

Maternal Factors Affecting Reported Infant Sleep Outcome

Submitted by

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Abstract

Infants differ in their ability to achieve organised sleep-wake behaviour. Difficulties in this developmental process are associated with problems falling asleep at bedtime and repeated night awakenings where parental assistance is needed to return to sleep. Studies have shown that a number of maternal psychosocial factors have been linked to differences in infant sleep outcome.

The primary aim of this study was to examine the relative contribution of maternal psychosocial factors including depression and anxiety symptoms, perceived past maternal parenting, maternal cognitions about infant sleep, maternal sleep history and the maternal settling strategy of active physical comforting to infant sleep outcome. A further aim was to explore the extent to which these variables affect infant sleep outcome through their link to maternal cognitions about infant sleep.

The study used a cross-sectional design to explore the relationship between selected maternal factors and infant sleep outcome. A sample of 95 primiparous mothers with infants aged 6 to 9 months, recruited from Maternal and Child Health Centres located in the western suburbs of Melbourne, participated in the study. The participants completed standard self-report questionnaires to measure depressive symptoms, trait anxiety, perceived past maternal care and overprotection, maternal cognitions about infant sleep, maternal sleep history, active physical comforting strategies and infant sleep outcome.

There were significant correlations noted among the maternal factors of perceived past maternal care, perceived past maternal overprotection, trait anxiety, maternal sleep history, maternal cognitions about infant sleep, active physical comforting and infant sleep outcome. The associations between maternal cognitions about infant sleep and trait anxiety and active physical comforting were also significant. Maternal sleep history was not associated with maternal cognitions about infant sleep but trait anxiety was associated with maternal sleep history. The proposed model to predict infant sleep outcome was tested using hierarchical multiple regression. Results of the multivariate analysis indicated that the proposed regression model was not a totally good fit for the data. Active physical comforting, perceived past maternal overprotection and maternal sleep history were the only factors that were significant predictors of infant sleep outcome. The hypothesis regarding the mediating role of the maternal behaviour of active physical comforting was confirmed suggesting that maternal cognitions about infant sleep shape maternal behaviour toward the infant at bedtime and hence sleep outcome. Further, the effect of trait anxiety on infant sleep outcome was mediated by maternal cognitions about infant sleep suggesting that high trait anxiety may affect a mother's perceptions regarding her infant's sleep behaviour. In addition, the influence of perceived past maternal overprotection on infant sleep outcome was mediated by maternal cognitions about infant sleep outcome suggesting that a mother's experience of being parented may also influence how the mother thinks and acts in response to her child's unsettled sleep behaviour. The lack of support for some hypotheses was discussed in the context of the limitations of the present study.

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Overall, the findings of this study have added to the knowledge of how perceptions of parenting received during childhood and maternal cognitions about infant sleep may influence how a mother approaches the task of parenting her infant at bedtime. Future research may further explore how these factors could contribute to the development of interventions attempting to improve infant sleep outcomes.

Declaration of Authenticity

I, Jennifer Margaret Sheehan, declare that the Doctor of Psychology (Clinical Psychology) thesis entitled Maternal Factors Affecting Reported Infant Sleep Outcome is no more than 40,000 words in length including quotes and exclusive of tables, figures, appendices, bibliography, references, and footnotes. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma. Except where otherwise indicated, this is my own work.

Signature:

Date:

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1 Literature Review

1.1 Introduction

The development of night time sleep consolidation is widely recognised as one of the major developmental tasks of infancy (Anders & Keener, 1985). Infants differ, however, in their ability to achieve organised sleep-wake behaviour (Goodlin-Jones, Burnham, Gaylor, & Anders, 2001). These differences are associated with difficulties settling to sleep at bedtime and repeated night awakenings where parental assistance is needed by the infant to return to sleep (Sadeh, Tikotzky, & Scher, 2009). Such awakenings have been labelled as signalled awakenings because they involve crying or some other means of gaining adults' attention (Anders, Halpern, & Hua, 1992; Burnham, Goodlin-Jones, Gaylor, & Anders, 2002; Sadeh, 1994). Indeed, sleep concerns are one of the most frequent problem that parents discuss with paediatricians and other allied health professionals (Adams, Jones, Esmail, & Mitchell, 2004; Benhamou, 2000; Goodlin-Jones, Burnham, & Anders, 2000). Infant night waking can pose serious challenges to parents' capacity to cope during the first year of development, contributing to family stress, increasing negative perceptions and resulting in a loss of the mother's confidence in her parenting ability (DeLeon & Karraker, 2007; Hiscock & Wake, 2002; Milgrom, Martin, & Negri, 1999).

The causes of sleep disturbance during infancy are not well understood (Teti, Kim, Mayer, & Counterline, 2010). Some authors have attributed infant sleep problems to factors intrinsic to the infant, such as temperament (Carey, 1974; Keener, Zeanah, & Anders, 1988; Sadeh, Lavie, & Scher, 1994), the capacity for self-regulation (Anders & Keener, 1985) and neurophysiology (Anders, 1982)

Psychosocial factors have also been associated with infant sleep-wake behaviour (for a review see Sadeh, Tikotzky, et al., 2009). Factors such as maternal depression (Armstrong, Van Haeringen, Dadds, & Cash, 1998; Bayer, Hiscock, Hampton, & Wake, 2007; Hiscock & Wake, 2001) and anxiety (Fisher, Feekery, & Rowe, 2004; McMahon, Barnett, Kowalenko, Tennant, & Don, 2001; Scher, 2008), insecure attachment and separation difficulties (Benoit, Zeanah, Boucher, & Minde, 1992; Dennis, 2005; Van Tassell, 1985; Zuckerman, Stevenson, & Bailey, 1987) have been linked to problematic infant sleep outcomes. Other potential factors that may be related to infant sleep outcome include perceptions of maternal past parenting and maternal sleep history but these links have received either limited or no empirical investigation. Research has however consistently demonstrated very strong links between maternal settling strategies and infant sleep outcome (Adair, Bauchner, Philip, Levenson, & Zuckerman, 1991; Burnham et al., 2002; Morrell & Cortina-Borja, 2002).

Despite research efforts over many years investigating the role of maternal factors in influencing infant sleep outcome, one of the least understood aspects is the role of maternal cognitions about infant sleep in organising maternal settling behaviour (Tikotzky & Sadeh, 2009). It seems reasonable to assume that maternal cognitions about infant sleep may influence the way a mother behaves when she is settling her infant to sleep and following a signalled night awakening. Few empirical studies, however, (Morrell, 1999a; Morrell & Steele, 2003; Sadeh, Flint-Ofir, Tirosh, & Tikotzky, 2007; Toselli, Farneti, & Salzarulo, 1995), and none from Australia, have directly examined this link.

In general the body of published research has concentrated on sleep problems and despite the complex multiple factors involved in infant sleep most of the research reviewed has focussed on group comparisons or individual predictors and utilised univariate analyses. In contrast there have been some attempts to explain infant sleep using sophisticated models but there have only been a relatively small number of studies that have tried to empirically test such models. This thesis reviews the research literature related to maternal factors influencing infant sleep outcome and proposes a model to explain infant sleep that includes some selected maternal factors. It examines the role of maternal cognitions about infant sleep along with a range of psychological factors (depressive symptoms and trait anxiety, perceived past maternal care and overprotection, maternal sleep history and the maternal behaviour of active physical comforting) and their relationship to infant sleep outcome.

1.2 Infant Sleep Patterns

During the first year, infant sleep develops rapidly along a somewhat prescribed developmental pathway (Anders, 1994; Burnham et al., 2002). This course is influenced by both biological and psychosocial factors (Goodlin-Jones et al., 2001; Sadeh, 2007). One of the most important features of this developmental process, from the parent's perspective, is the gradual reduction in sleep duration during the day and the consolidation of sleep during the night (Anders & Keener, 1985; Ficca, Fagioli, Giganti, & Salzarulo, 1999; Goodlin-Jones & Anders, 2004).

At birth, healthy full-term infants typically sleep around 16 to 17 hours per day. Studies have shown, however, that there is significant variability in the length of time individual infants spend asleep. For instance, Sadeh et al. (1996) reported that some newborns sleep for 22 hours while others sleep for only 10 hours each day. The

structure of sleep-wakefulness during this period strongly reflects a basic 90 minute rest-activity cycle more than it does a day-night rhythm (Anders, 1982; Coons & Guilleminault, 1982). These multiple sleep cycles, distributed across a 24 hour period, will eventually combine to form a regular sleep-wake pattern comprising one main consolidated sleep episode at night (Anders & Keener, 1985; Burnham et al., 2002). Circadian organisation is not developed and there is no relationship between sleep-wake patterns and time of day in the first few weeks (Mares, Newman, & Warren, 2005). Rather, sleep patterns are regulated by hunger, satiety and feeding times (Adair & Bauchner, 1993; Goodlin-Jones et al., 2000; Sadeh, 2007). During the first month, however, both the structure and temporal organisation of sleep develops rapidly (Sadeh, 2007). As the circadian rhythm emerges, infants become increasingly responsive to environmental cues, such as the light-dark cycle, to synchronise their sleep-wake pattern. Social cues, such as feeding times and night-time routines also begin to influence sleep-wake patterns (Anders, Sadeh, & Appareddy, 1995).

As the infant matures more sleep begins to occur at night and more wakefulness occurs during the day (Ficca et al., 1999; Sadeh, 2007). At around four months, average total sleep time is about 14 to 15 hours each day decreasing to 13 to 14 hours at six months of age (Anders et al., 1995). Sleep-wake patterns also begin to change so that, increasingly, longer sleep periods begin to occur at night. During the first three months sleep periods are between 3 to 4 hours and by six months the longest continuous sleep period is around 6 to 8 hours (Anders et al., 1995; Mindell & Owens, 2003). Two of these longer periods make up the night, interrupted by one or two brief awakenings (Sadeh, 2007). In a similar way, wakeful periods consolidate, lengthen and shift to the daytime, interrupted by brief naps (Anders, 1994). The total number of sleep-wake

cycles in a 24 hour period gradually decreases as periods of sleep and wakefulness shift to a diurnal pattern of organisation (Sadeh, 2007). By 12 months diurnal organisation is well established typically with one long period of sleep at night of around 8 to 12 hours and two shorter sleep periods during the day (Sadeh, 2007). Findings from Kleitman and Engelmann's (1953) seminal longitudinal study demonstrated that there was only a small decrease in total sleeping and waking hours during the first year. The average total sleep time remained around 14 to 15 hours each day however, there was a change in the distribution of sleep across the day and more consolidation of sleep during the night. An important development for research in this area has been the use of the internet via a web-based survey as the first attempt to collect normative data on the sleeping patterns of infants and toddlers in the United States and Canada (Sadeh, Mindell, Luedtke, & Wiegand, 2009) and across primarily Caucasian (including Australia) and primarily Asian countries (Mindell, Sadeh, Wiegand, How, & Goh, 2010). The series of papers (Mindell, Sadeh, Kohyama, & How, 2010; Mindell, Sadeh, Wiegand, et al., 2010; Teng, Bartle, Sadeh, & Mindell, 2011) published from these surveys of a large cohort of children from birth to 3 years have provided important information on sleeping patterns across diverse countries and regions and changes in those patterns with increasing age.

In the first few months of development all infants awaken during the night and require some parental assistance to return to sleep (Anders, 1994). By around 4 to 6 months of age, most infants continue to awaken during the night but are developing the ability to return to sleep without the help of their parents (Anders, 1994; Bayer et al., 2007). Anders and Keener (1985) termed the infant's ability to return to sleep, following a signalled night awakening, as "self-soothing". The ability to self-soothe

when falling asleep at bedtime and following a night awakening is critical to the development of healthy sleep-wake behaviour (Burnham et al., 2002; Sadeh, Mindell, et al., 2009) and is a major developmental task in infancy (Sadeh & Anders, 1993). Not all infants, however, learn to self-soothe and many parents find the frequent and drawn out night awakenings and associated crying disruptive and distressing (Bayer et al., 2007).

1.3 Prevalence of Night Awakenings

While reports vary greatly, due to different methodologies and definitions (Benhamou, 2000; Minde et al., 1993), findings suggest that there is a high prevalence of night awakening during the first year of development (Armstrong, Quinn, & Dadds, 1994; Bayer et al., 2007; Hiscock & Wake, 2001). Studies reporting on the prevalence of night waking are generally conducted during the second half of the first year as in the first six months an infant is not expected to have developed a pattern of longer duration of sleep during the night (Adair et al., 1991; Bayer et al., 2007)

Zuckerman et al (1987), in a longitudinal study of 308 white middle class mothers from Boston, reported a night waking prevalence rate of 22% among infants aged 8 months old. In a large Australian community survey ($N = 738$) conducted in three middle-class local government areas in Melbourne, Hiscock and Wake (2001) reported a prevalence rate of 46% for night awakenings in infants aged 6 to 12 months. Night awakenings or difficulty in getting an infant to sleep based on maternal report have typically been used as a criterion for sleep problems/difficulties as exemplified by an Australian community survey of 692 Australian mothers of infants 3 to 6 months in Melbourne in which 34% ($n = 237$) of parents reported a problem with their infant's sleep (Bayer et al., 2007). Results for combined Australian ($n = 1073$) and New Zealand ($n = 1081$) samples from the large internet based survey (Mindell, Sadeh, Wiegand, et

al., 2010) showed that sleep problems were reported by 31.21% of parents of 0–2 month old infants, 28.37% of 3–5 month old infants, 33.85% of 6–8 month old infants, and 38.94% of 9–11 month old infants.

Richman (1981) attempted to develop a more objective way of measuring sleep by asking parents to report specific sleep and waking behaviours in a sleep diary across a two week period. Using this method, Richman conducted a community survey of 771 children with sleep disruption and found the following rates of disturbance in 1 to 2 year olds: 56% woke up to one night a week; 24% woke between two and four nights a week; 20% woke between five and seven nights a week.

There is evidence to suggest that sleep difficulties, once established during infancy, persist into later childhood (Sadeh & Anders, 1993). In the study described above, Zuckerman et al. (1987) conducted a follow-up assessment of 8 month old infants with sleep problems and found that 41% of them still had problems when they were 3 years old. Retrospectively, only 26% of the children with sleep problems at three years did not manifest them when they were 8 months old. Similarly, in an Australian follow-up community study of 8 to 10 month old infants who had been identified with sleep problems, 12% of mothers reported that at age 3 to 4 years their child's sleep problem had persisted and 19% reported that the problem had recurred (Lam, Hiscock, & Wake, 2003). In the longitudinal study conducted by Wolke, Meyer, Ohrt and Riegel (1995) parent reports indicated that 23% of infants with night waking problems at five months were "night wakers" at 20 months. Of those infants waking at 20 months, 17% continued to be "night wakers" at 56 months. In a large Canadian longitudinal study ($N = 1,741$) Touchette et al. (2005) reported that at five months, 24% of children slept less

than six consecutive hours. Of the children who slept less than six consecutive hours at five months or 17 months, 33% ($n = 24$) were still not sleeping six consecutive hours at 29 months. These studies attest to the enduring nature of sleep problems in early childhood. The long-term nature of sleep problems is also confirmed by studies of adults reporting disturbed sleep during childhood (Hauri & Olmstead, 1980; Klink, Quan, Kaltenborn, & Lebowitz, 1992). In studies evaluating the familial incidence of sleep disturbance the mother was identified as the most frequently affected family member (Bastien & Morin, 2000; Beaulieu-Bonneau, LeBlanc, Mérette, Dauvilliers, & Morin, 2007). Bastien and Morin (Bastien & Morin, 2000) also reported that the familial incidence of insomnia was higher in individuals with childhood (31%) and adolescent onset insomnia (33%) suggesting that a familial history of insomnia may be a risk factor for insomnia.

1.4 Mothers' Perception of Infant Sleep

The definition of an infant sleep problem is not straightforward as specific criteria for defining settling and night waking problems have yet to be established. Currently definitions for infant sleep problems vary depending on whether they are based on parent report (Morrell, 1999a), diagnostic manual criteria (American Psychiatric Association, 2000) or research criteria (Morrell, 1999a; Richman, 1981). Infants who experience difficulty falling asleep at bedtime and whose night awakenings are associated with crying and requests for parental assistance are generally considered by parents to have sleep problems (Anders et al., 1995; Morrell, 1999a).

The criteria researchers have used for measuring infant sleep outcome have varied widely and included: 'sleeping at night without waking the parents'; 'sleeping from one hour after bedtime until the start of the next day' (Adair et al., 1991); 'sleeping

from 10 pm to 5 am' (Bernal, 1973); 'not waking or disturbing the parents between midnight and 5am (Moore & Ucko, 1957). Some studies have reported discrepancies between research criteria for defining sleep problems and maternal perceptions of a sleep problem. For example, in a British study, Scott & Richards (1990) conducted a postal survey and asked 1,500 mothers of 1 year-olds how many nights per week their infants woke and whether or not they thought there was a night waking problem. Ten per cent of mothers whose infants met the researchers' criteria for sleep disturbance (woke on five or more nights a week) did not regard this as a difficulty. On the other hand, 37% of mothers whose infants woke less often regarded it as a problem. Similarly, Jaffa et al. (1993) reported that having lengthy delays in settling for the night was not viewed as a problem if parents enjoyed or needed their infant's persistent requests for company. Thus, parental perception of night waking as a problem may be more important than actual night waking in determining sleep problems particularly for those parents who expect their infants to sleep through the night (Goodlin-Jones et al., 2000).

Parents typically become aware of infant night awakenings when they are 'signalled awakenings', that is, waking accompanied by crying, or some other means of signalling to gain adults' attention (Anders et al., 1992; Burnham et al., 2002; Goodlin-Jones & Anders, 2001; Sadeh, 1994). Whether or not such infants actually awakened more often than infants who did not signal their parents has been a question raised in the literature (Hayes, Roberts, & Stowe, 1996) . The work of Minde et al. (1993) and Anders (1979), for example, using home-based objective sleep measures have added greater clarity regarding the accuracy of parental reports. Minde et al. (1993) placed an infrared video camera for three nights in the homes of children aged 12 to 36 months,

30 with a severe sleep disorder, and 28 control children without a parent-reported sleep disorder ('good sleepers'). When the two groups were compared, there was no difference in the frequency of interrupted sleep. There was, however, a difference in the way the infants returned to sleep, in that, 'good sleepers' soothed themselves back to sleep. Similarly in an early study, Anders (1979) using a time lapse video recording system, in a study of 2 and 9 month old infants, established that the 'good sleepers' woke up as frequently as the 'poor sleepers'. He concluded that while some infants signal their awakenings by crying, others seem to be able to self-soothe during night awakenings and return to sleep without parental assistance. When self-soothing behaviour results in the infant returning to sleep, there will be an underreporting by parents of the incidence and length of an infant's night awakening.

