toddler emotion-regulation maturity.

In relation to highly reactive toddlers, although behaviours were not coded when toddlers were distressed, as this type of behaviour was not deemed to be adaptive in this



study, most distressed children stayed within proximity of their mother. This type of behaviour is observed in dyads classified as insecure-ambivalent (Crugnola et al., 2011; Nachmias, Gunnar, Mangelsdorf, Parritz, & Buss, 1996) and is believed to be a result of unpredictable, non-responsive parenting. However, it should be noted that adaptive proximity seeking behaviours are also observed in secure dyads. However as this study did not measure attachment or find a relationship between highly reactive toddlers and maternal sensitivity, any interpretation is conjecture. In fact, none of the maternal characteristics included in this study related to toddlers' emotion-regulation maturity. Therefore it is suggested that future research include measures of emotional availability (meeting the measurement recommendations stated previously) as well as attachment to increase clarity around toddlers' emotion-regulatory development during toddlerhood.

**Child Temperament.** The second self-regulatory path derived from the frustration task related to child temperament revealed that older toddlers were reported by their mothers as being more persistent, demonstrating more emotion-regulation maturity (use of more mature emotion-regulation strategies) and using less maternal support seeking; and these children demonstrated the least distress. Commensurate with developmental theories of temperament that posit that persistence, believed to be a forerunner of executive functioning, relates to children's ability to self-regulate their emotions and behaviour (Rothbart & Derryberry, 1981). Toddlers at the older end of the age-range in the study (20-22 months of age), and those who were reported by their mothers to be more persistent demonstrated more emotion-regulation maturity. They utilised more autonomous strategies (involving some cognitive reappraisal and situation modification) and showed less negative affect. Executive functioning includes attention, task-switching and inhibition capacities and is widely understood to be an important factor along with parenting in the development of self-regulation (Berger, 2011). Although EF is believed to emerge in the third year (Best &

Miller, 2010; Rothbart et al., 2011), findings from this study add to previous research (Posner & Rothbart, 1998) that suggests that early signs of EF, which are related to temperamental effortful control (persistence) and attempts at autonomous problem solving, may be apparent during toddlerhood.

Maternal ratings of reactivity were related to higher levels of observed negative affect in toddlers, and reactivity was not associated with the use of any self-regulatory strategies. These findings are consistent with previous research reporting that highly reactive children struggle to use effective strategies to regulate their emotions due to their reactive style interfering with their capacity to interact flexibly and adaptively either with the source of frustration or their parent in order to reduce their level of distress (Braungart-Rieker & Stifter, 1996; Calkins, Dedmon, Gill, Lomax, & Johnson, 2002; Calkins & Howse, 2004). Further, these findings which suggest that reactive children lack more advanced self-regulatory systems, support the notion that rudimentary self-regulation (attentional orienting) which emerges during infancy is related to child temperament rather than maternal characteristics (Rothbart et al., 2011).

**Maternal Age.** Older maternal age was expected to relate to higher levels of maternal hardiness in this study due to theories of parenting which suggest that psychological maturity develops with age and its associated increased resources (Belsky, 1984; Heinicke, 1984), as well as the notion that interpersonal and life events, which accrue as people age, may contribute to significant shifts in maturity (Manners & Durkin, 2000). Further, previous findings (albeit with small effect size) with the larger cohort sample (Camberis et al., 2014) suggested that older maternal age related to higher levels of maternal hardiness. However, in the current smaller subsample the association between maternal age and psychological maturity was not significant, probably due to less statistical power and a more restricted age-range. Alternatively, this finding may be in line with previous findings that only identified a

relationship between maternal age and psychological maturity in mothers younger than 30 years (nj look at introXXX) suggesting that effects of age on psychological maturity may plateau by the third decade. The age range in the current study included women from their mid-twenties to early forties; thereby, precluding adolescent mothers. Whether hardiness affords some advantage to women in adolescence as they approach motherhood and during early parenthood remains unknown.

### **Strengths and Limitations**

The current prospective research design allowed for the predictive exploration of maternal characteristics, namely psychological maturity, on subsequent parenting and child self-regulatory capacities. The design was framed by drawing on salient theories of parenting, including Belsky's determinants of parenting, Baumrind's authoritative parenting, and Biringen's theory of emotional availability. A mixed methodology was adopted using well-recognised measures and approaches, including semi-structured interviews, observation of mother child interaction, child behaviour and questionnaires regarding the child and mother. A range of potential confounding variables were considered inclusive of child biological and developmental factors together with maternal and contextual factors. Finally, the use of structural equation modelling allowed exhaustive models to be tested and inferences to be made. Thus adding to the integrity of the results and providing confidence in the interpretation of the research findings.

However, there are a number of limitations to the possible validity and generalisability of the findings that need to be acknowledged. These include sample characteristics, the use of parent-report measures of child temperament and behavioural adjustment, the implementation and coding of the observational measures, and the fact that some key constructs which may have added explanatory power were not included; notably, assessment of mother-child attachment and maternal attachment state of mind.