Regardless of the various criteria used to describe infant sleep outcome, it is the infant's capacity to self-soothe and return to sleep following a night awakening, rather than night waking as such, which underpins an infant sleep problem (Armstrong, O'Donnell, McCallum, & Dadds, 1998; Goodlin-Jones et al., 2001). Researchers have for many decades been interested in exploring factors that influence an infant's capacity to self-soothe and therefore lead to improved sleep outcomes. Research findings suggest that a major contributor to infant night time sleep consolidation is parenting settling strategies, particularly strategies implemented around bedtime or in response to night awakenings. Notably most studies have focussed on the influence of maternal settling behaviours (Sadeh, Tikotzky, et al., 2009).

1.5 Maternal Settling Strategies and Infant Sleep Outcomes

Sleep is considered to be one of the “first coregulatory behaviours infants practise with parents” (Schwichtenberg & Poehlmann, 2008, p.1). Numerous researchers (Anders, 1994; Goodlin-Jones et al., 2001; Mindell & Owens, 2003; Morrell & Cortina-Borja, 2002) have suggested that a mother’s bedtime behaviour with her infant can either hinder or facilitate the infant’s ability to develop self-soothing skills. Indeed, the importance of parental settling strategies at bedtime as a “regulator” in the development of self-soothing behaviours, is one of the most consistent findings regarding infant sleep outcome in infancy (Anders, 1994; Goodlin-Jones et al., 2001). It has been suggested that infants of mothers who actively comfort their infants to sleep have less consolidated sleep. On the other hand, infants who received encouragement to fall asleep without assistance were likely to have more consolidated sleep at night (Adair et al., 1991; Anders et al., 1992; Morrell & Cortina-Borja, 2002; Sadeh, Mindell, et al., 2009). It is generally accepted in the literature that parents who actively soothe their infants to sleep may impede the development of self-soothing ability that enables the infant to fall asleep at bedtime and manage subsequent night awakenings without needing parental help to return to sleep (Adair et al., 1991; Goodlin-Jones et al., 2001; Sadeh, Tikotzky, et al., 2009). Conversely, parents who limit bedtime interaction with their infants may be providing increased opportunities for their infants to develop appropriate self-soothing skills (Anders, 1994).

Given the link between maternal bedtime behaviour and infant sleep outcome researchers have started to address the need for more information concerning what mothers actually do at infant bedtime (Burnham et al., 2002; Mao, Burnham, Goodlin-Jones, Gaylor, & Anders, 2004; Morrell & Cortina-Borja, 2002; Sadeh, Mindell, et al.,

2009). Studies examining maternal strategies used to settle infants to sleep have mostly been carried out in the United Kingdom (Morrell & Cortina-Borja, 2002) the United States (Anders, 1994), Israel (Sadeh et al., 2007; Scher, 2008) and Italy (Toselli, Farneti, & Salzarulo, 1998). In an important move away from country specific studies on sleep a recent paper (Mindell, Sadeh, Kohyama, et al., 2010) based on the previously cited internet survey (Mindell, Sadeh, Wiegand, et al., 2010) reported cross-cultural data on parental settling behaviours and sleep outcomes for a large sample of infants and toddlers ($N = 29,287$) aged 0 to 36 months. Results from the total sample confirmed findings from the earlier studies described above in that parenting behaviours at bedtime, especially feeding, were the strongest predictors of sleep outcome in children up to three years old. Breast-feeding back to sleep after a night waking was the strongest predictor of the number of night awakenings. Cross cultural comparisons between primarily Asian and primarily Caucasian groups showed significant differences in parenting behaviours.

Until very recently there has been a lack of knowledge about the range of strategies Australian mothers use to settle infants to sleep. Hiscock and Wake (2001), in a previously cited study, explored maternal well-being in an Australian community sample ($N = 737$) of mothers of infants 6 to 12 months of age who were recruited from Maternal Child Health Centres in three middle-class areas. Almost half of the mothers ($n = 339$, 46%) reported their infant as having a sleep problem. When the two groups were compared infants with a sleep problem were more likely to be nursed to sleep (16% vs. 8.0%, $p < .001$), and sleep in parent's bed (4% vs. 2%, $p < .01$). The latest publication (Teng et al., 2011) of combined Australian and New Zealand data from the large internet based survey (Mindell, Sadeh, Kohyama, et al., 2010; Mindell, Sadeh,

Wiegand, et al., 2010) reported age related changes in parent settling behaviour both at bedtime and after a night waking. In particular as infant age increased there was a decrease in the use of strategies such as bottle feeding, breast-feeding, rocking and holding to settle at bedtime and after a night waking. As noted above the authors reported that sleep problems were reported by 33.85% of parents of 6–8 month olds and 38.94% of parents of 9–11 month olds. Although the frequency of various settling strategies were reported for the various age groups across the 0-3 years range there was no comparison of the particular settling strategies used by parents who did not report their child having a sleep problem and parents who perceived their child had a sleep problem. While this study has provided important data regarding the use of settling strategies in the combined Australian and New Zealand samples there have been no studies that have rigorously examined this issue in a sample of Australian parents.

Studies measuring the relationship between maternal settling strategies involving active physical comforting and infant sleep outcome have generally measured maternal behaviour in one of two ways. The measures used have either clustered several related behaviours into a single settling strategy (factor) or studies have explored the relative contribution of a particular settling behaviour to infant sleep outcome. The use of different terminology in some studies to describe the same settling strategy makes it difficult to make comparisons between studies.

In an early study, Van Tassell (1985) explored the influence of a range of child and environmental variables on sleep disturbance during the first two years of life in a sample of 70 mother-infant dyads (41% of the infants were first-borns). Mothers completed self-report questionnaires during interviews when their infants were aged

from 4 to 15 months ($M = 9.02$) and again when their infants were between 15 and 27 months ($M = 21.30$). The dependent variable, sleep disturbance was based on the sum of responses to two items, mothers' ratings (0 to 2) of their infant's sleep as problematic and the average number of awakenings per night. Apart from the Toddler Temperament Scale (Carey & McDevitt, 1978) all self-report measures used at interview 1, were constructed for the purpose of the study and therefore had not demonstrated reliability and validity. The variables associated with infant sleep disturbance during the first year included child characteristics (sex and temperament), sleeping and feeding activities (night feeds, crying, sleeping in parental bed) and maternal employment. Correlations between feeding and sleeping activities and sleep disturbance were as follows: night feeds ($r = .58, p < .001$), cried before falling asleep ($r = .50, p < .05$) and sleeping in parent's bed ($r = .24, p < .01$). An intercorrelation was reported between night feeds and sleeping in the parent's bed ($r = .43$). In the hierarchical multiple regression analysis conducted for the first year the six variables were entered in three steps and accounted for 52% of the variance in sleeping disturbance. Child characteristics, entered at step 1, accounted for 9% of the variance, sleeping and feeding activities (collapsed into the sleeping and feeding factor), entered at step 2, accounted for 38% of the variance in sleep disturbance while maternal employment, entered at step 3, predicted 5% of the variance. Interestingly, night feeds accounted for 31% of the variance. Van Tassel considered feeding a predictor of infant sleep disturbance because it interfered with continuous night sleep. Giving a feed and sleeping in the parental bed are examples of strategies that comprise the Active Physical Comforting factor (Morrell & Cortina-Borja, 2002). The infants in the initial sample ranged from 4 months to 15 months ($M = 9.02$) but it is not clear if the author controlled for infant age. It is reasonable to assume

that younger infants may be waking for a night feed rather than exhibiting problematic sleeping behaviour.

Using a sample of 122 mothers and their 9 month old infants ($M = 9.40$ months) who were consecutively recruited for the study when they attended a Boston Medical Clinic for the 9 month old well child visit, Adair et al. (1991) conducted a cross-sectional study to assess the importance of maternal presence at bedtime as a settling strategy. Parental presence in this study was defined as feeding the child, rocking, walking, singing, lying down with child, or being present in child's room. It was reported that 40 (33%) mothers indicated that they were present at bedtime. Of these parents, 17 (42%) mothers reported feeding their infant to sleep and 23 (58%) engaged in other (unspecified) activities at bedtime. Problematic night awakening (seven or more awakenings in the preceding week) occurred in 28% of the sample. Infants whose parents were present at bedtime were more likely to experience more night awakenings (40% vs. 22%, $p < .05$). Multivariate analysis indicated that parental presence at bedtime was a significant predictor of infant night waking ($\beta = -2.31$, $p < .05$) but the amount of variance contributed by this factor was not reported. The authors suggested that parental soothing may establish a learned association between parental presence and falling asleep. While the authors did not specifically identify these techniques as active comforting strategies they are similar to those strategies which were later identified as comprising the Active Physical Comforting subscale (Morrell & Cortina-Borja, 2002).

One of the most comprehensive studies undertaken to identify the range of settling strategies employed by mothers to encourage sleep at bedtime was conducted by

Toselli, Farneti, and Salzarulo in 1998. The sample consisted of 104 middle-class first-time mothers and data was obtained from telephone interviews when infants were one month and 12 months old. Toselli et al. identified 19 different maternal settling strategies used across a 12 month period. The authors categorised the strategies into six groupings: physical contact (holding, rocking, taking into parental bed); movement (rocking cradle); acoustic stimuli (singing, music, talking in a quiet way); food/drink (camomile/honey, syrup, breastfeeding, bottle, pacifier); changing the environment (changing infant position, placing infant in a quiet place, communicating a quiet presence); social interaction (playing with infant). At one month, the most common strategy employed by mothers involved physical comforting: holding (19%) and holding + rocking (40%). A developmental trend was noted at the 12 month follow-up, as the percentage of mothers employing some strategies decreased, holding and rocking strategies (e.g. holding + rocking (40% vs. 16%), and strategies involving breast feeding (8% vs. 1%), while taking the infant into the parent's bed (0% vs. 22%) and bottle feeding (0% to 11%) increased. Findings from recent reports (Teng et al., 2011) are similar in regard to an association between increasing infant age and a decrease in parental interventions such as holding and breast-feeding at bed-time and an increase in bottle-feeding and taking into the parental bed after waking during the night. The physical contact and feeding strategies reported in these studies were similar to those that comprised the Active Physical Comforting subscale (2002) described below.

Morrell and colleagues conducted a number of studies using the same sample of mothers recruited from a General Practice surgery in Oxfordshire described in the previously cited study (Morrell, 1999a). In their 2002 study Morrell and Cortina-Borja (2002) described a newly developed self-report Parent Interactive Bedtime Behaviours

Scale (PIBBS). A factor analysis of the PIBBS items revealed five different categories of settling strategies: active physical comforting (stroking, cuddling/rocking, holding, giving a drink, settling in parent's bed); encouraging autonomy (listening to music, special toy, leave to cry); movement (walks in pram/car rides); passive physical comforting (stand/lie near cot); social comforting (talking softly, singing, reading a story, playing with child). This new measure (the PIBBS) was then used with a sample of 288 mothers (52% were primipara) to explore the variety of settling strategies employed by the mothers when their infants were aged 12 to 19 months ($M = 13.70$ months). Results showed that active physical comforting and encouraging autonomy were the most common strategies chosen by mothers and were used with equal frequency. Endorsement frequencies indicated that the most common active physical comforting strategies were feeding (72%), cuddling (50%) and stroking (50%) while settling on the sofa (27%), settling in the parental bed (20%) and carrying around the house (10%) were the least commonly employed settling strategies in this category. Offering a special toy (47%) and leaving to cry (45%) were the most common encouragement of autonomy strategies used. Scores on the sleep diaries (Richman, 1981) completed by parents were correlated with the PIBBS factors giving Pearson correlation coefficients of .50 ($p < .001$) for active physical comforting, and -.27 ($p < .01$) for encouragement of autonomy. There was no significant association between sleep diary scores and settle by movement, passive physical comforting and social comforting factors. On the basis of their infant's sleep, according to the ISQ research criteria as derived from Richman (Morrell, 1999a), a sub-group of 99 mothers were divided into those with problem sleepers ($n = 40$) and those without problem sleepers ($n = 59$). The two groups were compared in terms of settling strategies used with results indicating that mothers of problem sleepers were more likely to use active physical

comforting techniques to settle their infant to sleep than mothers of non-problem sleepers (50% vs. 29%). Conversely, mothers of non-problem sleepers were more likely to use strategies that encouraged autonomy relative to mothers of problem sleepers (33% vs. 25%). There were no differences between the two groups on the use of other settling techniques such as, settle by movement, passive physical comforting and social comforting.

In a further publication Morrell and Steele (2003) used a sub-sample of the mothers to explore the contribution of various factors, anxiety, depression, parents' own experience of care, maternal cognitions about infant sleep, temperament, maternal settling strategies and attachment security) to infant sleep problems. The sub-sample consisted of 100 mothers (52% primiparous) and their 14 to 16 month old infants (40 with sleeping problems and 60 without according to ISQ research criteria as derived from Richman (Morrell, 1999a). Maternal settling strategies were assessed using the three subscales of the PIBBS (Morrell & Cortina-Borja, 2002): Active Physical Comforting, Encouragement of Autonomy and Passive Physical Comforting that had been reported as being associated with infant sleep problems (Morrell & Cortina-Borja, 2002). Using logistic regression analysis and controlling for infant age, with the dependent variable being sleeping problems/no sleeping problems, Morrell and Steele assessed the contribution of a range of factors to infant sleep difficulty at one year of age. The factors were entered in a sequence of six blocks. Within each block a step-wise procedure was employed to extract the most significant variable. The significant factors from each block, in order of percentage of variance explained, were maternal cognitions about infant sleep (limit setting and anger) (36%), fussy-difficult temperament (10%), depression (7%), infant age (6%), ambivalent attachment (4%) and active physical

comforting (3%). Overall the model explained 66% of the variance in infant sleep problems.

In a previously cited study, Touchette et al. (2005) examined the link between infant sleep and maternal settling strategies both at sleep onset and in response to a night awakening in a sample of 1,741 children recruited from the Canadian Province of Quebec. The researchers conducted a longitudinal study using a randomized 3-level stratified survey design. Data was collected using maternal self-report measures and home interviews when the children were 5, 17 and 29 months old. The sample was divided into two groups according to the following criteria: children who slept > than six consecutive hours at night ($n = 1331$, 77%) and children who slept < than six consecutive hours ($n = 410$, 24%). The most common settling strategy in response to a night awakening was feeding. At five months the risk of being a 'poor' sleeper, was 2.6 times greater for infants who were fed during the night than for infants whose mothers comforted them in their beds or allowed them to cry. The risk of being a 'poor' sleeper was 1.2 times greater in infants who were put to bed asleep or had parental presence until sleep, compared with mothers who encouraged their child to fall asleep independently. Of the infants who were sleeping < 6 consecutive hours at 5 months, 73 (18%) were still sleeping < 6 consecutive hours at 17 months. At 17 months, the risk of sleeping < 6 consecutive hours was 4.6 times greater among children who required parental assistance to fall asleep. In particular 40% of infants who slept < 6 consecutive hours and 13.5% of infants who slept > than six consecutive hours were fed following a night waking with the risk of being a poor sleeper 3.8 times greater for those infants who were settled in this way. The finding of an association between feeding and less consolidated sleeping, in the context of night awakening is to be expected in young

infants. Feeding a 17 month old child in the context of a night awakening, may be understood as a settling strategy requiring the presence of the parent for the child to resume sleep.

In a large internet sample of 5,006 US-Canadian parents, Sadeh et al. (2009) examined the relationship between parental settling strategies and sleep outcome during the first 3 years of life, using a web-based online survey (an expanded version of Sadeh's (2004) Brief Infant Sleep Questionnaire). In this sample, 56% of participants were first-time mothers. Specific strategies used at bedtime and following a night awakening were recorded. Strategies used at bedtime time, in the 6 to 8 month old group ($n = 712$) included: bottle feeding (30%), nursing/(breast-feeding) (28%), rocking (31%), holding (36%), watching TV (4%), in crib alone in the room (48%), in crib with parental presence (10%), settle in parent's bed with parent (14%) in another room (6%). Somewhat similar strategies were used following a night awakening and included: holding/rocking to sleep (28%), picking up/returning awake (13%), pat in crib (34%), give a bottle (31%), nursing (breast-feeding) to sleep (32%), verbal comfort (14%), bring child to parent's bed (23%), leave to cry (17%), wait a few minutes (50%), play until ready to sleep (2%), watch TV (2%), sing to child (11%). The researchers also reported age-related changes in settling strategies. The use of physical comforting strategies decreased with age while strategies encouraging self-soothing (leave to cry, wait a few minutes, verbal comforting) increased with age. Similar findings of age-related changes in settling strategies have been reported in other studies (Burnham et al., 2002; Morrell & Cortina-Borja, 2002; Toselli et al., 1998). While the authors did not specifically identify settling techniques as active physical comforting strategies, the settling strategies (apart from the in crib alone strategy) are similar to those that

comprise the Active Physical Comforting subscale of the PIBBS (Morrell & Cortina-Borja, 2002). A stepwise regression analysis indicated that infant night awakening was explained by a set of overlapping variables including: not sleeping in a separate room; giving a feed during the night; bringing child into parent's bed. Together these variables explained 21% of the variance in night awakenings with feeding to sleep uniquely explaining 11% of the variance. A limitation of this study as acknowledged by the authors was that the parent cohort was skewed toward higher education and higher representation of white Caucasian participants. Further, terms used to identify specific settling strategies (holding, nursing and rocking) were not defined creating possible ambiguity.

Tikotzky and Sadeh (2009) in a longitudinal study from pregnancy through the first year of life, assessed the relationship between maternal soothing behaviour at sleep onset and following a night awakening and infant sleep in a sample of 85 mother-infant dyads. Participants, who were all expecting their first child, were recruited for the study during the third trimester of pregnancy and data was collected at 1, 6 and 12 months post birth. Sleep was assessed using actigraphy and sleep diary scores. The authors constructed a bedtime soothing scale to assess the use of maternal settling techniques at sleep onset. Soothing techniques included: (a) in crib by him/herself without caregivers help; (b) in crib with parent's passive presence; (c) in crib with brief parental help; (d) in crib parental extended help; (e) while nursing, feeding, drinking or outside crib with caregiver's active help; (f) falling asleep in parental bed. A similar scale was constructed to assess settling strategies used after night awakenings. Higher scores on each scale indicated higher maternal soothing involvement. Results indicated that greater maternal involvement at bedtime and during the night was correlated with more

actigraphic reported night awakenings at six months (at bedtime $r = .34, p < .01$; during the night $r = .43, p < .001$). Results also indicated that night awakenings at six months predicted more night awakenings at 12 months ($r = .39, p < .001$).

There is also some evidence that the type of settling strategies used by mothers could vary according to social class. In a longitudinal study with 58 high- and 64 low-adversity primiparous mothers and their infants, Cronin, Halligan and Murray (2008) explored the association between social disadvantage, maternal settling strategies and infant sleep using self-report measures. Settling strategies were measured at 4, 7 and 12 weeks postpartum using a modified version of the PIBBS (Morrell & Cortina-Borja, 2002) that comprised four factors (Active Comforting, Parental Presence, Settle by Movement and Encourage Autonomy strategies) and infant sleep outcome at 4, 7 and 12 weeks postpartum, and at 12 and 18 months using the modified ISQ (Morrell, 1999a). The researchers omitted the ISQ item measuring the frequency with which parents settle their infant in the parental bed because the item overlapped with a possible maternal settling strategy from the PIBBS. Findings indicated that during the first three months, high-adversity mothers were more likely to actively comfort their infant to sleep at bedtime than their low-adversity counterparts. Further, high adversity mothers continued to rely on active comforting strategies throughout the early postnatal period whereas low-adversity mothers were more likely to adjust their settling reporting a decrease in the use of active comforting. Despite the differential use of active comforting there was no significant difference in infant sleep scores between low- and high-adversity mothers at 4, 7 and 12 weeks postpartum. There were, however, significant group differences in mean infant sleep scores at 12 months (high adversity $M = 7.00$; low adversity $M = 3.50$) and 18 months (high adversity $M = 7.20$; low adversity

$M = 3.60$). The authors also measured the association between settling strategies at 12 weeks and infant sleep outcomes at 18 months and reported no significant relationship between active physical comforting strategies and infant sleep scores at 18 months, as rated by the ISQ ($r = .04$, *ns*). This finding is in contrast to previous studies that have linked actively physical comforting to infant sleep problems (Adair et al., 1991; Morrell & Cortina-Borja, 2002; Tikotzky & Sadeh, 2009; Touchette et al., 2005). It is possible that this discrepant finding is related to some extent to the definition/measurement of the settling strategies. In this study, Cronin et al. (2008) defined Active Physical Comforting as stroking, cuddling, rocking and talking softly to the infant. The authors notably excluded feeding and sleeping in the parental bed. Instead, feeding and sleeping in the parental bed were techniques included in the parental presence strategy and there was a high correlation between parental presence and the ISQ total sleep score ($r = .32$, $p < .001$) at 18 months. It would appear in this study, that feeding and sleeping in the parental bed were more powerful predictors of problematic infant sleep outcome than the other strategies that comprised active physical comforting as defined by Morrell and Cortina-Borja (2002).

The findings from the above studies suggest that the task of identifying what mothers actually do to settle their infants to sleep at bedtime is very complex. Firstly, the terms used to describe the particular strategies are not defined making it difficult to compare settling strategies across studies. Secondly, studies generally do not always differentiate between strategies used at bedtime and those used to respond to a night awakening (Morrell & Cortina-Borja, 2002). This practice seems to assume that mothers employ the same settling strategies at bedtime and in response to a night awakening. In those studies that have differentiated between sleep onset strategies and

nocturnal awakenings (Sadeh, Mindell, et al., 2009; Touchette et al., 2005), results have highlighted the importance of giving a feed and settling in the parental bed following a night awakening, to infant sleep disturbance. However, some of these studies have not controlled for infant age which may lead to the false belief that night time feeds are linked to sleep problems. Night feeding is to be expected in young infants however, feeding an older child in the context of a night awakening may be understood as a settling strategy requiring a parental presence to resume sleep. Finally, the use of a pacifier/dummy, as a settling strategy, has received sporadic research attention (Adair et al., 1991; Goodlin-Jones, Eiben, & Anders, 1997; Scher & Blumberg, 1999; Teng et al., 2011; Toselli et al., 1998). Anecdotal evidence, however, would suggest that a pacifier/dummy is commonly used by mothers to settle an infant to sleep and following a night awakening.

Overall, the findings from the above studies suggest that mothers generally utilized a range of strategies to settle their infants to sleep, with strategies involving active physical comforting strategies tending to be more prevalent. The studies have also showed that while some mothers were able to adjust their approach to settling as the infant grew older, others were unable to adapt settling strategies to match their infant's development. There is also considerable evidence that infants, whose mothers used active physical comforting as a settling strategy at bedtime and following a night awakening, had less consolidated sleep. The findings suggest that those mothers who continue to rely on active comforting as a settling strategy may unintentionally contribute to problematic infant sleep.

1.6 The Role of Maternal Cognitions in Infant Sleep

While the literature linking maternal settling behaviour and infant sleep outcome is extensive, few studies have attempted to explore potential underlying factors which may lead some mothers to become highly involved at bedtime and others to limit involvement and engage in settling behaviours which promote self-soothing (Sadeh, Tikotzky, et al., 2009). One potential factor underlying maternal bedtime settling strategies is maternal cognitions about infant sleep (Morrell, 1999b; Tikotzky & Sadeh, 2009).

In a recent study (Tikotzky, Sharabany, Hirsch, & Sadeh, 2010) the authors referred to parental cognitions as “the attributions, expectations, interpretations and beliefs parents have regarding their children” p. 317. Studies exploring the role of parental cognitions within the family have shown that parental cognitions, especially in the form of expectations or attributions regarding the child’s behaviour, play an important role in parent-child relationships and child development (Bugental & Johnston, 2000; Miller, 1995). Slep and O’Leary (1998) assessed maternal attributions in a sample of 40 mothers and their 24 to 42 month old toddlers. The study design involved an experimental manipulation of maternal cognitions and it was demonstrated that mothers in the “child responsible” group, who were told that their children were responsible for their behaviour were harsher in their discipline, felt angrier with their children and exhibited higher levels of negative reactions, compared with mothers who were told that their children were not responsible for their behaviour.

Research evidence also suggests that parents may hold specific cognitive representations of their infants even before the birth of the child (Benoit, Parker, &

Zeanah, 1997). Benoit et al. (1997) used the Working Model of the Child Interview with mothers during pregnancy and 12 months after birth to examine the stability and predictive validity of classifications of mothers' representations of their infants. The researchers found a significant relationship between the mothers' prenatal representations of their infants and the Infant Strange Situation attachment classifications when the infants were 12 months old. The authors suggested that the ideas a mother holds of her infant before birth, may colour her experience with the child and influence subsequent child development (Benoit, Parker, et al., 1997).

The findings from the above studies suggest that parental cognitions about child behaviour are linked with child behaviour outcomes. Research has also suggested that the influence parental cognitions have on child behaviour is mediated through the way parents react and behave towards their children (Bugental & Johnston, 2000; Grusec, 2006; Hoza et al., 2000; Miller, 1995; Sadeh, Tikotzky, et al., 2009; Slep & O'Leary, 1998; Tikotzky & Sadeh, 2009).

Although there is a substantial body of research exploring the links between parental cognitions and parenting behaviour, there has been only a limited number of studies that have explored the role of parental cognitions in relation to infant sleep outcome (Morrell, 1999b; Morrell & Steele, 2003; Sadeh et al., 2007; Tikotzky & Sadeh, 2009; Toselli et al., 1995). In an early study, Lozoff, Wolf and Davis (1985) explored the association between maternal attitude towards the child and sleep problems. The sample consisted of mothers of 96 children aged between six months and four years who were recruited from paediatric clinics during a 'well-child' visit. Twenty-eight children were assigned to a sleep-problem group and the remaining 68

children acted as the control group. A sleep problem was defined as night waking that involved sleep onset problems three or more nights each week. The authors reported that sleep problems were associated with an attitude of maternal ambivalence towards the child. Similarly, in a previously described study, Scott and Richards (1990) found that mothers of infants with less consolidated night time sleep tended to feel dominated by their babies and used negative adjectives to describe their infant. Within these studies there has been mounting evidence suggesting that maternal cognitions about infant sleep are significantly associated with infant sleep outcome (Sadeh, Tikotzky, et al., 2009). However, despite extensive research that has consistently demonstrated links between maternal settling strategies at bedtime and infant sleep outcomes, only a few studies have examined the links between maternal cognitions, maternal bedtime settling techniques and infant sleep.

Toselli, Farneti, & Salzarulo (1995), in a previously cited study, provided a detailed account of expectant mothers' cognitions about infant sleep including their expectations and interpretations of night awakenings. The authors reported that at one month preterm, 91% of the sample believed hunger to be the most frequent reason for a child awakening. In the follow-up study (Toselli et al., 1998), 95% of the same mothers cited 'hunger' as the main reason for their infants waking during the night when they were one month old. At 12 months of age, most mothers (89%) cited 'sufficient sleep' as the reason for infant waking. Toselli et al. also found that the relationship between maternal ideas, measured in pregnancy, about the cause of awakening and parents' intervention strategies showed contradictions. While hunger was considered by mothers to be the most relevant reason for night waking during the first month, feeding was not a commonly used settling strategy to encourage sleep. The authors also found that

mothers held contradictory beliefs as to who was responsible for sleep initiation. While expectant mothers thought sleep was a natural phenomenon they also believed sleep could be encouraged (Toselli et al., 1995). This belief was confirmed by the increasing use of settling strategies during the first year (Toselli et al., 1998). By the end of the first year, 75% of mothers believed their infants 'needed company' to fall asleep. Mothers' proposed settling strategies also changed following the birth of their infant (Toselli et al., 1998). Indeed, none of the participants in the study applied the settling strategies they had considered before birth. The authors concluded that maternal prenatal cognitions regarding sleep are not sufficiently internalised to influence maternal settling behaviour in the concrete circumstances of managing a crying infant. Further, Toselli et al. (1998) reported that mothers did not know where they obtained information for using a particular settling strategy but cited experience with the baby as the reason for choosing a particular settling strategy.

Despite the growing interest in the role of parental cognitions in child development, few measures have been developed that assess the cognitions that mothers have about their own infant's sleep. To redress this gap Morrell (1999b) developed the Maternal Cognitions about Infant Sleep Questionnaire (MCISQ) and validated it on a sample of 150 mothers and their 13 to 16 month old infants ($M = 13.70$ months) recruited from General Practitioner practices following a routine vaccination. Based on their ISQ (Morrell, 1999a) research criteria scores a subgroup of 59 mothers was selected into a sleep problem group ($n = 22$) and a control group ($n = 37$). Morrell (1999b) measured the association between the scores on the five factors which comprise the MCISQ (Limit Setting, Anger, Doubt, Feeding, Safety) and maternal ratings obtained using Richman's (1981) sleep diary. The findings indicated that maternal

cognitions about infant sleep that emphasised limit setting ($r = .52, p = <.001$), anger ($r = .39, p < .01$) and doubt ($r = .37, p < .01$) were associated with infant sleep problems. Maternal cognitions concerning worries about infant hunger and fears about cot death were not correlated with infant sleep problems in this study. Morrell suggested that in response to the stressors associated with infant night waking, it is possible that problematic maternal cognitions may lead to intrusive or rejecting maternal interactions at bedtime, which may result in less consolidated night sleep.

In later studies, (Morrell & Cortina-Borja,(2002) based on the same population of mothers, Morrell and colleagues further explored the links between cognitions, maternal settling behaviours and infant sleep. Morrell and Cortina-Borja (2002), used multivariate repeated measures to examine the factors associated with change in maternal settling strategies over a one year period for four sleep subgroups (no problem, developer, recoverer, persistent). The factors explored included infant temperament and maternal cognitions about infant sleep. In this study, the Maternal Cognitions about Infant Sleep Questionnaire (MCISQ) comprised only the Limit Setting, Anger and Doubt factors because they had been found previously to be associated with infant sleep outcome (Morrell, 1999b). Based on the total scores on these three sub-scales the sample was split into two groups: ‘problematic maternal cognitions’ (the highest scoring 50% of the participants) and ‘unproblematic maternal cognitions’ (the lowest scoring 50% of the participants). Comparisons between the sleep subgroups showed that the factors accounting for changes in maternal settling strategies between 1 and 2 years were maternal adaption to infant development, maternal cognitions and to a lesser extent maternal response to infant temperament. Thus, mothers with problematic cognitions and who persisted in their use of active physical comforting strategies to

settle their infants to sleep were more likely to have infants who experienced sleep problems.

Similarly, in their 2003 study Morrell and Steele used logistic regression analysis to examine the contribution of various factors (attachment security, temperament, maternal cognitions about infant sleep and maternal settling strategies) to infant sleep disturbance and found that maternal cognitions about infant sleep reflecting difficulties in limit setting and anger at the infant's demands were important factors in explaining the variance, 25% and 11% respectively, in infant sleep disturbance. The authors also used path analysis to assess the continuity of sleep problems, across a 12 month period. Results indicated that both fussy-difficult temperament and maternal cognitions about infant sleep (limit setting and anger) had a direct effect on maternal settling strategies (active physical comforting) which in turn predicted persistent sleep problems.

Tikotzky and Sadeh (2009), in a previously described longitudinal study, assessed the links between maternal cognitions about infant sleep from pregnancy through the first year of infant development. Maternal cognitions were assessed with the Distress and Limits factors of the Infant Sleep Vignettes Interpretation Scale (ISVIS) (Sadeh et al., 2007) while infant sleep outcome was assessed with actigraph, maternal diaries and the Brief Infant Sleep Questionnaire (Sadeh, 2004). The results indicated that maternal cognitions that emphasised the infant's distress at night were associated with more frequent night awakenings at six months of age. Conversely, maternal cognitions that emphasised limit setting were associated with more consolidated night sleep. At six months, increased scores on the Distress scale were associated with more

maternal soothing both at bedtime ($r = .29$) and following a night awakening ($r = .24$), while increased scores on the Limits scale were associated with less maternal soothing both at bedtime ($r = -.41, p < .001$) and following a night awakening ($r = -.23$).

Structural equation modelling (SEM) confirmed the correlational results. Prenatal maternal cognitions were associated with infant sleep at six months, but not associated with infant sleep at 12 months. In addition, maternal cognitions at 6 months were found to predict infant sleep outcome at 12 months. Using SEM analysis the researchers also confirmed the mediating role of maternal soothing activities in the association between maternal cognitions (using the Distress and Limits scales) and infant sleep outcome. The researchers proposed that the mother's appraisal of her infant's distress, and not characteristics of the infant, subsequently influenced her behaviour toward the infant in response to perceived distress, at bedtime and following a night awakening.

While studies assessing the links between maternal cognitions, maternal bedtime settling techniques and infant sleep are few, the evidence thus far lends support for the proposition that maternal cognitions related to infant sleep may influence the type and amount of parental involvement at bedtime and following a night awakening and consequently infant sleep outcome (Tikotzky & Sadeh, 2009). There are other potential ways that cognitions may indirectly influence infant sleep outcome.

1.7 Maternal Depression and Infant Sleep

Mothers experiencing postnatal depression (PND) frequently suffer disabling symptoms including: loss of interest in usually pleasurable activities, fatigue, impaired concentration or decision making, anger, guilt, over-sensitivity, and sleeping difficulties (American Psychiatric Association, 2000). In 2000, according to a population based survey in Victoria, the prevalence of PND among women, 5 to 6 months postpartum,

was 14% (Brown, Bruinsma, Darcy, Small, & Lumley, 2004). In this survey, depression was defined as a score of 13 or above on the commonly used screening instrument, the Edinburgh Postnatal Depression Scale (EPDS). Many more women experience mild to moderate symptomatology that goes unreported (Pope, 2000). The symptoms of PND may affect the mother's self-esteem and confidence in the parenting role. Depression may also significantly impair the woman's interpersonal functioning and interfere with the quality and sensitivity of her interactions with her child (Edhborg, Lundh, Seimyr, & Widström, 2003; Fisher, Murray, & Feekery, 2004; Hiscock & Wake, 2001; Murray, 1991; O'Hara, 1997).

Maternal depression has been proposed as a factor associated with infant sleep outcome (Armstrong, O'Donnell, et al., 1998; Bayer et al., 2007; Cronin et al., 2008; Fisher, Feekery, & Rowe-Murray, 2002; Hiscock & Wake, 2001; Karraker & Young, 2007; Lam et al., 2003; Milgrom, Ericksen, Negri, & Gemmill, 2005; Morrell & Steele, 2003; Warren, Howe, Simmens, & Dahl, 2006). How maternal depression and infant sleep are linked, however, is not fully understood (Hiscock & Wake, 2001; Karraker & Young, 2007).

Research exploring the association between maternal depression and infant sleep has been conducted from two different viewpoints: maternal depression and its association with infant sleep (Dennis, 2005; Lozoff et al., 1985; Warren et al., 2006) and the contribution of infant sleep disturbance to maternal depression by means of disruption to the mother's sleep cycle (Armstrong, Van Haeringen, et al., 1998). From the perspective of the first viewpoint, maternal depression leads mothers to engage in parenting behaviours that influence infant night awakening (Karraker & Young, 2007).

The alternate view proposes that lowered maternal mood results from both sleep loss and fragmented sleep (Armstrong, O'Donnell, et al., 1998) due to infant night awakenings.

Based on evidence from studies that have demonstrated that lowered mood can result from sleep loss and fragmentation (Pilcher & Huffcutt, 1996) researchers have questioned whether some mothers who are diagnosed as experiencing maternal depression, might instead be experiencing lowered mood because of sleep disruption due to infant sleep patterns (Armstrong, Van Haeringen, et al., 1998; Dennis, 2005; Hiscock & Wake, 2001). Support for this perspective comes from studies demonstrating that the successful treatment of infant sleep difficulties, via behavioural intervention programs, has been shown to improve maternal psychological well-being (Mindell, Kuhn, Lewin, Meltzer, & Sadeh, 2006).

Scott and Richards (1990), in a previously described study, explored the association between maternal distress and infant sleep.. The questionnaire to assess maternal well-being which was used in the study contained six questions derived from depression scales (the authors did not indicate from which depression scales the questions were drawn). Each of the six questions was scored on a 4-point scale. One hundred and ninety-eight mothers (19%) were classified as distressed. A significant association was also reported between the mother's distress and the severity and frequency of the child's sleep difficulties. Maternal distress increased with increasing severity and frequency of night time awakenings.