**Sample characteristics.** Due to sampling stratification in the originating larger cohort, the current subsample comprised almost an equal number of assisted conception and spontaneously conceiving older mothers. Although this allowed some current contemporary contextual factors, specifically older maternal age and mode of conception, to be explored in relation to parenting and child outcomes, these unique characteristics limit the generalisability of the findings to broader parent populations. In addition to being older than the current average age of Australian first-time mothers (Roberts, 2012), the sample were predominantly married or in a de-facto relationship, highly educated, English-speaking, and living in a metropolitan area. Given this homogeneity it would be interesting for future research to test the current research models in a broader age-group, in a more culturally diverse and more representative community sample of first-time mothers.

**Maternal-Report Measures.** Maternal-report measures of child temperament at four months and 18 months were included in this study. While beyond the scope of the current research, ideally, objective observations of temperament would also have been included. Nevertheless, there is evidence that parent report measures have objective validity (Rothbart & Hwang, 2002) and the temperament easy-difficultness scores used in the current study have been validated against observed behaviour (Allen & Prior, 1995). Further it is recognised that maternal perception is important; perhaps, even more meaningful than objective data (Bates & McFayden-Ketchum, 2000) as it informs how mothers may respond to their child (Prior, Sanson, Smart, & Oberklaid, 2000). Future studies could also consider the use of cross-informant measures of child temperament, such as father or child-caregiver report.

**Coding of Observational Measures.** Two interactions were recorded during the same home-visit for this study. The first, a five minute mother-child free-play and pack-away interaction was coded for emotional availability. Maternal sensitivity was the only maternal

dimension to relate to hardiness in this study. It has been mentioned previously that a longer and more challenging interaction may have elicited different dimensions of EA. Nevertheless, sensitivity was directly linked to toddlers' daytime napping, maternal support seeking and child emotional availability in this study. Child and parent EA scores are likely to be related due to the dyadic nature of the measure. However, it is important to note that in this study coding of the child and the mother was completed through coders in different laboratories and neither had access to the others' data or information relating to the mother or child. These procedures are recommended by the EA's author (Biringen et al., 2014). Moreover, Child EA (observed) and socioemotional competence (maternal-report) were correlated in this study, thereby, providing some validity for child emotional availability.

The second interaction was a five minute frustration task that required the mother to remain in the room while completing a split-attention task. The coding protocol was developed for this study and strategies were only coded if toddlers were not distressed. This was based on the notion that regulation strategies occur prior to the expression of affect in Gross's model. However, not all of the strategies that regulate emotions posited by Gross (2007) were included in this research. Response modulation, for example, refers to a family of strategies that occur once an emotion has been elicited (e.g., deciding to display a poker face when feeling upset so nobody notices) and these were considered beyond the scope of the naturalistic observational methods utilised, and possibly beyond the developmental capacity of the toddler-aged children reported on here (Kopp, 1982). Future research capturing all Gross' families of regulatory strategies might reveal associations with maternal characteristics not found in this study. In addition assessing EA in a more challenging or stressful context, over a longer period of time and in a more diverse sample should account for this study's limitations and improve interpretations of relationships amongst hardiness, emotional availability and child self-regulatory and socio-emotional development.

**Key Constructs not Included in the Study.** A unique finding from this thesis was that prenatal hardiness and EA sensitivity were associated. These two key constructs share similar attributes; namely, the ability to perspective-take, be flexible and adaptively responsive. They also share theoretically similar origins based on overcoming adversity. This finding suggests that exploring the relationship between a mother's attachment state of mind (origin of sensitivity) and hardiness may lead to a greater understanding of the relationship between these two contributory factors to the quality of parenting. Further, it is possible that including both maternal attachment state of mind and mother-child attachment would have explained more of the unaccounted variance in the current research findings.

This thesis was theoretically based on several parenting models that posit that maternal psychological maturity, sensitivity and an authoritative parenting style are determinants of parenting quality and child outcomes. While constructs to measure psychological maturity and sensitivity were included, a measure for parenting styles was not. Biringen (Biringen et al., 2014) notes that, although they are often linked theoretically, there is a lack of research 'bridging' Baumrind's (Baumrind, 1968) parenting styles and the construct of emotional availability. Therefore, future research including emotional availability and hardiness could be extended by including a parenting styles measure such as the Parental Authority Questionnaire (Alkharusi, Aldhafri, Kazem, Alzubiadi, & Al-Bahrani, 2011; Buri, 1991) based on Baumrind's parenting typology.

### **Future Directions**

The research reported in this thesis has identified a number of interesting findings regarding the influence of prenatal maternal psychological maturity and maternal sensitivity on child self-regulatory development during toddlerhood as well as indicating a number of new avenues for future studies. Nonetheless, several further areas of focus for future

empirical work concerning the parental and child characteristics addressed in the current research are considered here.

**Hardiness.** The current sample of mothers was low risk from a socio-economic standpoint and their children were healthy and had no developmental concerns. More complex, higher risk samples of mothers, for example, adolescent, economically disadvantaged mothers and mothers whose children might be more medically or developmentally vulnerable (e.g. extreme prematurity) are considered to experience more negative parent and child outcomes. Firstly, such research could consider whether the protective attributes of hardiness found in the current study with older low-risk mothers is also applicable to higher risk samples. Secondly, exploring maternal hardiness and the effects of parenting stress in such samples could indicate whether interventions based on the construct might be effective.

However, to effectively measure hardiness, for example, in a different age-range such as adolescence might require re-examining and defining hardiness in light of the psychosocial, biological and physical demands associated with that developmental stage (Ouellette, 2010). Ouellette (2010) suggests that personality characteristics other than challenge, commitment and control may be more meaningful in a measure for adolescents. Further examining the differential impact of varied stressors on parenting during adolescence and in other higher risk samples might also be salient.