In the previously cited Australian study, Hiscock and Wake (2001) explored maternal well-being in an Australian community sample ($N = 737$) of mothers of infants 6 to 12 months of age who were recruited from Maternal Child Health Centres. The Edinburgh Postnatal Depression Scale (EPDS) was used to measure postnatal depression. Almost half of the mothers (46%) reported their infant as having a sleep problem. These mothers were asked to rate the severity of their infant's sleep problem on a 7-point visual analogue scale. The mean EPDS was 7.60 ($SD = 4.20$). For the univariate analysis participants were grouped according to their EPDS scores: < 10 , 10-12 and > 12). Unfortunately, the correlation coefficient between maternal depression and infant sleep severity was not reported. The authors however, reported the percentage of mothers in each EPDS category who perceived their infant had a sleep problem. Mothers with higher EPDS scores reported increased sleep problem severity scores: EPDS > 12 , 68%; EPDS 10-12, 62%; EPDS < 10 , 36%. The logistic regression analysis also showed that maternal report of a sleep problem was a predictor of higher EPDS scores (> 10 and > 12). The authors claimed that mothers with higher EPDS scores perceived their infant's sleep patterns differently from non-depressed mothers. Hiscock and Wade also explored the association between maternal depression and current maternal sleep quality. A question regarding 'maternal sleep quality', was taken from the Pittsburgh Sleep Quality Index (PSQI) (Buysse, Reynolds, Monk, Berman, & Kupfer, 1988) although the question was not specified. The logistic regression was repeated with sleep quality included in the analysis. After controlling for sleep quality as 'good' or 'very good' the presence of an infant sleep problem no longer predicted an EPDS score > 10 . The authors concluded that maternal sleep quality may be an important factor in attenuating the relationship between depression and infant sleep problems. However, maternal sleep quality data was only available for 42% ($n = 305$) of

the sample. When considering the results of this study it would be important to take into account the subjective report of an infant sleep problem and its severity as the factor against which reports of depression were assessed.

Fisher, Feekery and Rowe-Murray (2002) assessed the association between maternal distress and infant sleep, using a cross-sectional design, in a sample of mothers ($N = 109$) and infants ($M = 22$ weeks) admitted to a mother-baby unit for infant feeding or settling problems. In this study the authors did not define the criteria for infant sleep disturbance and did not directly assess the link between maternal mood and infant sleep outcome. Mood states were assessed using the Profile of Mood States (POMS) scale and the EPDS. The POMS scores indicated that 83 mothers (91%) had clinically significant fatigue. The mean EPDS score was 12 ($SD = 6.10$) and 50 women (48%) scored in the clinical range (using a cut off score > 13). The researchers also conducted an item analysis of the anxiety-related items (questions 4, 6, 8 and 10) of the EPDS scale. Scores on these items were higher than the depression related items. The Fatigue factor of the POMS scale indicated that 91% ($n = 92$) of participants had clinically significant fatigue ($M = 20.10$, $SD = 5.70$). In addition, Fisher et al. used a non-hierarchical iterative K-mean cluster analysis of the POMS subscales and the EPDS scores to further assess the links between fatigue and psychological distress. After five iterations three significant groups emerged: probably depressed group ($n = 37$), distressed and fatigued group ($n = 35$) and fatigued only group ($n = 28$). On the basis of these results Fisher and colleagues argued that psychological distress associated with maternal sleep deprivation, can be distinguished from PND. The authors concluded that women experiencing the effects of ongoing sleep deprivation may be misdiagnosed with

depression because they have elevated scores on the EPDS. The findings of this study are consistent with those reported by Armstrong, Van Haeringen et al. (1998).

The above studies have provided evidence that in some mothers, depression may be due to sleep deprivation. As noted above further support for this argument comes from those studies which have shown that successful treatment of infant sleep difficulties, via behavioural intervention programs, improves maternal psychological well-being. For instance, Armstrong, Van Haeringen et al. (1998) recruited 114 mother-infant dyads from a Brisbane Sleep Clinic to examine the effectiveness of an outpatient behaviour modification programme (controlled crying) on infant sleep problems. The EPDS was administered on admission to the clinic and two months later, parents completed a second questionnaire. The authors reported a significant decrease in the percentage of mothers who were diagnosed with depression following the behavioural intervention for infant sleep problems. The researchers claimed that chronic sleep deprivation “may produce symptomatology easily confused with that described as post-natal depression” (p. 262). An important limitation to the interpretation of findings from this study, however, was the poor response rate to the second questionnaire. Only 61% ($n = 70$) of participants returned the questionnaire.

The argument that maternal depression causes an increase in infant night awakening comes from longitudinal studies that have examined the link between these variables across several months or years (Warren et al., 2006; Zuckerman et al., 1987). For instance, Zuckerman et al. (1987), in a previously described longitudinal community study, reported a significant positive association between maternal depression and infant sleep problems. Children of depressed mothers had twice the rate

of sleep problems at eight months than children of non-depressed mothers (27% vs. 13%). Zuckerman et al. argued that depression did not appear to be a consequence of children's sleep problems. This conclusion was based on the finding that rates of newly identified PND cases were similar, when children were three years old, whether or not the child had a reported sleep problem at eight months.

While Goodlin-Jones, Eiben, and Anders (1997) did not report on the association between depression and infant sleep per se, the authors did present findings in relation to maternal psychological wellbeing, maternal bedtime strategies and infant sleep scores. Goodlin-Jones et al. conducted a one year longitudinal study with mothers recruited at two weeks postpartum from local community health centres ($N = 21$ mother-infant dyads). The mother-infant dyads were randomly assigned to either an experimental condition with a representational sleep aid (RSA) or a control group. At 1, 6 and 12 months, time lapse video-recording was used to capture mother-infant night time interactions and maternal well-being was measured at two weeks, one and six months using the Beck Depression Inventory (BDI) (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and at six months with the SCL-90-R (Derogatis & Cleary, 1977). The authors reported a significant positive association between maternal depression scores and infant age (one month to six months: $r = .40$, six months to 12 months: $r = .60$). When the infants were 6 months old, Goodlin et al. also reported a significant negative association between psychological well-being and infant sleep difficulties. Mothers who reported higher levels of depressive feelings were more likely to intervene at night and had infants who were less likely to self-soothe following a signalled night awakenings ($r = -.51$). The authors claimed that mothers' level of depression was a more important

contributing factor for the infant signalling during the night than the maternal settling strategy of putting the infant to bed already asleep.

While there may not yet be a consensus regarding the causal direction of the association between maternal depression and infant sleep outcome, there has been considerable research exploring this relationship. Results of some studies suggest that infant sleep outcome is linked to depression in some mothers due to sleep deprivation. Depression, however, regardless of its source, leads some mothers to engage in parenting techniques, such as active physical comforting, that are linked to problematic sleep outcome.

There is extensive evidence that depressed mothers hold more negative cognitions about themselves and their children compared to non-depressed mothers (Church, Brechman-Toussaint, & Hine, 2005; Field, 1995; Teti & Gelfand, 1997). In a previously described study, Scott & Richards (1990) reported that distressed mothers held more negative attitudes towards motherhood and used negative adjectives, such as demanding, grizzly, exhausting, grumpy, miserable and irritable to describe their infant. Mothers also reported that they felt dominated by their child.

To explore maternal cognitions in women diagnosed with PND, Church et al. (2005) used an Australian sample of 406 postnatal women recruited across a 12 month period from the birth register in Sydney. Questionnaires were mailed to women (on six different occasions) when their infants were aged between 5 to 14 weeks. The EPDS (Cox, Holden, & Sagovsky, 1987) was used to measure PND and the Maternal Attitudes Questionnaire (MAQ) (Warner, Appleby, Whitton, & Faragher, 1997) assessed

dysfunctional maternal cognitions. An example of an item from the MAQ is “to be a good mother I should be able to cope well all the time”. Baby Problems were measured by summation of responses to six items related to general health, sleeping, colic, feeding, crying, and irritability. These items were rated on a 3-point scale where 1 = *none* and 3 = *a lot*. Pearson correlations revealed a significant positive association between the perception of having a difficult baby and PND scores ($r = .29, p < .01$). Indirect pathways were also evaluated in this study using the procedure outlined by Baron & Kenny (1986). The authors reported that dysfunctional maternal cognitions fully mediated the positive association between PND and baby problems. Therefore, the mother’s experience of having a difficult baby was associated with depression entirely by its relationship with dysfunctional maternal cognitions. The authors concluded that the more mothers assessed their infant as difficult, the more devalued they felt as a mother and the more depressive symptoms they reported. A limitation of this study was the non-validated baby problems measure. In addition, only 37% of participants returned questionnaires, therefore it cannot be assumed that the sample was representative.

The findings presented above indicate that there is an association between maternal depression and infant sleep and suggest that maternal cognitions about infant sleep play an important role in mediating the association between maternal depression and infant sleep outcomes. These studies raise the important issue that it may not be the objective infant waking behaviour that matters but how the mother perceives the problem in the circumstances of her life. While research suggests that current maternal well-being is an important factor for infant sleep outcomes it is also clear that a mother’s own history is likely to not only play a part in her current well-being but also

influence how she approaches the task of parenting her own infant (Benoit, Parker, et al., 1997; Ingram, 2003; Tikotzky, Sharabany, et al., 2010; Van IJzendoorn, 1995).

1.8 Maternal Perceptions of Parenting Received in Childhood

Why parents interact with their infants in particular ways has long been of interest to those investigating parenting and parent-infant relationships, as well as service providers seeking to enhance positive parenting or intervene and prevent problematic parenting practices (Belsky, 1984; Serbin & Karp, 2003). While a great deal of research attention has focussed on the consequences of mother-infant interactions for child development less attention has been given to understanding why mothers behave as they do when interacting with their infants (Mäntymaa, Tamminen, Puura, & Salmelin, 2006; Sadeh, Tikotzky, et al., 2009).

Attachment is a term used to describe the enduring emotional bond that unites infant and parent (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1969). According to Bowlby (1973) as a consequence of repeated and prolonged interactions with the caregiver the infant develops internal representations, or internal working models, of relationships, of the self and others and of the attachment relationship as a whole. Bowlby claimed that working models of self and the attachment figure are complementary in that the working model of the self is developed in the context of how adequate or inadequate an individual is from the perspective of the his/her caregiver (Bowlby, 1973). For instance, an infant who experienced sensitive and accepting caregiving may develop an internal working model of the caregiver as trustworthy and supportive, and of the self as worthy of support. In contrast, an infant who experienced inconsistencies in caregiver warmth or availability or consistent disapproval or rejection may develop an internal working model of the caregiver as unavailable and

untrustworthy, of the self as unworthy of caregiver support, and of the attachment relationship as unreliable. The type of model the child constructs is therefore of great consequence for future relationships (Bretherton, 1992), including romantic relationships (Hazan & Shaver, 1987), friendships (Bartholomew & Horowitz, 1991), peer networks (Bartholomew & Horowitz, 1991) and parent-child relationships (Benoit et al., 1992; Berlin, Cassidy, & Appleyard, 2008). Many studies have demonstrated the continuity of attachment patterns from parents to children (Benoit & Parker, 1994; George & Solomon, 1996; Main, Kaplan, & Cassidy, 1985; Slade, Belsky, Aber, & Phelps, 1999) including across three generations (Benoit & Parker, 1994; Van IJzendoorn, 1995).

Mothers' internal working models of relationships involving "cognitive and affective constructs" (Crowell & Feldman, 1991, p. 597) develop from their interactions with parents during childhood and these internalised representations influence their interactions with their children. According to attachment theory (Bowlby, 1973, 1980), internal working models are incorporated into personality structures, are relatively stable, and are influential throughout life, particularly in regard to parenting. In his theoretical writing Bowlby (1982) referred to the caregiving system and his belief that all behavioural systems are guided at a cognitive level by internal representations. Following Bowlby's ideas, Crowell and Feldman (1991) noted that "a woman, even prior to parenthood, knows the maternal role from experiences with her own mother, and... she will play out that role, replicating the pattern of the parent-child relationship with her own children" (p. 597). From this perspective, a mother's perception of the parenting she received during childhood will influence her cognitive representations of her own infant which help determine her feelings about, and actions

towards her child (George & Solomon, 1996). Support for this claim comes from the results of a longitudinal study of first-born sons where it was demonstrated that the way a mother perceived her own attachment experiences was related not only to her thoughts and feelings about her infant but also to her observed parenting (Slade et al., 1999).

Van IJzendoorn (1992) defined the transmission of parenting “as the process through which purposively or unintendedly an earlier generation psychologically influences the parenting attitudes and behaviour of the next generation” (p. 76) and in a later study Van IJzendoorn (1995) claimed that not only are parents' mental representations of attachment transmitted to their infants, but also that parental responsiveness to infant needs is likely to be the mechanism through which such transmission occurs. There has been some evidence for the influence of prior relationships on mothers' sensitivity towards young infants in a recent study (Mäntymaa et al., 2006) where mothers' childhood relationships with their own mothers, assessed by interview, were associated with observations of the mothers' interactive and affective behaviour with their 2 month old infants.

Most of the previously cited research on links between past parent-child relationships and later relationships in adulthood has used the Adult Attachment Interview (AAI) to measure perceptions of past experience with parents and current internal working models of attachment relationships. Given the association between memories of parenting behaviour and adult attachment styles (Collins & Read, 1990; Hazan & Shaver, 1987) an alternative approach taken by researchers in examining early parent-child relationships and the effect on later relationships has been to rely on

retrospective self-reports of the parenting received during childhood (Dalton, Frick-Horbury, & Kitzmann, 2006).

A number of retrospective measures have been constructed and have focussed on a wide array of parental attitudes and behaviours. Factor analyses, conducted over many decades, have indicated that parenting behaviours and attitudes may be conceptualised as having two main factors (Blatt & Homann, 1992; Gerlsma, Arrindell, van der Veen, & Emmerlamp, 1991; Parker, Tupling, & Brown, 1979; Rapee, 1997; Schaefer, 1965). The first factor describes attitudes and behaviours related to acceptance and warmth contrasted with rejection and criticism while the second factor describes an autonomy dimension with autonomy contrasted with control/over-protection (Gladstone & Parker, 2005; Rapee, 1997). The focus on these constructs is due to the importance given to them in the attachment literature (Gallagher & Cartwright-Hatton, 2008). For instance, Bowlby (1969, 1973) emphasised availability, warmth and sensitivity of the primary caregiver in the development of security in childhood. Ainsworth et al. (1978), on the other hand, highlighted the importance of parent's sensitivity-insensitivity, acceptance-rejection, co-operation-interference and accessibility-ignoring in functional parent-child relationships. Reports of adult's retrospective perceptions of their early parenting experiences have been taken as indicators of their attachment security in infancy (Hazan & Shaver, 1987). For instance, secure adults reported that their parents had been more accepting and respectful of them during childhood than did insecure adults.

In an early study, Tronick, Ricks and Cohn (1992) conducted a cross-sectional study to assess the association between maternal recall of parental acceptance and infant

attachment classification in a sample of 21 mothers and their 12 month old infants. The Mother-Father-Peer Scale (Epstein, 1983) was used to measure maternal recall of acceptance and encouragement of independence during childhood while infants were classified as secure or anxious in their attachment relationship with the mother on the basis of their pattern of behaviour in the Strange Situation Procedure (SSP) (Ainsworth et al., 1978). The authors reported a significant association between maternal recall of parental acceptance and the quality of the mother-infant relationship. Mothers of securely attached infants evaluated their relationship with their parents as more accepting and encouraging of independence than did mothers of anxiously attached infants. These results suggest that mothers who recalled positive parenting experiences have infants who are securely attached according to the SSP. The authors claimed that while the cross-sectional nature of the study did not establish conclusively that infant-mother relationships are causally related to the mother's early childhood experience, the results provided a basis upon which prospective studies of differences in the mother-infant relationship could be further explored.

While a large number of measures have been used to assess perceptions of past parenting, the Parental Bonding Instrument (PBI) (Parker et al., 1979) comprising the dimensions of Care and Overprotection, is one of the most consistently used retrospective measures of parenting (Enns, Cox, & Clara, 2002). The majority of studies using the PBI (Parker et al., 1979) have focussed attention on the association between perceived past parenting experiences and psychopathology in adult clinical populations (Gerlsma et al., 1991; León & León, 1990; Parker, 1979a, 1979b; Rapee, 1997). Few studies, however, have used this measure to assess the links between maternal

perception of parenting received during childhood and child behaviour outcomes during infancy.

Priel and Besser (2000) investigated the relationship between mother's experiences of the parenting she received during childhood and prediction of infant temperament in a longitudinal study of 115 first-time mothers. Participants completed the PBI (Parker et al., 1979) during the last trimester of pregnancy and the Revised Infant Temperament Questionnaire (ITQ-R) (Carey & McDevitt, 1978) when their infants were 4 months old. Difficult temperament was based on scores on five dimensions: intensity, rhythmicity, approach, adaptability and mood. Results indicated that scores on the Overprotection scale of the PBI were significantly negatively correlated with maternal perceptions of the infant as rhythmic and approaching and positively correlated with perceptions of the infant as intense. Thus, mothers who experienced the parenting they received from their mothers during childhood as controlling also perceived their infants as having a more difficult temperament.

Jefferis and Oliver (2006) compared differences in child conduct problems according to mother's perception of her own parenting during childhood. The sample consisted of 74 mothers and their 3 to 5 year old sons (23 boys with conduct problems and 51 controls). Mothers' recollection of parenting experienced during childhood was measured with the PBI (Parker et al., 1979) while the Revised Rutter Parent Scale for Preschool Children (Hogg, Rutter, & Richman, 1997) was used to assess child problems. The authors reported that mothers' recollections of the parenting received during childhood were significantly correlated with their rating of their children as having conduct problems. The findings of this study indicated that mothers who

described the parenting they had received from their mothers during childhood as being overprotective and less caring were more likely to report their child as having a conduct problem.

The results from the above studies suggest that a mother's perception of the parenting received during childhood may influence her current parenting behaviour and, as a consequence, her infant's/child's behaviour. Given the robust findings from previous studies of a link between current maternal bedtime behaviour and infant sleep outcomes (Goodlin-Jones et al., 2001; Morrell & Cortina-Borja, 2002; Sadeh, Tikotzky, et al., 2009; Tikotzky, Sadeh, & Glickman-Gavrieli, 2010) it seems possible that a mother's past parenting experience may be a factor affecting infant sleep outcome.

Despite an extensive search of the literature only one study was found that had assessed the relationship between mothers' perception of parenting received during childhood and infant sleep outcomes. In a follow-up study, Morrell and Steele (2003), explored the contribution of various factors (anxiety, depression, parental early experience, maternal cognitions, temperament, maternal settling strategies and attachment security) to infant sleep outcome. As previously described, the sample consisted of 100 mothers and their 14 to 16 month old infants (40 with sleeping problems and 60 without according to maternal report) who were recruited from a general practice in Oxfordshire. Recalled experience of parenting received was assessed using the Care and Overprotection factors of the PBI (Parker et al., 1979) with the dependent variable being sleep problems/no sleeping problems. Using logistic regression analysis, Morrell and Steele assessed the contribution of a range of factors to

infant sleep difficulty at one year of age. Mothers' perception of the parenting received during childhood was not a significant predictor of infant sleep difficulties.