Finally, this thesis focused on mothers and their toddler offspring. Nonetheless, fathers involvement with their children is also related to positive child outcomes (Flouri & Buchanan 2003) (Dumont & Paquette, 2012), and the emotional quality of their interactions with their child are statistically similar to those of mothers' (John, Halliburton, & Humphrey, 2012); thus, whether or not hardiness among fathers is pertinent to child regulatory capacity warrants empirical exploration. While research regarding fatherhood and fathering has

increased significantly since the latter part of the 20th Century, Tamis-Le Monda (2004) argued that many studies remained a-theoretical. Paquette (2004) proposed the notion of the 'father-child-activation relationship'. Through this emotional bond fathers could encourage children to take risks while keeping safety and security in mind and through this interactional process help their children to be 'braver' when dealing with the unfamiliar. Arguably, using this model of fathering, hardiness might be an equally, if not more important, personal characteristic for fathers to bring to parenthood through supporting authoritative parenting and thereby their children's social emotional development.

**Parenting Stress and Child Socio-Emotional Development.** Theoretically hardy individuals should be more effective in securing social and spousal support. Findings from the Parenting Stress Index in Study 3 of this current research indicate that hardier mothers did perceive that they had more spousal support and experienced less social isolation, in as much as these were components of the overall parent stress domain. Moreover, overall lower parenting stress (mother and child-related stress) was related concurrently with ratings of fewer child behaviour problems, higher child social competence and higher observed child emotional availability; albeit, with a small effect size. Indeed, lower parenting stress also related to maternal report of easier infant temperament at 4 months. This finding supports earlier findings (Abidin, 1992; Belsky, 1984; Belsky & Barends, 2002; Cappa et al., 2011; Coon & Fine, 2008; Crnic & Low, 2002). However, as reported in Study 3, parenting stress was not related to maternal sensitivity; although sensitivity was expected to mediate parenting stress and child outcomes. Overall, these findings provide evidence that hardier mothers perceive their child and parenting as less stressful; and their child as more socio-emotionally competent with fewer behaviour problems. The findings also offer some objective evidence that parental stress can impact directly on child emotion regulation.



Future research would benefit with additional objective ratings of child socio-emotional competence and behaviour to better understand the relationships between hardiness, parenting stress, maternal sensitivity and child developmental outcomes. Further, the differential influence of varied levels of spousal and social support, specifically in interaction with hardiness and parent sensitivity and in interaction with their child could also be explored.

**Maternal Sensitivity.** Maternal Sensitivity was not included in Study 1, which explored toddlers' night-time sleep, as this study was designed to replicate a previous cross-sectional study including pre-school aged children (Johnson & McMahon, 2008). The findings from this study have provided robust evidence that prenatal maternal hardiness through its influence on adaptive cognitions and behaviour is more influential than child characteristics in relation to night-time sleep, after accounting for numerous child and maternal characteristics. Previous researchers have failed to find a relationship between sensitivity (measured during the day) and children's night-time sleep (Scher, 2001), while others have found that maternal emotional availability assessed at infant's bedtime is related to infant sleep (Teti, Kim, Mayer, & Countermine, 2010). The unique finding from the current research is that hardiness and sensitivity are associated with toddlers' daytime napping. This in combination with earlier equivocal findings regarding maternal sensitivity at children's bedtime suggest that including hardiness and sensitivity in future research may clarify current knowledge regarding maternal factors involved with toddlers' sleep outcomes.

**Maternal Cognitions.** A further limitation of this research was that maternal cognitions were not measured across all three studies. In Study 1, maternal cognitions around toddlers' night-time sleep were included in replication of prior research and were significant in mediating the effect of hardiness and toddlers' sleep; thereby, effectively explaining the underlying mechanisms involved in hardy mothers' behaviour at bedtime. In Study 2,

maternal sensitivity significantly mediated the relationship between maternal hardiness and toddlers' daytime napping; however, cognitions and behaviours related to napping were not collected, making interpretation of this finding unclear. Future research would benefit from including measures of cognitions such as locus of control, which might clarify relationships between maternal characteristics and child developmental outcomes.

### **Clinical Implications**

While it is encouraging to point out to older mothers that maturity is adaptive, one might think about the implications for younger mothers and mothers lower in hardiness, who are less likely to have an internal sense of control; mothers who are less likely to take their child's perspective or adaptively transform challenges into opportunities for personal growth. Findings from the present research suggest that these mothers experience more difficulty managing the day-to-day challenges and stresses related to parenting and are less equipped to promote their children's socio-emotional development.

Parenting interventions that are informed of the psychological attributes of hardiness, and of what might potentiate its further development for the individual, may lead to a more efficacious approach. In combination with elements of cognitive behavioural therapy, a hardiness-informed approach could assist mothers to view parenting and their child from a more adaptive perspective. Interventions that assisted women by acknowledging their parenting capacities and strengths and by encouraging effective authoritative parenting (i.e., sensitively scaffolding child exploration and growth while at the same time encouraging age-appropriate autonomy) to gain a sense of personal control and agency would contribute to more realistic expectations regarding parenting. Such interventions would facilitate a reduction in perceived stress and grant parents a greater capacity to meet their child's needs. In light of the theoretical assumptions regarding the development of hardiness via early life experiences, interventions that also encourage parents to explore their early life experiences

from different perspectives may assist the development of hardiness later in life in much the same way that individuals with an insecure attachment relationship through a process of reframing perceptions about early attachment relationships with forgiveness, flexibility and perspective taking can earn a secure attachment status.

Findings from this study support the vast body of literature documenting the positive influence of maternal sensitivity on children's emotional and self-regulatory development (e.g., Ainsworth & Bell, 1970; Biringen et al., 2014; Bornstein, Hendricks, Haynes, & Painter, 2007; Braungart-Rieker, Garwood, Powers, & Wang, 2001). They also suggest that interventions that assist mothers to understand the full range of their toddlers' emotional experience will enable them to accurately read their child's cues and respond appropriately. While parenting programs, such as Parent-Child Interaction Training (Eyberg, 1988), target the mother-child dyad and demonstrate some effectiveness in improving maternal expressions of sensitivity, innovative research using the Emotional Availability construct as an intervention is hoping to improve mothers' emotional availability scores (their emotional connection with their child). However, Biringen admits that this is a challenge given the depth of a mother's 'affective procedures' (Emde, 1980 as cited in, Biringen et al., 2014).

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# Appendices

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## Appendix A: Study 1 Published Article



## ORIGINAL ARTICLE

Assisted conception, maternal personality and parenting:  
Associations with toddler sleep behaviourNikki Johnson,<sup>1</sup> Catherine McMahon<sup>1</sup> and Frances Gibson<sup>2</sup><sup>1</sup>Department of Psychology, Macquarie University, Sydney, New South Wales, Australia, <sup>2</sup>Institute of Early Childhood, Macquarie University, Sydney, New South Wales, Australia**Aim:** To explore the role of maternal personality (hardiness), sleep-related cognitions and bedtime involvement in child sleep behaviour during the second post-natal year in a sample of spontaneous and assisted conception first-time mothers.**Method:** Mothers ( $n = 134$  (spontaneous ( $n = 81$ ); assisted ( $n = 53$ ) conception)) reported on a resilience measure (hardiness) during pregnancy and child sleep at 7 and 19 months post-partum. At 19 months post-partum, mothers also reported on their cognitions and involvement around their child's bedtime, and half the sample used Actigraph monitors (Actiwatch-16, Mini Mitter Co. Inc, Bend, OR, USA) to validate maternal report of child sleep.**Results:** No significant differences were found between spontaneous and assisted conception mothers on any of the study variables; therefore, assisted and spontaneous samples were combined. Structural equation modelling confirmed that lower pre-birth maternal hardiness was associated with more problematic sleep-related cognitions ( $\beta = 0.23$ ,  $P < 0.01$ ) and involvement at bedtime ( $\beta = 0.29$ ,  $P < 0.01$ ) and poorer child sleep outcomes ( $\beta = -0.33$ ,  $P < 0.001$ ) during toddlerhood, even after considering concurrent maternal mood and child temperament.**Conclusions:** Pre-birth maternal hardiness rather than mode of conception contributes to parenting cognitions and behaviour around child sleep and, ultimately, toddlers' sleep outcomes. Findings suggest that targeting negative maternal perceptions of control and efficacy through clinical interventions could benefit toddlers' sleep.**Key words:** assisted reproductive technology; cognitions; early childhood; hardiness; parenting; sleep.

## What is already known on this topic

- 1 Outcomes for children conceived with assisted conception are equivocal.
- 2 Childhood sleep difficulties are prevalent in Western societies and have been associated with long-term adverse outcomes.
- 3 Parental sleep-related cognitions and behaviour around bedtime have been found to predict child sleep behaviour.

## What this study adds

- 1 No differences in parenting or toddler sleep behaviour were found between assisted and spontaneous conception samples.
- 2 Maternal hardiness (psychological maturity) was predictive of maternal sleep-related cognitions, bedtime involvement and child sleep behaviour over and above maternal mood and characteristics inherent to the child.
- 3 Suggestion that targeting maternal cognitions related to control and self-efficacy would benefit child sleep outcomes.

Sleep problems during early childhood have been associated with emotional,<sup>1</sup> behavioural<sup>2</sup> and cognitive<sup>3</sup> dysfunction, as well as ongoing sleep difficulties.<sup>4</sup> The purpose of this paper is to further investigate the maternal characteristics that may contribute to early childhood sleep behaviour within the context of contemporary parenting trends.

Sleep consolidation, which begins between 9 and 12 months of age, relies on behavioural organisation and adaptation which are important in the development of a child's self-regulatory system.<sup>5,6</sup> Authoritative parenting interactions<sup>7</sup> that provide sensitive support for emotional distress<sup>8</sup> and encourage appropriate

challenges and opportunities for mastery<sup>9</sup> are particularly important. Indeed, appropriate limit setting and promotion of autonomy at bedtime play an important role in the development of adaptive sleep behaviour in pre-school-aged children,<sup>10</sup> and children who do not learn to self-soothe have been found to demand their parents' attention, resulting in increased night waking.<sup>11</sup>

Heinicke<sup>12,13</sup> argued that a higher level of maternal ego strength, or psychological maturity, was likely to underpin an authoritative parenting style and was the strongest predictor of adaptation to post-birth challenges as well as positive and responsive parenting. Psychologically mature parents have been described as being empathic,<sup>14</sup> having a capacity for perspective taking<sup>15</sup> and coping flexibly with life's challenges.<sup>13</sup>

Hardiness, an index of personality functioning closely related to ego strength, encompasses adaptive flexible responsiveness to stress and is characterised by commitment, a sense of control and enjoyment of challenge.<sup>16</sup> Johnson and McMahon<sup>17</sup> found

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Conflicts of interest: None.