As noted in the studies described above, there is some evidence that a mother's own perception of parenting received during childhood may affect the quality of her parenting behavior. In these studies it is proposed that a mother's experience with her own mother, leads to an internal representation of the caregiver as either responsive or unresponsive to her needs. As early experience becomes internalized it is presumed to influence not only the degree of responsiveness the mother is able to show towards her child but also her perception of her current relationship with her child (Bowlby, 1988; Main et al., 1985). Thus, it is possible that the internalization of early parenting experience may be a factor influencing parenting behaviors including those related to bedtime settling strategies. While there are theoretical assumptions from attachment theory to support this supposition there has only been the one empirical study by Morrell and Steele (2003) that has examined the contribution of recalled experience of being parented to infant sleep outcome.

1.8.1 Maternal Perceptions of Parenting Received in Childhood and Anxiety and Depression Symptoms

Apart from the more obvious direct connection between a mother's perceptions of the parenting she received during childhood and the parenting she provides for her child, early childhood experiences may also have an indirect effect on the mother-infant relationships and parenting through their influence on maternal mood. While perceptions of parenting received in childhood have been found to be associated with various forms of psychopathology, with depression (Parker, 1979a) and anxiety (Carter, Sbrocco, Lewis, & Friedman, 2001; León & León, 1990; Parker, 1979b) having

received the most research attention (Gerlsma, Emmelkamp, & Arrindell, 1990), less is known about the link between past maternal perception of parenting during childhood and emotional well-being in non-clinical populations.

As noted above in exploring the links between perceptions of parenting received in childhood and adult mental health outcomes researchers have focussed on the concepts of care and control derived from the attachment literature (Ainsworth et al., 1978; Bowlby, 1969, 1973). Bowlby (1980) first suggested that rejecting or inconsistent caregiving in childhood is associated with anxiety and depression in adulthood.

A number of studies have examined the association between perceptions of parenting received in childhood and mood in adulthood using the PBI (and similar retrospective measures) (Gerlsma, et al., 1990; Ingram, Overbey, & Fortier, 2001; Parker, 1983; Wilhelm, Niven, Parker, & Hadzi-Pavolic, 2005). In an early study, Parker (1979b) examined the relationship between perceptions of parenting during childhood and trait anxiety and depression in a community sample of 289 undergraduate psychology students (191 female, 98 male) from the University of New South Wales. Participants completed the PBI (Parker et al., 1979) and the Costello and Comrey (1967) trait measure of anxiety and depression. The mean scores for perception of parenting received from mothers during childhood were 27.1 ($SD = 7.30$) and 14.3 ($SD = 7.40$) respectively for the Care and Overprotection dimensions of the PBI. In contrast, the mean scores for perception of parenting received from fathers during childhood were 23.7 ($SD = 8.50$) and 12.5 ($SD = 7.00$) respectively for the Care and Overprotection dimensions of the PBI. The differences between scores related to mothers and fathers were not significant. Intercorrelations between the care and

overprotection scores for mothers were $r = -.44$ ($p < .001$) and $r = -0.29$ ($p < .001$) for fathers suggesting that high overprotection scores were negatively associated with low Care scores. Using multiple regression analysis, Parker assessed the contribution of care and overprotection to the variance in trait anxiety and depression scores in both male and female participants. Results indicated that only the maternal care scores were a significant predictor of trait depression (explaining 9.3% of the variance) while maternal care and maternal overprotection scores were both significant predictors of trait anxiety explaining 6.1% and 2.6% of the variance respectively. Parker claimed that in regard to anxiety and depression the perception of the parenting received from mothers rather than from fathers was more influential.

Further evidence supporting the link between parenting received in childhood and anxiety and depression is provided in a study by Gittleman, Klein, Smider, & Essex (1998). The researchers explored the link between perception of parenting received during childhood and state anxiety and depression in a sample of 530 women who were recruited from obstetrics or family practice clinics. The women completed self-report measures when their infants were 12 months old. Maternal perception of past parenting was measured by the PBI (Parker, et al., 1979). State anxiety was measured by the State form of the Spielberger State-Trait Anxiety Inventory (STAI) (Spielberger, 1983) while depression was assessed with the Centre for Epidemiologic Studies Depression Scale (Radloff, 1977). A hierarchical regression analysis indicated that perceived past maternal care was a small but significant predictor of depression ($\beta = -0.12$, $p < .05$) while perceived past maternal overprotection was a small but significant predictor of state anxiety ($\beta = 0.12$, $p < .001$). The amount of variance explained by these two variables was not reported. In contrast to findings from previous studies (Parker, 1979b)

no association was found between the Care factor of the PBI and anxiety. Other studies (Carter et al., 2001; Parker, 1979b) which have assessed the link between perceptions of parenting received in childhood and anxiety in adults have focussed on trait anxiety and used different measures (Costello & Comrey, 1967; Spielberger, 1983) so the use of state anxiety in this study may have accounted for the different result.

In another study, Carter et al. (2001) explored the relationship between perception of past parenting, using the PBI (Parker et al., 1979), and trait anxiety and depression in a sample of 55 European American undergraduate psychology students. Anxiety was measured with Spielberger's (1983) Trait form of the STAI, while the BDI (Beck et al., 1961) was used to measure depression. Correlations between the variables indicated significant negative correlations between the care factor of the PBI and trait anxiety ($r = -.46$) and depression ($r = -.44$) respectively and a significant positive relationship between overprotection and trait anxiety ($r = .32$). No association was found between the overprotection factor of the PBI and depression ($r = .26$, ns). This finding suggests that increased levels of trait anxiety are associated with parenting that is characterized by low care and high overprotection. High depression scores, on the other hand were associated with low perceived care rather than parenting that is more overprotective and controlling. The results from this study are similar to those reported by Parker (1979b) in the study described above.

To explore the impact of perceptions of parenting received on mood, Mayes and Leckman (2007) conducted a community study with a sample of 41 middle class mothers, recruited from prenatal education and support groups. Maternal perceptions of past parenting were measured with the PBI (Parker et al., 1979) and depression was

assessed with the BDI (Beck et al., 1961). The mothers were interviewed in their homes at eight months gestation, two weeks postpartum and three months postpartum. Mayes and Leckman reported a mean perceived past maternal care score of 25.4 ($SD = 7.00$) while the mean perceived past maternal overprotection score was 15.1 ($SD = 8.10$). While significant associations were reported between perceived past maternal care scores and depression at each of the three time points, perceived past maternal overprotection was not significantly associated with maternal depression. This result suggests that mothers who had higher depression scores were more likely to perceive the parenting they received in childhood as lacking in care rather than being controlling. The researchers used repeated measures analysis of variance to assess the links between the BDI scores and maternal perceptions of parenting received during childhood at each of the three time points. Findings indicated that there was a significant fluctuation, over time, in reports of maternal depression. Past history of depression, with and without treatment was also associated with mood fluctuations. Finally, the contributions of perceived past maternal care and perceived past maternal overprotection were examined after gender, past history of depression and perceived social support had been entered into the model. The results indicated that perceived past maternal care was a modest but significant predictor of depression between eight months gestation and three months postpartum, accounting for 16% of the total variance. Mayes and Leckman concluded that maternal perception of parenting received during childhood that was lacking in care may be a risk factor for depression in the perinatal period.

While numerous research studies have demonstrated links between perceptions of past parenting and adult mental health (Gerlsma et al., 1991; Parker, 1979a, 1979b; Rapee, 1997) the link between recalled parenting, maternal well-being and infant sleep

has received little research attention. Only the previously described studies of Fisher et al. (2002) and Morrell and Steele (2003) have explored mothers' perceptions of being parented and mood in the context of infant sleep disturbance.

Fisher et al. (2002), in a previously described cross-sectional study explored the link between perceptions of parenting experienced in childhood and psychological mood in a sample of 109 Australian women admitted with their infants to a mother-baby unit. As previously described mood was assessed with both the Profile of Mood States (POMS; McNair, Lorr, & Droppleman, 1971) and the EPDS (Cox et al., 1987) while the Care and Overprotection factors of the PBI (Parker et al., 1979) were used to measure perceived past parenting experience. Fisher et al. reported a mean maternal care score of 23.4 ($SD = 7.00$) while the mean maternal overprotection score was 15.10 ($SD = 8.10$). Between group differences were found on the maternal care factor of the PBI (Parker et al., 1979) with mean scores for the probably distressed group ($M = 20.50$, $SD = 3.40$) and the fatigued and distressed group ($M = 22.90$, $SD = 2.40$) significantly lower than the mean score for the fatigued only group ($M = 25.40$, $SD = 2.10$). In the overall sample participants had higher scores on the anxiety-related items of the EPDS, compared to the depression items, but the authors did not examine the association between these scores and the Overprotection factor of the PBI (Parker et al., 1979) even though the mean score (15.10) was higher than the mean score (13.30) reported by Parker et al. (1979) in the validation study. As described above several studies have found that increased levels of anxiety are associated with perceptions of past parenting that is characterized by both low care and high overprotection (Carter et al., 2001; Parker, 1979b).

Findings from the above studies tend to be mixed regarding the association between perceived past maternal care and perceived past maternal overprotection and anxiety and depression symptoms. Apart from the finding of Gittleman et al.(1998), the studies reviewed above found that anxious adults are more likely to perceive the parenting they received during childhood as both lacking in care and controlling, while adults experiencing depression are more likely to have perceived their parents as deficient in care. These findings are consistent with previous research that has explored the links between the maternal perception of parenting received during childhood and adult mental health outcomes (for a review see Gerlsma et al., 1990; Rapee, 1997).

1.9 Maternal Anxiety and Infant Sleep

While anxiety has been shown to be common during the postnatal period (Britton, 2008; Stuart, Couser, Schilder, O'Hara, & Gorman, 1998; Wenzel, Haugen, Jackson, & Brendle, 2003) it has not received the same research attention that had been afforded to postnatal depression (Matthey, Barnett, Howie, & Kavanagh, 2003; Skouteris, Wertheim, Rallis, Milgrom, & Paxton, 2009). Anxiety is often comorbid with depression (Britton, 2008) and some reports suggest that measures do not always differentiate anxiety from depressive symptomatology especially during the time around childbirth (Heron, O'Connor, Evans, Golding, & Glover, 2004; Ross, Gilbert Evans, Sellers, & Romach, 2003). Anxiety may also go unnoticed because the presenting symptoms may not be severe enough to meet the criteria for a diagnosis of an anxiety disorder (Stuart et al., 1998). In contrast, the degree to which a mother experiences anxiety about separating from her infant has been the focus of some research effort (Hock, McBride, & Gnezda, 1989; Hsu, 2004; Scher, 2008; Scher & Blumberg, 1999). Hock et al. (1989) conceptualised maternal separation anxiety as a distinctive dimension of motherhood, characterised by an unpleasant emotional state of guilt, worry and

sadness reflecting concerns and apprehension about short-term separation experiences from the child. Hock et al. (1989) viewed maternal separation anxiety as a “stable personality disposition rather than forcing it in a category of state or trait” (p. 800). Correlational analyses, however, have shown a positive association between trait anxiety and maternal separation anxiety (Hock et al., 1989; Hsu, 2004; Stifter, Coulehan, & Fish, 1993). While anxiety has not received the research attention that has been paid to depression, it is no less important, due to the potential impact on parenting behaviour and child development (Hsu, 2004; McBride & Belsky, 1988).

There is theoretical and empirical evidence suggesting that a specific link between maternal anxiety and infant sleep may exist. For instance, cognitive deficits associated with anxiety symptoms (such as negative attribution style) and behavioural correlates of anxiety disorders (avoidance of anxiety provoking situations) have been related to mother-infant interaction patterns, which have been reported to promote insecure attachment (del Carmen, Pedersen, Huffman, & Bryan, 1993) and subsequent infant sleep disturbance (Anders, 1994). Consistent links have been reported between maternal settling behaviours and infant sleep outcome (Sadeh, Tikotzky, et al., 2009) and it has been proposed that the degree to which the mother experiences anxiety may have implications for her night time parenting behaviour (Thunström, 1999).

Maternal anxiety, especially in regard to infant health and parenting ability, has been linked with infant sleep problems. For instance, Thunström (1999) conducted a cross-sectional study to explore the association between maternal anxiety and infant sleep using a community sample of 2,066 Swedish mothers and their infants aged 6 to 18 months. The author constructed a questionnaire that was based on items from the

International Classification of Sleep Disorders ICSD) (2001). In addition, parents also reported on sleep refusal, night waking, parental night time interventions, health and feeding problems. Infant sleep problems were considered severe, according to the items from the ICSD, in 9% ($n = 90$) of children aged 6 to 12 months and in 4% ($n = 39$) children aged 13 to 20 months. The problem group ($n = 129$) was compared with the control group ($n = 1,937$). With regard to health there was no significant difference between the control group and the problem group when comparing various childhood diseases and common medical problems. Mothers of infants in the sleep problem group however, reported more worries and anxiety concerning their infant's health than did control mothers. Mothers with high anxiety were more likely to intervene both when settling the child to sleep and following a signalled night awakening with strategies such as singing, walks in prams/strollers, rocking, holding, taking the child into the parents' bed and feeding.

Thome (2000) found a relationship between maternal stress and worries about infant health and infant sleep disturbance in a sample of 734 Icelandic women and their 2 month old infants. In a previously described Australian study, Fisher, Feekery et al. (2004), reported that mothers with high anxiety scores (as measured by items on the EPDS) who had sleep disturbed infants, expressed concern about infant health in connection with food intake, the adequacy of food and infant death. In contrast, Morrell (1999b), in a previously described study, demonstrated a relationship between parenting stress and infant sleep problems in a sample of mothers and their 1 year old infants. Using the Doubt factor of MCISQ and composite scores from the sleep diaries (Richman, 1981), doubt about parenting ability and stress about infant demands, were found to be significantly associated with infant sleep problems ($r = .37, p < .01$).

Morrell suggested that such maternal doubts and worries may disrupt mother-infant interactions, interfering with the infant's ability to self-soothe. In contrast to findings from previous studies (Fisher, Feekery, et al., 2004; Thome, 2000; Thunström, 1999) worry about infant health and death were not associated with infant sleep problems.

Maternal separation anxiety has also been linked to infant sleep outcome. Scher and Blumberg (1999) conducted a longitudinal follow-up study in a sample of 81 mother-infant dyads recruited from the maternity ward of a hospital in Haifa. Maternal distress was assessed with the Emotional Status Index (1989) when infants were 12 months old, while infant sleep was measured with the Sleep Questionnaire (Scher et al., 1995). Maternal separation anxiety was significantly associated with infant sleep problems. Mothers with low separation anxiety reported that their infants had significantly less night awakenings compared to those mothers with high separation anxiety ($\chi^2 = 5.5, p < .05$). Of the infants who had been classified as 'night wakers', 87% had mothers who reported high levels of separation anxiety. Compared to mothers with low anxiety, mothers with high anxiety were more likely to have infants who required more parental intervention to settle, e.g. providing a pacifier (79% vs. 51%). Results suggest that infants of low anxiety mothers may have been given more opportunities to practise self-soothing skills as finger-sucking was the soothing technique of 36% of infants of low anxiety mothers compared to only 4% of infants of mothers with high maternal anxiety.

In a later study, Scher (2008) also reported an association between maternal separation anxiety and infant sleep outcome in a sample of 52 mothers and their 8 month old infants recruited from a community centre. Infant sleep was measured

objectively, with an activity monitor, and subjectively with the Sleep Questionnaire (Scher et al., 1995). Separation anxiety was assessed with the Maternal Separation Anxiety Scale (MSAS; Hock et al., 1989). Infant sleep outcome measured when the infants were 10 months was significantly associated with maternal separation anxiety with respect to objective but not subjective reports of infant sleep. Results also showed that mothers who were actively involved in settling their infants to sleep (stroking, rocking, singing) had higher levels of separation anxiety. The researchers suggested that a mother's own worries about separating from her infant, rather than her perceptions of infant distress, were associated with infant sleep quality.

Intervention studies, aimed at resolving unsettled infant behaviour, have also reported high anxiety levels in mothers admitted to residential centres for infants with feeding and sleeping problems. For instance, Fisher, Feekery et al. (2004), in a previously described Australian study, using the Tension-Anxiety subscale of the POMS (McNair et al., 1971) identified anxiety scores in the clinical range in 26% of the sample. One month after the intervention, only 3% of mothers reported anxiety scores in the clinical range. While on admission 90% of mothers had reported that their infants were sleeping poorly or very poorly, one month following discharge, only 20% reported infant sleep difficulties. Mindell et al. (2009) assessed the impact of a consistent bedtime routine on infant sleep and maternal mood. The community sample comprised 405 mothers and their infants aged 7 to 18 months. Families were randomly assigned to a 'routine intervention' or 'control' group. Maternal mood was assessed with the POMS (McNair et al., 1971) while infant sleep was measured with both the Brief Infant Sleep Questionnaire (Sadeh, 2004) and a daily sleep diary. Findings indicated that following the introduction of a bedtime routine, improved infant sleep was associated with

decreased levels of maternal anxiety, as measured by the tension-anxiety subscale of the POMS. The researchers suggested that the implementation of a sleep routine may have resulted in decreased arousal level because mothers may have felt more in control at bedtime.

While a few studies have attempted to address possible underlying cognitions that may influence the type and amount of maternal involvement at bedtime and following a night awakening (Morrell, 1999b; Sadeh et al., 2007; Tikotzky & Sadeh, 2009), the link between anxiety, maternal cognitions and infant has received limited research attention (Tikotzky & Sadeh, 2009).

Feldman et al. (1999) reported that maternal trait anxiety was related to a higher level of preoccupation, with women reporting increased frequency of thoughts and worries about their infants, increased level of distress, and a reduced ability to manage their distress. In an early study, Nover, Shore, Timberlake and Greenspan (1984) explored the association between maternal perception of infant behaviour, maternal anxiety and infant sleep in a community sample of 43 white, middle-class, primiparous mothers and their nine month old infants. Mothers completed the IPAT Anxiety Scale Questionnaire (ASQ) and the Perception of Infant Behaviour Scale (PIBS) and participated in a videotaped play session. Nover et al. reported a positive association between maternal anxiety scores and maternal perception of infant behaviour. While maternal anxiety scores were within the normative range, mothers with higher anxiety scores tended to have distorted and negative perceptions of their infants' sleeping difficulties even though the infants were not independently rated as 'difficult'. In the

play session mothers with distorted perceptions were also observed to be less warm, sensitive and responsive to their infants.