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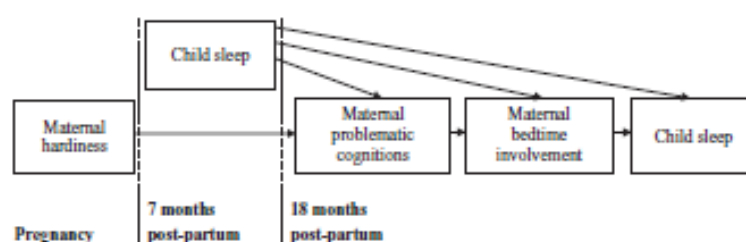


Fig. 1 Model of prospective research design.

that mothers of pre-schoolers with higher levels of hardness reported fewer problematic bedtime cognitions and behaviours and more optimal child sleep outcomes.

More recently, hardness was identified as the strongest predictor of positive psychological adjustment to pregnancy in a study of older first-time mothers.<sup>18</sup> The trend to delay parenthood in developed countries and age-related fertility decline has meant larger numbers of women have required assisted conception (AC; including ovulation stimulation and *in vitro* fertilisation). Findings regarding parental adjustment after AC are equivocal,<sup>19–21</sup> and there is some evidence that AC mothers perceive their infants as more difficult<sup>22</sup> and vulnerable.<sup>23–25</sup> Indeed, an Australian audit study found that AC mothers were over-represented in admissions to residential support facilities for unsettled infant behaviour.<sup>26</sup> These findings, suggestive of problems with sleep and settling in the first post-natal year, warrant further investigation during toddlerhood, as does the role of maternal hardness in predicting parenting and child development outcomes in early childhood. The current study aims to extend previous research by prospectively exploring the effect of pre-birth maternal hardness on toddlers' sleep and offers a unique opportunity to investigate AC parenting in the context of child sleep in the second post-natal year.

Given equivocal findings, we first tested the hypotheses that AC mothers may experience more problematic cognitions, demonstrate more bedtime involvement and have toddlers who sleep less than mothers who conceive spontaneously (SC). Then, using a theoretically driven model which posits that a child's capacity for self-regulation is developed via early maternal interactions<sup>27</sup> which are predicted by maternal psychological maturity,<sup>28</sup> we tested the hypotheses that mothers with a lower level of pre-birth hardness will report the following: (i) more problematic cognitions leading to (ii) more bedtime involvement, resulting in (iii) toddlers who sleep less. To take account of the contribution of sleep patterns during infancy, we also tested the associations among child sleep at 7 and 18 months, and maternal bedtime cognitions and involvement (see Fig. 1).

## Method

### Participants

Participants for this study were recruited from an existing longitudinal study, Parental Age and the Transition to Parenthood

Australia (PATPA). PATPA recruited first-time mothers and women conceiving through AC during their third trimester in metropolitan clinics and hospitals. Older mothers and AC mothers were oversampled relative to their representation in the community (see McMahon *et al.*<sup>18</sup>). When children were 4 months old, a sub-sample of mothers was invited to participate in the current study ( $n = 167$ ); of these, 81 (60%) spontaneous and 53 AC (ART  $n = 43$ , fertility treatment  $n = 10$ ) mothers agreed to participate in the current study which involved a home visit when their child was a toddler.

No significant differences were found between those who did and those who did not participate ( $n = 33$ ), nor were there significant demographic differences between AC and SC mothers, with the exception that AC mothers on average were significantly older than SC mothers. Participants were predominantly from an English-speaking background, highly educated and in a married or *de facto* relationship (see Table 1).

### Procedure

Following relevant ethics committees' approval, data collected by PATPA during participants' third trimester of pregnancy were used to ascertain mode of conception, maternal hardness and demographic information. Mothers reported on child temperament 4 months post-partum and on child sleep behaviour seven months post-partum. All other measures, including maternal sleep-related cognitions and bedtime involvement, were completed during the home visit when children were approximately 19 months of age and in good health. Mothers were shown how to complete the sleep chart, and a subgroup were also shown how to use an Actigraph monitor (Actiwatch-16, Mini Mitter Co. Inc). Participants returned the chart and monitor in a postage-paid envelope and received a children's book in acknowledgement.

### Maternal measures

Maternal hardness (psychological maturity) was assessed using the *Personal Views Survey III-R*<sup>29</sup> which contains 18 items that cluster to form an overall score, HardiAttitude and three distinct factors: commitment, control and challenge. The authors recommend using the HardiAttitude score as it reflects the conceptual uniqueness of hardness: the balance of being involved (commitment); an initiator (control); and continuous learning (challenge). Scores range from 18 to



**Table 1** Maternal and child characteristics by mode of conception

Characteristics	Total sample	Mode of conception	
	n = 134	Spontaneous n = 81	Assisted n = 53
<b>Maternal</b>			
Age at giving birth			
Years (SD)	33.84 (4.64)	32.23 (4.38)	36 (4.19)*
Marital status			
Married or de facto	132 (99%)	78 (96%)	54 (100%)
Cultural influence			
English only currently spoken at home	115 (86%)	67 (83%)	42 (79%)
Education			
Secondary school	19 (14%)	10 (12%)	9 (17%)
Trade/technical	22 (16%)	15 (18%)	7 (13%)
University	94 (70%)	56 (69%)	38 (70%)
<b>Child</b>			
Age at home visit			
Months (SD)	19.06 (1.01)	19.12 (1.03)	18.97 (1.06)
Birthweight			
Grams (SD)	3418 (583)	3238.34 (526.85)	3397.10 (660.22)
Gender			
Boys	72 (54%)	44 (54%)	28 (53%)
ICU post-birth			
Days	14 (10.6%)	9 (11%)	5 (9%)
Ongoing illnesses			
Mild asthma/allergies (SD)	9 (7%)	7 (8%)	2 (4%)

\*P &lt; 0.05, significant difference.

48 (30–35) signifies an average capacity to cope effectively during stressful times). The scale has a good internal consistency  $\alpha = 0.88$ .<sup>29</sup>

An abridged version of the *Maternal Cognitions about Infant Sleep Questionnaire* (MCISQ)<sup>30</sup> which included 15 of the original 20 items<sup>17</sup> was used to measure maternal cognitions. Items cluster to form three subscales: setting limits (e.g. 'I am able to let my child sleep on his/her own'), anger (e.g. 'If I try to resist my child's demands at night, I think I might get very angry') and doubt (e.g. 'When my child doesn't sleep at night, I doubt my competence as a parent'). MCISQ has a good discriminant validity, internal consistency and test-retest reliability over 1 month  $\alpha = 0.82$ ,  $r = 0.81$ ,  $P < 0.001$ .<sup>30</sup>

Mothers completed the *Parental Interaction Bedtime Behaviour Scale* (PIBB)<sup>31</sup> to measure maternal behaviour around children's bedtime. The PIBB is comprised of 17 items that cluster to form six subscales: active physical comforting (e.g. 'Stroke or pat part of your child'), encourage autonomy (e.g. 'Leave your child to cry'), settle by movement (e.g. 'Take your child for car rides'), passive physical comforting (e.g. 'Stand near the cot/bed without picking your child up') and social comforting (e.g. 'Read a story to your child'). The PIBB has adequate internal validity (Cronbach's  $\alpha = 0.71$ ) for a measure tapping different but related strategies.<sup>31</sup>

## Child measures

When children were 7 months old, mothers reported their average amount of sleep (hours and minutes) per night during the previous week, as well as the average number of night wakings.

When children were 18 months old, mothers completed a 4-day sleep chart which included the following: (i) time child was put to bed and time he/she awoke in the morning and (ii) number and duration of night wakings. To validate maternal report, 72 mothers (54%) attached an Actigraph monitor to their child's non-dominant wrist or ankle at bedtime for 4 consecutive nights. Child movement during the night was scored as *sleep* or *awake* in 30-s epochs using the Mini Mitter sleep algorithm. Actigraph variables in the current study were (i) total sleep duration, indexed by the first and last 5 min of consecutive sleep and (ii) duration of time awake during sleep period.

## Potential confounding variables

Maternal stress and depression (Parenting Stress Index and Depression subscale)<sup>32</sup> which were assessed during the home visit, along with mothers' age at the time of giving birth and language currently spoken at home, were examined as potential covariates.

Mothers reported on The Short Temperament Scale for Infants<sup>33</sup> when children were 4 months of age; easy to difficult scores were used in the current study. To control for neonatal and developmental differences, gender, birthweight and admission to intensive care following birth and ongoing illnesses were also considered in preliminary analysis as potential covariates.

## Results

Both the maternal problematic cognitions and bedtime interaction behaviour measures required some modification (see details below). The remainder of maternal and child measures showed good variability and normal distributions (see Table 2 for descriptive statistics).

## Maternal measures

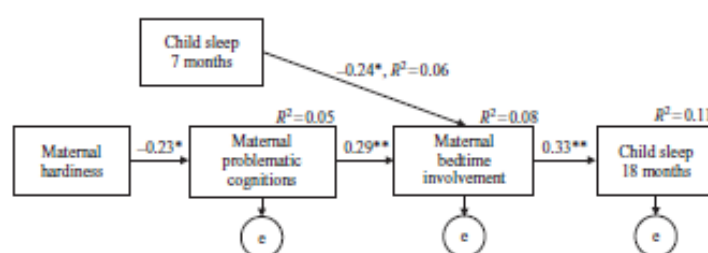
On the maternal cognitions measure, almost all mothers scored five items from the anger subscale as never occurring, and these were removed (e.g. 'When my child wakes at night, I think I lose control and harm him/her'). An unrotated principal component analysis (PCA) with the remaining items demonstrated that an overall cognitions score was acceptable in the present sample (Cronbach's  $\alpha = 0.68$ ) with higher scores reflecting more problematic sleep-related cognitions.

On the maternal bedtime behaviour measure, a majority of mothers reported that they would never 'leave their child to cry', and almost all reported that they would 'read a book at bedtime'; these items were removed. A more robust overall score using PCA forcing a single-factor solution found 10 of the items loaded onto one factor with higher scores reflecting more maternal bedtime involvement (e.g. 'Stroke or pat part of your child', 'lie with child'; Cronbach's  $\alpha = 0.76$ ).