Maternal anxiety may also be linked to infant sleep indirectly through the mother's own sleep history.

1.10 Maternal Sleep History

During pregnancy and the postpartum period, women are likely to experience considerable sleep disruption (Karacan, Williams, Hirsch, McCaulley, & Heine, 1969; Lee, 1998; Mindell & Jacobson, 2000; Swanson, Pickett, Flynn, & Armitage, 2011). Some obvious reasons for sleep disruption include, change in hormonal levels and physiology (Lee, Zaffke, & McEnany, 2000; Santiago, Nolleto, Kinzler, & Santiago, 2001), dysregulation of the sleep-wake cycle (Swanson et al., 2011) as well as changes to lifestyle, responsibilities and interpersonal relationships (Banks & Dinges, 2007; Bayer et al., 2007). To measure the extent of sleep problems during pregnancy, Mindell and Jacobson (2000) recruited 127 pregnant women attending scheduled obstetric visits. The results indicated that sleep disturbances are common during pregnancy and become more prevalent as pregnancy progresses. By the end of pregnancy, 97% of women reported poor sleep, but only 30% ($n = 38$) considered they had a current sleep problem. The authors suggested that pregnant women may resign themselves to poor sleep quality considering it a normal part of pregnancy and that the finding may also represent a larger issue of poor recognition of sleep disturbance in general.

In a recent study, Swanson, Pickett, Flynn and Armitage (2011) also measured the extent of sleep problems in a sample that comprised 114 pregnant and 143 postpartum women who had sought services from an outpatient psychiatry clinic.

Women were considered to be postpartum if they had given birth in the 6 months prior to their intake visit. Insomnia symptoms were measured with the Insomnia Severity Index (ISI) (Bastien, Vallieres, & Morin, 2001). Fifty-two per cent of the sample reported moderately severe insomnia symptoms while 12% reported severe insomnia symptoms. No significant difference was found between the ISI scores of pregnant and postpartum women. The authors concluded that perinatal women should be screened for sleep problems.

During the postpartum period a woman's sleep quality can also be impacted by the infant's irregular sleep schedule (Armstrong, Van Haeringen, et al., 1998; Fisher et al., 2002). In an early study Karacan, Williams, Hirsch, McCaulley & Heine (1969) studied sleep patterns during pregnancy and the postpartum period in a small sample of women ($N=13$). For the three women for whom pre-pregnancy data was available, results showed an increase in total sleep time (TST) and a decrease in sleep efficiency (SE) from pre-pregnancy to the first trimester. The data also indicated that within this small sample sleep disturbance was greatest during the first postpartum month, particularly for first-time mothers.

Similarly, Lee, Zaffke and McEnany (2000), in a longitudinal study, explored sleep disturbance in both primiparous and multiparous women from pre-pregnancy to postpartum. Participants were recruited through newspaper and television advertising. Forty-five women were studied during the follicular phase of their menstrual cycles. Of the 45 women, 33 conceived and were studied through each trimester of pregnancy; 29 of these women also provided data at one and three months postpartum. At each time point, the women were monitored in their homes for two consecutive nights using

polysomnography. Results indicated that there was a significant change in TST over the study period. TST for the sample increased from 412 minutes during pre-pregnancy to 446 minutes during the first trimester. This finding supports results from the early Karacan et al. (1969) study cited above. From the third trimester to one month postpartum TST decreased from 415 mins to 379 minutes. Interestingly, while multiparous mothers averaged more sleep at each time interval compared with first-time mothers, TST was not significantly influenced by parity. SE decreased over time from 93% before pregnancy to 81% at one month postpartum. Even though their children were sleeping through the night, in pre-pregnancy and at each time interval except one month postpartum, multiparas had lower SE compared with nulliparas because of frequent brief awakenings. Sleep disturbance was greatest at one month postpartum for all mothers but particularly for first-time mothers.

A recent Australian longitudinal study (Bei, Milgrom, Ericksen, & Trinder), was conducted to explore changes in sleep time and efficiency in a community sample of 44 women, who were recruited from an antenatal clinic in a regional Melbourne hospital. Sleep was assessed using both objective and self-report measures during the third trimester (time-1) and the first postpartum week (time-2). Objective data was also recorded for seven days after delivery. Subjective sleep was measured with the PSQI (Buysse et al., 1988) while objective sleep data was recorded with wrist actigraph. Objective sleep results were similar to those reported by Lee et al. (2000) in that, TST decreased significantly between time-1 (428 mins) and time-2 (372 mins). SE also decreased significantly from 76% (at time-1) to 62% (at time-2). Subjective sleep scores were compared at time-0 (prior to pregnancy), time-1 and time-2. Data indicated that compared to pre-pregnancy baseline values, subjective sleep was worse at both time-1

and time-2 with significantly decreased TST and SE scores. In addition, both objective and subjective measures indicated that sleep disruption was greatest during the week following delivery. While subjective and actigraphy TST and SE mean scores were similar, they did not correlate significantly at either time-1 or time-2. The authors concluded that perceptions of poor sleep “might reflect global changes in sleep, but are not necessarily accurate measurements of actual sleep” (p. 536).

In general, researchers have focussed on sleep quality during the pregnancy or postpartum (Lee et al., 2000; Swanson et al., 2011) with almost no attention given to mothers’ sleep history prior to becoming pregnant. Yet it would seem quite likely that a woman with a history of poor sleep may have more difficulty adjusting to changed sleep patterns which are inevitable following childbirth (Moline, Broch, Zak, & Gross, 2003).

Sleep-related complaints are common in the general population. Of all the sleep related complaints, insomnia, namely the subjective perception of insufficient sleep or non-restorative sleep, is the most prevalent (Neckelmann, Mykletun, & Dahl, 2007; Santiago et al., 2001). The term, insomnia, can refer to either a symptom or a disorder (Roth & Roehrs, 2003). Insomnia becomes a disorder when insufficient sleep causes significant distress or daytime functional impairment (Harvey, 2001). The most common daytime impairments of insomnia include complaints of mood disturbances, impaired cognitive functioning and daytime fatigue (Moul et al., 2002). Typical mood symptoms include irritability, mild dysphoria and difficulty tolerating stress. Cognitive complaints include difficulties in concentrating and completing tasks.

As insomnia occurs only where there is adequate opportunity for sleep, it needs to be distinguished from sleep deprivation, in which the individual has normal sleep ability but inadequate opportunity for sleep (Buysse, Germain, Moul, & Nofzinger, 2005). Epidemiologic studies show that 20% to 35% of the general population report insomnia symptoms (Ohayon, 2002) with women being at increased risk (Buysse et al., 2008).

The main theoretical models proposed to explain the aetiology of insomnia (Smith, Smith, Nowakowski, & Perlis, 2003) all emphasize the importance of sleep-related thoughts, behaviours and perceived arousal processes in maintaining insomnia (Edinger & Means, 2005; Harvey, Tang, & Browning, 2005; Jansson & Linton, 2007; Morin, 1993). There is mounting evidence suggesting that cognitive models have empirical value in explaining the mechanisms involved in insomnia and the possible interrelationships between the psychological, affective, behavioural and cognitive elements (Jansson & Linton, 2007). Cognitive models of insomnia are informed by cognitive models of other psychological disorders (for instance, Beck, 1976) as well as from earlier studies outlining the importance of cognitive processes to insomnia (Espie, 2002; Harvey, 2002; Harvey et al., 2005; Morin, 2000).

Broadly, cognitive models of insomnia, have implicated two linked cognitive processes: dysfunctional cognitions or beliefs surrounding sleep and worry/ruminating thoughts (Harvey, 2002; Morin, 1993; Smith et al., 2003). According to the cognitive framework, insomnia is maintained by a flow of cognitive processes that are activated at night and during the day (Harvey, 2002). It is claimed that worry activates the sympathetic nervous system (the flight or fight response) thereby triggering

physiological arousal and distress. The contribution of worry, arousal and distress plunges the individual into an anxiety state, which results in difficulty falling asleep and maintaining sleep (Espie, 2002).

Morin, Stone, Trinkle, Mercer and Remsberg (1993), showed the importance of unhelpful beliefs about sleep in the maintenance of insomnia. In their study, they compared differences in beliefs, attitudes, expectations and attributions about sleep in a sample of 145 older adults ($M = 68.20$ years old). Two groups were recruited: 74 'poor' sleepers who were seeking treatment for insomnia and 71 self-reported 'good' sleepers. The results indicated that 'poor' sleepers held more unrealistic expectations about their sleep requirements, held stronger beliefs about the consequences of insomnia and worried more about losing control and the unpredictability of sleep.

Stress and arousal have also been found to be linked to sleeplessness. Morin, Rodrigue, & Ivers (2003) conducted a cross-sectional study and compared stress, coping skills and arousal in a sample of 67 participants (40 individuals with insomnia and 27 good sleepers). The researchers found that the frequency with which 'good' and 'bad' sleepers' experienced daily stressors did not differ. Rather, it was their appraisals of those events that were different, with 'poor' sleepers evaluating both daily minor events and major life events as more stressful than the evaluations made by 'good' sleepers. The authors suggested that appraisal processes, rather than the actual stress itself was implicated in sleep disturbance. Individuals who have been sleeping poorly for a period of time have been found to experience behavioural changes (Espie, 2002). Behavioural changes may include keeping an irregular sleep-wake schedule, spending excessive amounts of time in bed in an attempt to gain more sleep time, taking day time naps and

engaging in stimulating activities during the night (Lee-Chiong, 2006). There is also evidence to suggest that insomnia may be a risk factor in the development of depressive symptomatology (Bei et al., 2010; Gillin, 1998; Hiscock & Wake, 2001; Neckelmann et al., 2007).

1.10.1 Maternal Sleep and Anxiety and Depression Symptoms

In one of the few studies that have explored the link between insomnia and depression in postpartum women, Dørheim et al. (2009), recruited a sample of 2,830 women who had delivered at Stavanger University Hospital in Norway. At seven weeks postpartum, questionnaires were mailed to women living within the hospital's catchment area. Depressive symptoms were measured with the EPDS (Cox et al., 1987) while the PSQI (Buysse et al., 1988) was used to measure maternal global sleep quality. Findings indicated that 17% of women had EPDS scores ≥ 10 ($M = 5.30$) while 58% ($M = 6.30$) reported experiencing poor quality sleep ($PSQI > 5$). A forward multiple logistic regression analysis was conducted to explore factors associated with maternal sleep quality. The analysis indicated that the following factors were significant predictors of maternal sleep problems: depressive symptoms, previous sleep problems, being primiparous, breastfeeding with supplement and having a male infant. Of these factors, depression, was the most strongly associated with maternal sleep problems ($OR = 7.4$, 95% CI 5.5-10.0, $p < .001$). In addition, Dørheim et al. asked participants four questions concerning their sleep history prior to pregnancy, previous difficulty falling asleep, multiple awakenings at night, early morning awakenings and sleep problems affecting daytime functioning. Results indicated that previous sleep problems were associated with poor global sleep quality ($OR = 3.4$, 95% CI 2.8-4.2, $p < .001$). The researchers suggested that mothers, with a history of sleep problems, may have more difficulty adjusting to sleep disruption during the postpartum period.

Bei et al. (2010), in a previously described study, also examined the link between sleep quality and mood. Depression was measured subjectively using both the Hospital and Depression Scale (HADS) (Zigmond & Snaith, 1983) and the Depression and Anxiety Stress Scale (DASS) (Lovibond & Lovibond, 1995). Multiple regression analysis indicated that the perception of night sleep, as measured by the PSI (Buysse et al., 1988) during the third trimester was a significant predictor of depression and anxiety (as measured by the HADS) accounting for 27% of the variance in the total HADS score. Third trimester subjective sleep scores were also significantly associated with lower postpartum HADS scores ($R^2 = .25, p < .05$). In contrast, objective measures of night time sleep were not significantly associated with either depression or anxiety during the third trimester or postpartum. The authors suggested that the perception of poor sleep may have a greater impact on mood than actual sleep quality and quantity.

As noted previously the authors of an Australian community study Hiscock & Wake (2001) reported that current maternal sleep quality (assessed by one unidentified item from the PSIQ (Buysse et al., 1988) was predictive of depression according to community (>10) or clinical (>12) cut off scores on the EPDS (Cox et al., 1987). However it is important to note that sleep quality data was only available for 42% of mothers.

The findings from these studies, suggest that mothers who perceived that they had good sleep quality were less likely to report depressive symptoms and that the presence of sleep problems prior to pregnancy, may influence maternal sleep quality during postpartum. It is also possible that postnatal depression may aggravate an already

impaired sleep quality in those women who have a history of unrecognised sleep problems.

Research has linked insomnia and anxiety via a number of different associations (2008). Individuals with insomnia are at increased risk of developing an anxiety disorder (Neckelmann et al., 2007). The first research to highlight this link was the National Institute of Mental Health Epidemiological Catchment Area study (Ford & Kamerow, 1989). In this population based study, 7,954 adults were interviewed on two occasions one year apart. Results indicated a significant association between insomnia symptoms and anxiety. In a survey of 1,200 adults aged 21 to 30 years, Breslau, Roth, Rosenthal and Andreski (1997) found that the risk of developing an anxiety disorder showed a two-fold increase in individuals who had insomnia three years earlier compared with those who were good sleepers. In another study, Morphy, Dunn, Lewis, Boardman & Croft (2007) conducted a questionnaire survey in the United Kingdom, using a random sample of 2,662 adults above 18 years of age. Results indicated that participants had a two-fold risk of developing an anxiety disorder if they had reported one sleep problem occurring 'on most nights' a year earlier. Other demonstrated links between insomnia and anxiety include higher ratings of trait anxiety in individuals with insomnia than in 'good' sleepers. For instance, Fichten, Creti, Amsel, Weinstein and Libman (1995) explored the link between anxiety and sleep in a sample of 634 older adults living in the community. The researchers compared 'poor' sleepers who experienced distress and those with similar reported 'poor' sleep who experienced no distress. Using the Penn State Worry Questionnaire (PSWQ) (Meyer, Miller, Metzger, & Borkovec, 1990) Fichten et al. reported a significant group difference between poor sleepers with high and low distress with the most distressed poor sleepers being the

most anxious ($M = 43.80$ vs. $M = 56.60$, $p < .001$). Fichten and colleagues claimed that the scores of highly distressed ‘poor’ sleepers reflected an “anxious, depressed, worrying and negative cognitive-affective set” (p. 214).

Despite these various relationships, the only study found that had examined the link between insomnia and anxiety in postpartum women was the previously described study by Swanson, Pickett, Flynn and Armitage (2011). At intake to the psychiatric outpatient clinic the 114 pregnant and 113 postpartum women ($N = 257$) completed the following measures: ISI (Bastien et al., 2001), EPDS (Cox et al., 1987), PSWQ (Meyer et al., 1990). The results indicated that, after controlling for depression, there was a significant relationship between generalized anxiety and insomnia for pregnant women, but not for postpartum women. The authors also reported that although the ISI total score was associated with anxiety scores only the ‘difficulty falling asleep’ item of the ISI was a significant predictor of anxiety scores. Limitations of the study acknowledged by the authors were that the PSWQ only measures symptoms of generalised anxiety and neither the ISI nor the PSWQ have been validated in childbearing samples.

1.10.2 Maternal Sleep and Infant Sleep

Exploring links between current maternal sleep or recent maternal sleep history and infant sleep in the postpartum period is problematic because of the possible bi-directional effects and due to the fact that, during pregnancy, reports of sleep disruptions are common as a result of hormonal and physiological changes (Lee et al., 2000). No studies could be located that investigated the link between maternal sleep history, in particular maternal sleep history prior to pregnancy and infant sleep. There is, however, some evidence of a link between parental sleep-habits and children’s sleep (Komada, Adachi, Matsuura, Mizuno, Hirose, Aritomi & Shirakawa, (2009). Komada et

al. (2009) conducted a longitudinal study with a sample of 319 pre-school children (1 to 5 years old) and 217 elementary school aged children (6 to 11 years old) and their parents. Questionnaires, related to sleep problems and life habits for the previous month, were distributed by post to families living in the Tokyo metropolitan areas of Japan. Based on reported lifestyle habits, parents were categorised as either morning or evening type with regular or irregular sleep habits. Children's sleep habits were also classified as either morning type with regular sleep habits, evening type with irregular sleep habits or intermediate according to sleep-wake regularity scores. Children, aged 1 to 5 years, of mothers who had evening irregular sleep, had significantly more irregular sleep habits than those children who had mothers with morning regular sleep. For instance, they had more difficulty in waking up, had higher sleep problem scores and were also more likely to experience daytime sleepiness. The findings from this study suggest that mother's sleep habits have a stronger influence on their children's sleep than do the sleep habits of fathers.

While no known studies have specifically linked sleep problems prior to pregnancy with infant sleep outcome, there is theoretical and empirical evidence suggesting that a specific link between sleep problems in women prior to pregnancy, and infant sleep may exist. In a mother with a history of insomnia, it is possible that some or all of the processes associated with insomnia described above may play a major role in shaping her expectations and parenting behaviour regarding infant sleep, and whether certain sleep behaviours, such as night awakenings, are perceived as problematic or not.

Negative cognitions and affectively laden beliefs and attitudes associated with sleep difficulties may affect the mother-infant relationship. It is possible that a mother, who has a history of being a poor sleeper, may hold the unhelpful belief that if she does not get sufficient sleep, as a result of being awakened several times at night by her young infant, her daytime functioning would be compromised. Furthermore, a mother who perceives her infant's night awakenings as a sleep interruption may respond to her infant's signalling with concern, if not outright frustration and anger, that was not present when she was sleeping well. She might also find it difficult to return to sleep due to intense worry about being unable to get the amount of sleep deemed necessary for her daytime functioning. Appraisal processes have been implicated in adult sleep disruptions so a woman with her own history of sleep problems may, in response to an infant sleep disturbance, experience doubt or uncertainty about herself as a competent parent. Thus, a mother may perceive her life as unpredictable and out of control and her infant's sleep as uncontrollable (Hiscock & Wake, 2002; Morin, 1993). Underlying such appraisals may be unreasonable expectations regarding sleep, her own and that of her infant (Lee-Chiong, 2006).

Another way in which maternal insomnia may affect infant sleep outcome is through its relationship with depression. As stated previously, research exploring relations between maternal depression and infant sleep have been conducted from two different viewpoints: maternal depression and its association with infant sleep (Dennis, 2005; Lozoff et al., 1985) and the contribution of infant sleep problems to maternal depression as a result of disruption to the mother's sleep cycle (Armstrong, Van Haeringen, et al., 1998; Fisher et al., 2002).