**Table 2** Descriptive statistics of maternal and child variables by mode of conception

Study variables	Mode of conception†				Total sample		
	Spontaneous		Assisted				
	M	SD	M	SD	M	SD	Range
Maternal hardness	40.02	5.01	41.18	5.27	40.61	5.20	25–54
Problematic cognitions	17.53	6.89	18.24	6.82	17.81	6.85	2–35
Bedtime involvement	10.02	5.47	11.02	6.49	10.42	5.89	0–27
Child sleep duration 18 months (hours)	10.78	0.75	10.52	0.72	10.69	0.77	8–13
Child sleep duration 7 months (hours)	10.50	1.14	10.64	10.70	10.55	1.08	7–13

†Independent sample *t*-tests between spontaneous and assisted conception samples, all tests non-significant *P*s > 0.10.



**Fig. 2** Structural equation model of child sleep development with standardised parameter estimates. Associations among pre-birth maternal hardness, problematic cognitions, bedtime involvement and child sleep at 7 and 18 months. \**P* < 0.01, \*\**P* < 0.001 (two-tailed). e, error.

## Child sleep behaviour

Mothers reported that toddlers slept 10.69 h per night (range 8–12.73 h, SD = 0.77) on average and spent 12.32 min awake per night (range 0–112.50, SD = 18.74) on average. Actigraph data validated maternal report of toddler sleep duration ( $r = 0.72$ ,  $n = 72$ ,  $P < 0.00$ ) but not time awake during the night ( $r = 0.16$ ,  $n = 72$ ,  $P > 0.10$ ), which is commensurate with previous findings.<sup>14</sup> Twenty per cent of children in this study were reported to sleep less than 10 h per night. Maternal report of sleep duration was used in analyses.

## Potential covariates

Maternal age, language spoken at home, stress and depression were not significantly related to any of the maternal predictor variables or child sleep (all *P*s > 0.10).

Child temperament, gender, birthweight, admittance to ICU and ongoing illnesses did not significantly relate to any of the maternal factors or child sleep (all *P*s > 0.10). No children had developmental problems or significant ongoing illnesses.

## Preliminary hypothesis testing

Hypotheses regarding the mode of conception were unsubstantiated. Women who conceived using AC did not differ significantly from SC women on any maternal variables, and children of AC mothers were not reported to receive significantly less

sleep at 7 or 18 months (all *t*-tests *P* > 0.10). As differences were not identified, the two samples were combined for further model testing (see Table 2).

## Model testing and path analyses

Significant correlations among the maternal predictors and child sleep behaviour provided preliminary evidence for the proposed model (all *r*s > 0.23, *P*s < 0.05). However, child sleep at 7 months was not significantly related to maternal cognitions or toddler sleep as predicted (*P*s > 0.05) but was associated with more bedtime involvement at 19 months ( $r = 0.27$ ,  $P < 0.05$ ) and was, therefore, retained in the final model.

A recursive path model based on developmental theories represents a direct causal link from maternal hardness to problematic cognitions to bedtime involvement and, finally, to child sleep at 18 months. A direct causal link from child sleep at 7 months to maternal involvement at 18 months represents the effect of early child sleep on ongoing maternal bedtime involvement (see Fig. 2).

Structural equation modelling<sup>35</sup> was performed, and several measures indicated the data were good fit to the proposed model:  $\chi^2(6) = 5.96$ ,  $P = 0.43$ ; root mean square error of approximation (RMSEA) = 0.000, <0.08<sup>36</sup> and comparative fit index (CFI) and Tucker–Lewis index (TLI) = 1.000, >0.95.<sup>37</sup> Furthermore, exhaustive alternative models were tested (e.g. toddler sleep predicting maternal cognitions and bedtime behaviour) but failed to fit the data, strongly supporting the proposed direction of the model.

As expected, mothers with lower levels of hardness experienced more problematic cognitions ( $\beta = -0.23$ ,  $P < 0.01$ ), which were associated with increased bedtime involvement ( $\beta = 0.29$ ,  $P < 0.01$ ), which in turn related to less child sleep at 18 months ( $\beta = -0.33$ ,  $P < 0.001$ ). In addition, less child sleep at 7 months was associated with increased maternal involvement at 18 months ( $\beta = -0.24$ ,  $P < 0.001$ ). An interaction term (sleep at 7 months  $\times$  maternal involvement) was tested but failed to fit the data.

## Discussion

This prospective study tested a theoretically derived model and found that maternal hardness measured prior to birth predicted maternal bedtime cognitions, which in turn related to maternal bedtime behaviour and toddler sleep. Findings extend on a previous cross-sectional study that supported this model.<sup>17</sup> A unique contribution was the inclusion of AC mothers and the findings that they were not more over-involved with their children at bedtime nor did their children receive less sleep. These findings add to a growing body of evidence suggesting that maternal traits, such as hardness, predict parenting outcomes rather than pregnancy-related contextual factors, such as age and mode of conception.<sup>18</sup> As no differences were found between the AC and SC participants on any study variables, the remaining discussion concerns the sample as a whole.

Contrary to expectation, child sleep at 7 months did not predict child sleep or maternal problematic cognitions at 18 months but was related to maternal bedtime involvement at 18 months. This suggests that while infant sleep behaviour does not predict how a mother will think about her child's sleep or directly relate to how well her child will sleep in the future, it may establish a habit of maternal over-involvement around bedtime that persists into toddlerhood.