In the study by Hiscock and Wake (2001), described above, the authors noted that the association between mothers' sleep quality and depressive symptoms was independent of their perception that their infant had a sleep problem. They suggested that current maternal sleep quality may mediate the relationship between depression and infant sleep outcome. However, as noted above, the use of maternal current sleep quality in regard to infant sleep becomes a circular process. Dørheim et al. (2009), in a previously described study that looked at sleep in postpartum depressed and non-depressed women, reported that subjective reporting of poor sleep quality was significantly associated with depression even after controlling for multiple risk factors (poor partner relationship, previous depression, depression during pregnancy and stressful life events). It was also reported that poor sleep quality, prior to pregnancy, was associated with postpartum depression independently of other significant risk factors.

Early in this chapter (p.7) the long-term nature of sleep problems in early childhood was noted. Studies examining the familial incidence of sleep disturbance in adults with insomnia suggest some possible explanations for this endurance in that the mother was the most frequently afflicted family member (Bastien & Morin, 2000; Beaulieu-Bonneau et al., 2007) and that the familial incidence of insomnia (31%) was higher in individuals with childhood onset insomnia (Bastien & Morin, 2000). While there has been no rigorous investigation of the link between maternal sleep history prior to pregnancy and infant sleep outcome the above studies suggest that maternal sleep history may be linked with infant sleep outcome.

1.11 Models of Infant Sleep

Clearly there are multiple complex processes associated with infant sleep outcome but the studies that have been reviewed above have generally focussed on individual predictors or particular categories of predictors. Several models have also been proposed to explain infant sleep disturbance. The transactional developmental model was initially developed by Sameroff and Chandler (1975) who proposed that child developmental outcomes are facilitated by bidirectional, reciprocal interactions between the child and his or her environment with transactions conceptualised “as embedded in a regulatory system that is a characteristic of all developmental processes” (p. 136).

The transactional model was adapted by Sadeh and Anders (1993) to enable a systems theory perspective to be applied to the identification of the multiple etiological factors influencing the development of infant sleep outcome. According to this adapted transactional model sleep-wake regulation is mediated by the parent-infant relationship (attachment systems, separation-individuation) and interactive bedtime behaviours. These factors are influenced by the infant intrinsic context (temperament) in interaction with the parental context (personality, psychopathology, fantasies, working models). The cultural, family and environment context (e.g. social and cultural norms, values, expectations, beliefs, economic pressures), in which the family lives, is considered to be a secondary influence in the regulation of sleep-wake patterns. An inherent assumption of the model is that infant sleep outcome can, in turn, affect each of these four contexts. Goodlin-Jones, Burnham and Anders (2000) further elaborated on the factors that contributed to infant sleep disturbance in later revisions of the model. While transactional models have provided a framework for past research and there have been

some recent studies (Mindell, Sadeh, Kohyama, et al., 2010) that have tested aspects of the transactional model, no studies have been conducted to assess all of these hypothesised links. Two other studies described in the literature review above have attempted to test various elements of the transactional model.

Morrell and Steele (2003), used logistic regression analysis to examine factors associated with infant sleep problems and reported empirical support for elements of the transactional model. Problematic cognitions about infant sleep, fussy-difficult temperament, depression, infant age, ambivalent attachment and active physical comforting were all significant predictors of sleep disturbance in infants aged 13 months. The combined factors explained 66% in the outcome variable, but active physical comforting contributed only 3% to the overall variance in infant sleep problems and mothers' early experience of parenting was not a significant predictor of infant sleep difficulties. In their later study, Tikotzky and Sadeh (2009) used a longitudinal design to assess the links between maternal related cognitions and infant sleep disturbance. The results indicated that maternal cognitions emphasising limit setting predicted more consolidated infant sleep while cognitions that emphasised the infant distress were linked with more problematic sleep. In terms of indirect pathways, maternal soothing mediated the relationship between maternal cognitions and infant sleep. The findings of these studies have been important but, clearly further studies that test models depicting the complex relationships between parenting and infant sleep outcome are necessary to better understand infant sleep.

2 Rationale and Aims of Study

2.1 Rationale

Several Australian studies have provided data on infant sleep with results indicating that 32% (Lam et al., 2003), 34% (Bayer, et al., 2007) and 46% (Hiscock & Wake, 2001) of mothers experience difficulty with settling their infant to sleep at bedtime and following a night awakening. Infant sleep problems, which can be experienced by parents as disruptive and distressing (Bayer et al., 2007) are one of the most frequent problems parents discuss with paediatricians and other allied health professionals (Adams et al., 2004). While the prevalence of infant sleep problems in Australia is broadly similar to that reported in overseas studies, research is needed to better understand the factors that contribute to sleep disturbance in Australian infants.

The causes of infant sleep disturbance are not well understood. As is evidenced from the literature review, most previous studies have examined individual predictors or particular categories of predictors of infant sleep problems. Few studies have evaluated models of infant sleep based on factors considered important to infant sleep outcome. It has been suggested that conceptual models of infant sleep (Morrell & Steele, 2003; Sadeh & Anders, 1993; Tikotzky & Sadeh, 2009) be developed to fully understand the multiple complex processes associated with infant sleep outcome. Notably, with few exceptions (Mindell, Sadeh, Kohyama, et al., 2010) the majority of studies have tended to focus on predictors of infant sleep disturbance rather than viewing infant sleep outcome as a continuum.

One area that has received wide research attention is the link between the maternal behaviour of active physical comforting and infant sleep outcome. Most

studies that have examined the variety of behaviours that mothers use to settle their infants to sleep have been conducted in countries outside Australia. Little is known, however, about the behaviours Australian mothers use to settle their infants to sleep and the link between active physical comforting and infant sleep outcome has not been examined in Australian infants.

As described in the above literature review, in the last decade research attention has been directed towards understanding the reasons that lead some mothers to become more actively involved in settling their infants to sleep at night and others to limit involvement. It has been proposed that the specific cognitions regarding setting limits, anger towards the infant and doubt about parenting, that a mother holds about her infant's sleep may influence the type and amount of involvement she has with her child at bedtime (Tikotzky & Sadeh, 2009). While there is large body of evidence suggesting that the influence parental cognitions have on child behaviour is mediated by the way parents behave and react towards their children (Bugental & Johnston, 2000), only a few studies, and none from Australia, have examined the links between maternal cognitions, maternal comforting strategies and infant sleep outcome.

Despite the links that have been shown between maternal cognitions and the type and amount of parental involvement at bedtime and following a night awakening (Morrell, 1999b; Sadeh et al., 2007; Tikotzky & Sadeh, 2009) there has been only limited attention given to understanding the past and current experiences that influence maternal cognitions and therefore maternal bedtime behaviours.

The influence of mothers' perceptions of being parented in childhood may affect the quality of a mother's parenting behaviour including that related to bedtime settling strategies. There are theoretical assumptions from attachment theory (Bowlby, 1969) which suggest that a mother's internalised childhood experiences will affect the way she parents her child. In particular her beliefs and expectations about infant sleep may be influenced by her perception of the parenting she received (Benhamou, 2000). Few studies, however, have examined the contribution of recalled experience of being parented to infant sleep outcome and none of these studies have been conducted in Australia.

Findings presented above indicate that numerous studies have demonstrated strong links between mothers' perceptions of being parented in childhood and depression and trait anxiety in adulthood. As many of these studies have been conducted with clinical populations (Gerlsma et al., 1990), less is known about the relationship between early parenting history and mood in non-clinical populations. Further, while maternal depression and to a lesser extent, trait anxiety have been consistently linked to infant sleep outcome, almost no research attention has been given to exploring the links between perceptions of being parented in childhood, maternal mood and infant sleep outcome. No studies in Australia have assessed the influence of a mother's own parenting history on her current well-being and how this influences the strategies the mother uses to settle her infant at bedtime.

As is evidenced in the literature review, maternal sleep quality has been the focus of research during pregnancy and/or the postpartum period (Lee et al., 2000; Swanson et al., 2011) and fragmented maternal sleep has been shown to be linked to

problematic infant sleep (Fisher et al., 2002). Few studies, however, and none from Australia, have explored how women's sleeping patterns prior to pregnancy may affect infant sleep outcome. As previously noted (2003), there is a danger that women's complaints of poor quality sleep during pregnancy may mask the long-standing nature of their sleep difficulties.

Given the well-established body of literature on adult insomnia showing a high familial incidence, with mothers particularly implicated, and evidence for the persistence of early sleep problems into childhood and adulthood, it seems important to investigate how a mother's own sleep history may shape her expectations and parenting behaviour regarding her infant's sleep.

This study has therefore been designed to both explore factors that contribute to infant sleep outcome and to increase our knowledge of how maternal cognitions influence maternal-infant bedtime interactions and hence infant sleep patterns based on maternal report. The consideration of the factors that are associated with such cognitions has been a notable gap in the literature. Previous studies exploring the link between maternal factors and infant sleep have predominantly looked at factors predictive of infant sleep disturbance/problems. This study has taken a broader approach and attempted to explore the influence of maternal factors on infant sleep outcome. In addition, the majority of studies exploring infant sleep have recruited either multiparous women or samples of mixed parity. In an attempt to limit the influence of confounding variables, all participants in this study were first-time mothers.

2.2 Aims

The primary aim of the current study was to assess the relative contribution of maternal factors, including perception of past parenting received, current maternal psychological functioning, sleep history, and night settling behaviour to infant sleep outcome in a sample of mothers with infants aged 6 to 9 months. A further aim was to investigate the extent to which these variables affect infant sleep through their link to maternal cognitions. Figure 1 presents a conceptual model of infant sleep outcome that was developed to address these aims.

2.3 Maternal Factors Influencing Infant Sleep Outcome

The model presented below in Figure 1 includes maternal psychosocial factors, perceived past maternal care and perceived past maternal overprotection (i.e. the mother's own experience of being parented during childhood), depressive symptoms and trait anxiety, maternal sleep history, maternal cognitions about infant sleep and the maternal behaviour of active physical comforting. There is consistent evidence that perceived parental rearing characterised by a lack of care and elevated overprotection is associated with the development of anxiety and depression. Based on the literature reviewed above it was expected that perceptions of the maternal parenting received (perceived past maternal care and perceived past maternal overprotection) would be linked to both current psychological state (depressive symptoms) and enduring personality characteristics (trait anxiety). The association between depressive symptoms and infant sleep has been reported extensively in the literature (Dennis, 2005; Goodlin-Jones et al., 1997; Lozoff et al., 1985; Scher, 2008; Warren et al., 2006). Compared to maternal depression there have been limited research attempts to link maternal anxiety and infant sleep. However both international (Morrell, 1999b; Scher & Blumberg, 1999; Thome, 2000; Thunström, 1999) and Australian studies (Fisher, Feekery, et al., 2004;

McMahon et al., 2001) have demonstrated links between maternal anxiety and infant sleep so this pathway was included in the model below.

A further factor that might be expected to be associated with infant sleep outcome was maternal sleep history. Despite an extensive search of the literature no studies were found that had examined the link between maternal sleep history and infant sleep. In contrast, the link between maternal sleep history and anxiety has been extensively studied with results indicating several different associations (Nutt & Wilson, 2008). For instance, Neckelmann et al. (2007) reported that individuals with insomnia are at risk of developing an anxiety disorder. Ratings of trait anxiety are higher in individuals with insomnia than in 'good' sleepers (Fichten et al., 1995). Insomnia is one of the six core symptoms of generalised anxiety disorder (American Psychiatric Association, 2000).

There is a well-established body of literature around cognitive based models of parenting behaviour suggesting that parental cognitions shape the specific practices undertaken by parents for the emotional, social, cognitive and physical care of a child (Bugental & Johnston, 2000; Miller, 1995; Slep & O'Leary, 1998). From the few studies to date related to infant sleep there has been mounting evidence suggesting that maternal cognitions about infant sleep are significantly associated with infant sleep outcome (Sadeh, Tikotzky, et al., 2009)

As described in the review above it seems that the influence of maternal factors on infant sleep may be via the mechanism of infant sleep related cognitions. Research has provided evidence of links between cognitions about infant sleep and maternal

depressive symptoms and cognitions about infant sleep and maternal anxiety. There is also substantial empirical evidence linking maternal behaviours, particularly those related to bedtime interactions and soothing routines, and infant sleep outcome (Adair et al., 1991; Anders, 1979; Goodlin-Jones et al., 2000; Morrell & Cortina-Borja, 2002). Maternal cognitions encompassing beliefs and attitudes have been linked to parenting behaviour and so maternal interactions at bed-time are expected to be influenced by cognitions and interpretations of the child's sleep related behaviour (Morrell, 1999b). The model below is hence representing findings from previous studies that suggest that maternal perceptions of parenting received in childhood, depressive symptoms and anxiety, and cognitions about infant sleep contribute to maternal behaviour at infant bedtime and following a signalled night awakening and consequently influence sleep outcome.

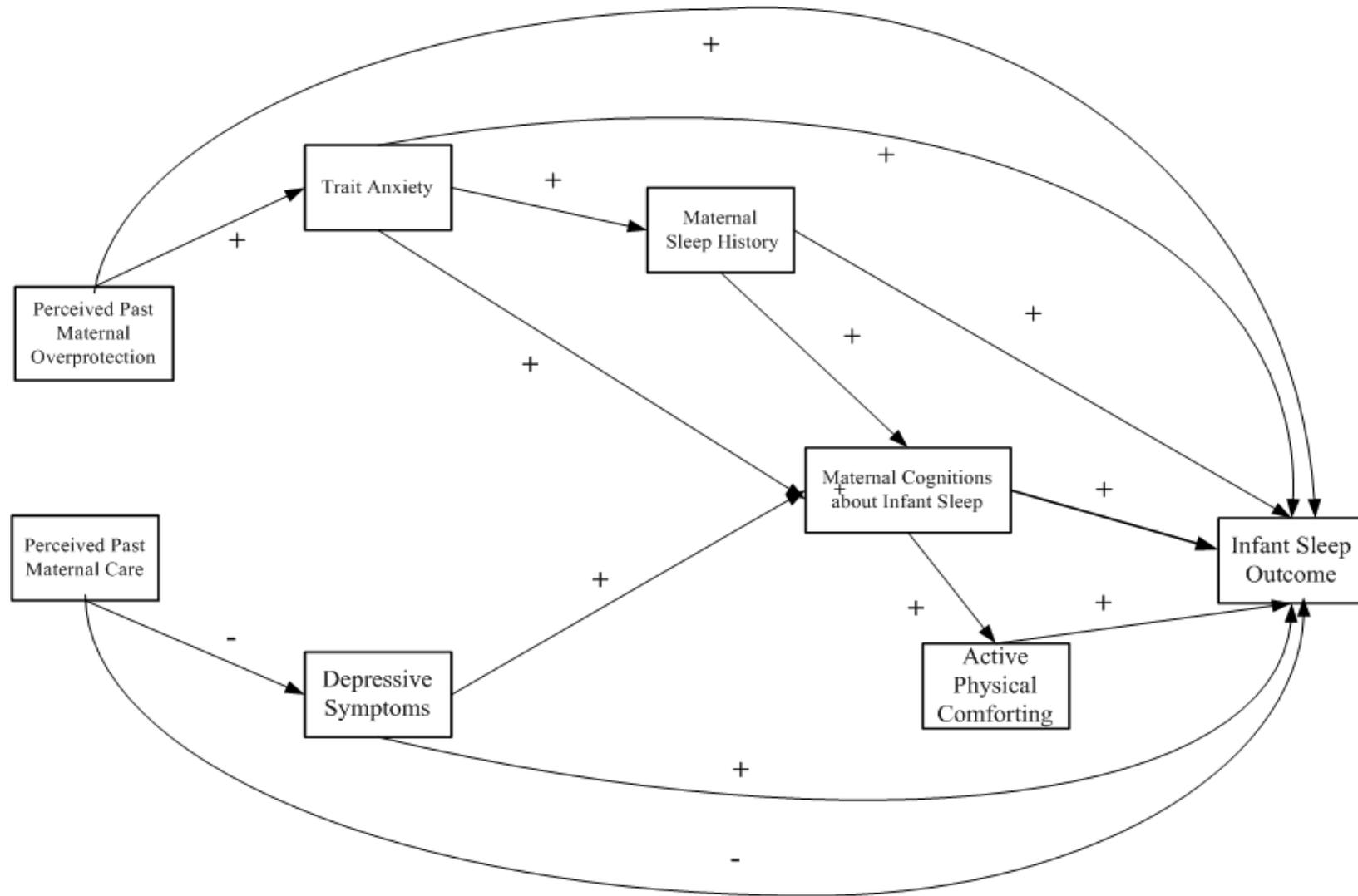


Figure 1. Model of maternal factors influencing infant sleep outcome.

2.3.1 Hypotheses

The following hypotheses were generated from the model.

1. Perceived past maternal care, as measured by the Parental Bonding Instrument Care Scale (PBI Care Scale), will be negatively associated with Infant Sleep Outcome, as measured by the ISQ, so that a high score on the PBI Care Scale will be associated with a low score on the ISQ (representing more consolidated infant sleep).
2. Perceived past maternal care, as measured by the Parental Bonding Instrument Care Scale (PBI Care Scale), will be negatively associated with depressive symptoms, as measured by the EPDS, so that a high score on the PBI Care Scale will be associated with a low score on the EPDS (representing fewer depressive symptoms).
3. Perceived past maternal overprotection, as measured by the Parental Bonding Instrument Overprotection Scale (PBI Overprotection Scale), will be positively associated with trait anxiety, as measured by the STAI, so that a high score on the PBI Overprotection Scale will be associated with a high score on the STAI (representing more anxiety symptoms).
4. Perceived past maternal overprotection, as measured by the PBI Overprotection Scale, will be positively associated with infant sleep outcome as measured by the ISQ, so that a high score on the PBI Overprotection Scale will be associated with a high score on the ISQ (representing less consolidated infant sleep).
5. Depressive symptoms, as measured by the EPDS, will be positively associated with infant sleep outcome, as measured by the ISQ, so that a high score on the EPDS will be associated with a high score on the ISQ (representing less consolidated infant sleep).
6. Depressive symptoms, as measured by the EPDS, will be positively associated with maternal cognitions about infant sleep as measured by the MCISQ-SAD, so that a high score on the EPDS will be associated with a high score on the MCISQ-SAD (representing more problematic sleep related cognitions).
7. Trait anxiety, as measured by the STAI, will be positively associated with infant sleep outcome, as measured by the ISQ, so that a high score on the

- STAI will be associated with a high score on the ISQ (representing less consolidated infant sleep).
8. Trait anxiety, as measured by the STAI, will be positively associated with maternal cognitions about infant sleep, as measured by the MCISQ-SAD, so that a high score on the STAI will be associated with a high score on the MCISQ-SAD (representing more problematic sleep related cognitions).
 9. Trait anxiety, as measured by the STAI, will be positively associated with maternal sleep history, as measured by the MSHQ, so that a high score on the STAI will be associated with a high score on the MSHQ (representing more problematic maternal sleep).
 10. Maternal sleep history, as measured by the MSHQ, will be positively associated with infant sleep outcome, as measured by the ISQ, so that a high score on the MSHQ will be associated with a high score on the ISQ (representing less consolidated infant sleep).
 11. Maternal sleep history, as measured by the MSHQ, will be positively associated with maternal cognitions about infant sleep, as measured by the MCISQ-SAD, so that a high score on the MSHQ will be associated with a high score on the MCISQ-SAD (representing more problematic sleep related cognitions).
 12. Maternal cognitions about infant sleep, as measured by the MCISQ-SAD, will be positively associated with infant sleep outcome, as measured by the ISQ, so that a high score on the MCISQ-SAD will be associated with a high score on the ISQ (representing less consolidated infant sleep).
 13. Maternal cognitions about infant sleep, as measured by the MCISQ-SAD, will be positively associated with active physical comforting, as measured by the Active Physical Comforting sub-scale of the PIBBS, so that a high score on the MCISQ-SAD will be associated with a high score on the APC (representing more frequent use of this strategy).
 14. Active physical comforting, as measured by the Active Physical Comforting subscale of the PIBBS, will be positively associated with infant sleep outcome, as measured by the ISQ, so that a high score on the APC will be associated with a high score on the ISQ (representing less consolidated infant sleep).