A common limitation in childhood sleep research is interpreting the direction of effects.<sup>38</sup> Accordingly, in this study, exhaustive models were tested, including sleep at 18 months as a predictor of maternal cognitions and bedtime involvement. However, the theoretical model proposed, which posits maternal hardness predicts toddlers' sleep behaviour, was the best fit and proved to be robust.

Hardness, included in the model because of its theoretical relevance to the constructs of psychological maturity and authoritative parenting,<sup>7</sup> encompasses elements of commitment, control and challenge and is related to other known indices of positive adjustment, such as locus of control.<sup>39</sup> Parents with high levels of psychological maturity are significantly more likely to promote their children's autonomy and self-regulation<sup>40</sup> and have a capacity to cope flexibly with life's challenges.<sup>12,13</sup>

To date, hardness has primarily been studied in high-stress contexts<sup>41-44</sup> where higher levels of hardness are related to better outcomes for individuals. More recently, hardness was explored in the context of parenting around child sleep in a cross-sectional community sample of mothers and their preschool-aged children.<sup>17</sup> The current study tested a similar theoretical model prospectively and elicited a similar pattern of findings, even after controlling for a more comprehensive range of maternal (concurrent maternal depression and stress) and

child (temperament, perinatal variables, health) factors often linked to childhood sleep problems. The current findings suggest that the proposed model of child sleep development is robust and that a mother's pre-birth ability to be adaptive, flexible and to transform adversity into challenge is more predictive of the development of her child's self-regulatory capacity in the context of sleep than characteristics inherent to the child.

To date, research has primarily explored maternal problematic cognitions and bedtime involvement during infancy when sleep/wake patterns are heavily reliant on maternal regulation. In contrast, the current study examined the relationship of these factors during toddlerhood when increased self-regulation would be expected in the child.<sup>8</sup>

Parents who are more involved at their child's bedtime typically report experiencing more problematic sleep-related cognitions, including anger and doubt about parenting competence,<sup>17,30,45</sup> which may explain an inability to set limits. In the present study, problematic cognitions were experienced significantly less by mothers with higher levels of hardness suggesting that maternal characteristics related to an authoritative parenting style (warmth, flexibility and an ability to set clear limits when appropriate) are important in the promotion of adaptive child sleep development in this age group.

Further, more problematic cognitions were associated with increased involvement at toddlers' bedtime which in turn related to less child sleep received. It is likely that maternal involvement acts to prolong bedtime, resulting in less time for children to obtain sleep. In this study, many toddlers fell asleep as late as 10 PM each night, and 20% had less than 10 h of total sleep which is significantly less than would be expected for children during this developmental stage.<sup>46</sup> These findings highlight that parenting beliefs and practices, which are potentially modifiable, are salient contributors to child sleep behaviour.

This study's prospective design and sample characteristics provide further evidence that inherent maternal characteristics appear to be influential in childhood sleep development over and above potentially more intractable child characteristics. Furthermore, this study established that the mode of conception was not associated with poor sleep in the second post-natal year. The use of Actigraph to validate mother-reported child sleep and the inclusion of maternal mood and child variables as potential confounding variables are other strengths of this study. However, the sample composition limits generalisability of findings due to oversampling of AC mothers and a lack of cultural and socio-economic diversity. Additionally, maternal cognitions and bedtime involvement at 7 months were not collected, and fathers (cognitions and behaviours) were not included.

Findings from this study confirm that a mother's personality contributes to the extent to which she involves herself at her child's bedtime. Behavioural interventions such as controlled comforting, which require a parent to leave their child to fall asleep alone, are safe<sup>47</sup> and effective for children over 6 months of age.<sup>48</sup> Yet it is not uncommon for some parents to struggle with this approach due to an inability to tolerate child distress.<sup>49</sup> Although a relatively stable trait, there is evidence that hardness can develop with encouragement to think and behave in more adaptive ways.<sup>50</sup> Consequently, mothers with a child experiencing sleep difficulties may benefit from interventions that include cognitive components specifically targeting



negative maternal perceptions of control and efficacy in the context of problematic sleep-related cognitions. This combined approach should improve therapeutic engagement and, ultimately, child sleep outcomes.

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## Appendix B: Ethics Approval

----- Original Message -----

**From:**

"Ethics Secretariat" <[ethics.secretariat@mq.edu.au](mailto:ethics.secretariat@mq.edu.au)>

**To:**

"Nikki Johnson" <[nikkijohnson@iinet.net.au](mailto:nikkijohnson@iinet.net.au)>

**Sent:**

Wed, 4 Mar 2015 09:56:32 +1100

**Subject:**

Re: Ref:HE26JUN2009-D00003

Dear Sir/Madam,

This email is to confirm that the following ethics application/s cited below received final approval from the Macquarie University Human Research Ethics Committee:

Chief Investigator: Ms Nikki Johnson

Ref: HE26JUN2009-D00003

Date Approved: 27 July 2009

Title: "Parental factors and the development of self-regulatory behaviours and mentalization in toddlers "

Please do not hesitate to contact me if you have any questions.

Yours sincerely,

Dr Karolyn White

Director, Research Ethics

Chair, Macquarie University Human Research Ethics Committee