The following hypotheses were generated to examine potential indirect pathways in the model.

15. The positive association between trait anxiety and infant sleep outcome will be mediated by maternal cognitions about infant sleep.
16. The positive association between maternal sleep history and infant sleep outcome will be mediated by maternal cognitions about infant sleep.
17. The positive association between maternal cognitions about infant sleep and infant sleep outcome will be mediated by active physical comforting.

3 Method

3.1 Participants

Primiparous mothers, 18 years or above, living in the City of Wyndham, were recruited for this study. Inclusion criteria for participants were the ability to speak and read English, no identified intellectual disability and having delivered a healthy singleton full-term infant aged between 6 months to 12 months.

3.1.1 Recruitment Sites

Participants were recruited from nine Maternal Child Health Centres located within the City of Wyndham. Maternal and Child Health Centres offer professional nursing support and advice for parents of children from birth to school age. These free sessions which are offered to all mothers and their children living in the municipality, occur at ten key ages: two weeks, four weeks, eight weeks, four months, six months, 12 months, 18 months, two years and four years.

3.2 Measures

3.2.1 Demographic Data Questionnaire (see Appendix A)

Demographic information was collected on maternal age, ethnicity, birthplace, education, marital status, living arrangements, employment status and infant's age and gender.

3.2.2 Edinburgh Postnatal Depression Scale (Cox et al., 1987) (see Appendix B)

The Edinburgh Postnatal Depression Scale (EPDS) is a 10-item self-report questionnaire specifically designed for the identification of postnatal depression. It has been used extensively as a screening questionnaire in clinical practice and in research into various aspects of postnatal depression (Guedeney, Fermanian, Guelfi, & Kumar,

2000; Milgrom et al., 2005). According to Boyd, Le and Somberg (2005) the EPDS is the most widely used measure for postnatal depression. The EPDS measures the emotional and cognitive symptoms of postnatal depression such as anhedonia and reactivity, self-blame, anxiety, panic, coping, insomnia (due to unhappiness), sadness, tearfulness and self-harm (Boyce, Stubbs, & Todd, 1993). The EPDS, unlike other depression rating scales, does not measure the somatic symptoms of depression, such as fatigue, weight loss and broken sleep (Boyd et al., 2005). Such somatic symptoms are readily acknowledged by many women who are nursing mothers rather than because of postnatal depression (Boyce et al., 1993; Boyd et al., 2005).

Participants are asked to rate on a four-point scale (0 to 3) how they have felt in the previous week. The EPDS includes questions such as 'I have been anxious or worried for no good reason' and 'I have felt sad or miserable'. The responses are summed to yield a score ranging from 0 to 30. A cut-off score of ≥ 13 is considered indicative of postnatal depression and flags the need for further assessment (Cox et al., 1987). The EPDS has been found to have adequate sensitivity, specificity and positive predictive value. In the original validation study, Cox et al. (1987) tested a British sample of 84 women at 13 weeks postpartum. Using a cut-off score of 13 or above the sensitivity of the EPDS was 85%, specificity 77% and the positive predictive value 83%. The EPDS was also validated in an Australian sample of 4,148 women recruited at 4 months post-partum from Maternal Child Health Centres in northern metropolitan Melbourne (Milgrom et al., 2005) where similar results were reported. In this community sample the prevalence rate for PND was reported as 13%. The scale has been shown to be internally consistent with alpha co-efficients in the moderate to high range (.73-.87). Test-retest reliabilities were in the good to moderate range (.53-.74),

however, correlations decreased as time between administrations increased (i.e. from 3 weeks to 12 weeks). The split-half reliability coefficients were also in the good to moderate range (.73-.83). The Cronbach's alpha for the EPDS for the current sample was .82 indicating good internal consistency.

3.2.3 State-Trait Anxiety Inventory (Spielberger, 1983) (see Appendix C)

The State-Trait Anxiety Inventory (STAI) (1983) is a widely used 40-item measure that assesses both state anxiety (STAI-S) and trait (STAI-T) anxiety. The state scale consists of 20 items and is designed to measure feelings of tension, worry, nervousness, and apprehension that are situationally determined. Participants are asked to describe how they feel using a 4-point scale ranging from 1 (*almost never*) to 4 (*almost always*). The responses to each item are added together to produce a score ranging from 20 to 80. A higher score indicates more state anxiety symptoms.

The trait scale consists of 20-items and is designed to measure dispositional anxiety which is considered to be an enduring stable personality characteristic (Spielberger, 1983). Participants are asked to describe how they generally feel using a 4-point scale ranging from 1 = *almost never* to 4 = *almost always*. The total score is calculated by adding together the responses to each of the twenty items to produce a score ranging from 20 to 80. Higher scores represent higher levels of trait anxiety. An example of a trait anxiety item is "I am a steady person".

The STAI has been used in over 3,000 studies and has been translated into 30 languages (Spielberger, 1989). The STAI has strong psychometric properties including established reliability (.86 to .92) and validity (Spielberger, 1983). In a more recent study, Barnes et al. (2002) conducted a reliability generalization review of 816 articles

using the STAI during a 10-year period, and reported comparable results regarding the psychometric properties. The review suggested that the STAI is still widely used in psychological research.

In the current study, only the trait scale (STAI-T) of the STAI was used. The trait scale has good construct validity and test-retest reliability (Spielberger, 1983). Cronbach's alpha for the STAI trait scale in the present study was .90 indicating very high internal consistency.

3.2.4 The Parental Bonding Instrument (Parker et al., 1979) (see Appendix D)

Perception of past maternal parenting was assessed with the Parental Bonding Instrument (PBI) (Parker et al., 1979). The PBI, developed in Australia by Parker, Tupling and Brown (1979), is a widely used instrument that can be used to assess perceived memories of being parented during the first 16-years. An underlying assumption of the scale is that parental care and overprotection directly affect the parent-child relationship (Canetti, Bachar, Galili-Weisstub, De-Nour, & Shalev, 1997). The PBI has two dimensions: Care and Overprotection. The Care factor consists of 12-items (score range from 0 to 36). High scores reflect warmth, affection and empathy while low scores indicate emotional coldness, indifference and neglect. An example of a Care item is "Spoke to me with a warm and friendly voice". The second dimension, Overprotection, consists of 13-items (scores range from 0 to 39). High Overprotection scores reflect parental control, intrusion and prevention of independent behaviour. Low scores indicate acceptance of independent behaviour and autonomy. An example of an Overprotection item is "Tried to control everything I did". Participants are asked to think about their relationship with their mother and/or father, during the first sixteen

years of childhood, and indicate the degree to which the parental attitudes and behaviours described in each statement described their parent, on a scale *very unlike* (0) to *very like* (3). Items on each subscale are summed to provide scores for each dimension. As the current study had only a modest sample size the number of variables needed to be limited in order to have adequate power so only the maternal form was used. The maternal form was chosen because mothers are more often studied than fathers and a number of studies (Birtchnell, 1988; Enns et al., 2002; Parker, 1979b) have demonstrated that early experience of past parenting by mothers has been more influential than perceptions of past parenting by fathers.

Acceptable test-retest reliability and validity have been shown in a variety of subject populations and settings (Boyce, Hickie, & Parker, 1991; Crowell & Feldman, 1989; Ingram & Ritter, 2000; Parker, 1989; Wilhelm, Niven, Parker, & Hadzi-Pavolic, 2005). Parker et al. (1979) obtained test-retest reliability coefficients of .76 for the Care scale and .63 for the Overprotection scale on two occasions three weeks apart. Split-half reliability was .88 for the Care dimension and .74 for the Overprotection dimension. MacKinnon, Henderson, Scott and Duncan-Jones (1989) used the PBI in a community sample of 386 Australian adults drawn from the Canberra electoral register. Analyses replicated the factor structure of the PBI, as previously reported by Parker et al. (1979), indicating two dimensions, which were moderately correlated (MacKinnon et al., 1989). Test-retest correlations were strong for both dimensions and ranged from .89 to .95 for Care and .74 to .89 for Overprotection, regardless of the time between interviews (MacKinnon et al., 1989). The stability of the PBI over a 20-year period, in a primarily non-clinical population, has also recently been demonstrated (Wilhelm et al., 2005). This research indicated that PBI scores remained consistent and stable over time and

were unaffected by age, social class and sex of the respondent. In the present study, Cronbach's alpha was 0.91 for the Care scale and .85 for the Overprotection scale, indicating very high internal consistency. The terms perceived past maternal care and perceived past maternal overprotection have been used to avoid confusion between two sets of relationships: the mother's relationship with her mother and her relationship with her child.

3.2.5 Maternal Sleep History Questionnaire (see Appendix E)

Maternal sleep history prior to pregnancy was measured using an adapted version of Edinger's (1987) Sleep History Questionnaire. Edinger's questionnaire is a tool for compiling an individual's sleep history for assessing insomnia complaints. The questionnaire consists of six sections: a) patient demographic data; b) medical illnesses and their pharmacologic treatments; c) psychiatric history, d) nature, duration and severity of the sleep problem, patient expectancies for sleep, and sleep-specific physiologic conditions that may cause insomnia; e) sleep habits, environmental factors and cognitive variables that may disrupt sleep; f) sleep medication or alcohol use history. The instrument also includes space for the client to write a narrative description of the sleep difficulty.

The Maternal Sleep History Questionnaire (MSHQ) used in the current study consisted of five closed questions, which related to sleep habits and expectations for sleep prior to pregnancy. An example of a sleep habit question is "What time did you go to bed at night?" Participants were asked to reflect on their sleep habits and then answer these questions. A further six questions, which measured the nature and severity of sleep symptoms were derived from section (d) of Edinger's (1987) Sleep History Questionnaire. Participants were asked to rate sleep symptoms on a 5-point scale

ranging from 0 (*not a problem*) to 4 (*almost always a problem*). Example of sleep difficulty items are “Dread going to bed” and “Trouble falling asleep”. The responses to each of the 6 items were added to produce a total score ranging from 0 to 24 and in the current study this score was used to represent maternal sleep history. High scores indicated that participants had a sleep problem. No formal tests of item reliability or validity have been conducted on the Sleep History Questionnaire but the items are reported to have face validity (Edinger, 1987). In the current study, Cronbach’s alpha for the adapted measure was .82 indicating high internal consistency.

3.2.6 Maternal Cognitions about Infant Sleep Questionnaire – Setting Limits, Anger, Doubt (MCISQ-SAD) (see Appendix F)

The 20-item Maternal Cognitions about Infant Sleep Questionnaire (MCISQ) was developed by Morrell (1999b) as a self-report instrument to measure mother’s cognitions about their infant’s sleep behaviours. The MCISQ consists of five-subscales: Limit Setting, Anger, Doubt, Feeding and Safety. Each item is rated on a 6-point scale ranging from 5 (*strongly agree*) to 0 (*strongly disagree*). Scores on items that comprise each subscale are summed to produce a total scale score. High scores on the Limit Setting subscale suggest difficulty by the mother in resisting her infant’s demands at night. High scores on the Anger subscale reflect feelings of anger, regret and helplessness that the mother may experience in response to the demands of parenting when the infant wakes or has trouble settling at night. High scores on the Doubt subscale suggest uncertainty experienced by the mother regarding the adequacy of her parenting as related to infant sleep problems. High scores on the Feeding subscale suggest that the mother believes feeding is important to soothe her infant at night. Finally, high scores on the Safety subscale indicate more concerns around the possibility of Sudden Infant Death Syndrome occurring while the infant sleeps at night.

Examples of items from each factor include: cognitions about limit settling ('My child will feel abandoned if I don't respond immediately to his/her cries at night'); anger at the infant's demands ('When my child cries at night, I wish I had never had a child'); doubt about parenting competence ('When my child doesn't sleep at night, I doubt my competence as a parent'); worries about feeding during the night ('When my child wakes at night, I think I may not have fed him/her enough during the day'); worries about safety ('My child might die unexpectedly in his/her sleep').

Morrell (1999b) measured the reliability and validity of the 20-item MCISQ in several studies of infants aged between 13 to 16 months. A test-retest reliability coefficient of .81 was obtained on two occasions four weeks apart. Cronbach's alpha was 0.82 indicating high internal consistency. In the original validation study (1999b) only three subscales (Limit Setting, Anger, Doubt) were shown to be associated with infant sleeping problems. In the current study these three sub-scales were combined (15 items) and referred to as the MCISQ-SAD scale and only these subscales were analysed. Higher scores on the MCISQ-SAD scale indicate more problematic sleep-related cognitions for Limit Setting, Anger and Doubt. Cronbach's alpha for the MCISQ-SAD scale in the current study was .76 indicating moderate internal consistency.

3.2.7 Active Physical Comforting subscale of the Parental Interactive Bedtime Behaviour Scale (Morrell & Cortina-Borja, 2002) (see Appendix G)

Maternal behaviours used to settle infants to sleep were measured with the Parental Interactive Bedtime Behaviour Scale (PIBBS). The scale, developed by Morrell and Cortina-Borja (2002), is a 17-item self-report questionnaire which measures the frequency of behaviours used to settle children to sleep. The PIBBS consists of five

subscales representing different strategies chosen by mothers to settle children to sleep:

- 1) Active Physical Comforting (e.g. the use of cuddling or settling in the parental bed;
- 2) Encouraging Autonomy (e.g. leave to cry;
- 3) Settle by Movement (e.g. the use of car or stroller rides;
- 4) Passive Physical Comforting (e.g. standing next to the cot without picking the infant up);
- 5) Social Comforting (e.g. talking softly).

Mothers were asked to rate how frequently they used each of these behaviours to settle their child to sleep, on a five-point scale, from 0 (*never*) through to 4 (*very often*). High scores indicated this strategy was used more commonly by mothers to settle their infants. Morrell & Cortina-Borja (2002) demonstrated the reliability and validity of the PIBBS in several studies. In a sample of 99 mothers and their 13 month old infants, Cronbach's alpha was reported as 0.71 indicating moderate internal consistency for the test items. The PIBBS was also found to be correlated significantly with entries recorded in Richman's sleep diary ($r = .73, p < .001$) thus demonstrating convergent validity. As the PIBBS assessed different but moderately correlated behavioural strategies, the authors suggested that the subscales should be used rather than the total score (Morrell & Cortina-Borja, 2002). For the purpose of this study only the Active Physical Comforting subscale (6 Items) was used. Cronbach's alpha for the Active Physical Comforting factor was .72 indicating moderate internal consistency.

3.2.8 The Infant Sleep Questionnaire (Morrell, 1999a) (see Appendix H)

The Infant Sleep Questionnaire (ISQ) is a 10-item maternal report that examines infant sleep from the perspective of settling problems, night-waking problems and sleeping in the parental bed (Morrell, 1999a). Part 1 of the questionnaire comprises 9 questions with mothers giving a numeric response (ranging from 0-7 depending on the question) that indicates detail relating to, a) the mother putting her baby to bed - such as how long it takes to settle the baby, how many times a week she has problems settling

her baby and, b) the baby waking during the night- such as how many nights a week the baby wakes, how many times during the night the baby wakes and how long it takes to get the baby back to sleep. A further question asks how often the baby is taken into the parental bed during the night as a way of getting the baby to sleep. A total score (0-38) can be obtained by summing these responses with a high score reflecting more problematic infant sleep. It had been suggested by Cronin et al. (2008) that there is an overlap between item 8 of the ISQ (“How often do you end up taking your baby into your bed because s/he is upset and won’t sleep?”) and item 17 of the Parent Interactive Bedtime Behaviour Scale (“How often do you settle in parent’s bed?”). Therefore, in the current study, item 8 of the ISQ was excluded from the calculation of the total score so that mothers were asked 8 questions yielding a possible total score of 31. This score was used as the outcome measure in the current study. The alpha level for the modified scale was .75 indicating moderate internal consistency. In Part 2 of the questionnaire mothers were asked to rate their child’s sleep, on a four-point scale (no problem, mild, moderate or severe problems). Infants with sleep problems based on maternal ratings were those reported as having mild, moderate or severe problems.

Morrell (1999a) established the concurrent validity of the ISQ by comparing Richman’s criteria (1999a) and maternal ratings with ISQ total scores in a British sample of 467 mothers with their 13 month old infants recruited from General Practitioner practices. Using an ISQ cut-off score of 12 or above, the sensitivity and specificity for Richman’s (1981) criteria was 94% and 93% respectively. Using an ISQ cut-off score of 6 or above for the maternal criteria sensitivity was 88% and specificity was 86%. Test-retest reliability coefficients of .93 (maternal rating) and .92 (total score) were obtained on two occasions two to four weeks apart. In a US study of 118 mother-

infant dyads (65 cocaine-exposed, 53 non-cocaine exposed) assessed at 7 months, Cronbach's alpha was reported as 0.73 indicating moderate internal consistency for the test items (Schuetze, Lawton, & Eiden, 2006). In the current study the alpha level was .74 indicating moderate internal consistency.

It had been suggested by Cronin (2008) that there is an overlap between item 8 of the ISQ ("How often do you end up taking your baby into your bed because s/he is upset and won't sleep?") and item 17 of the Parent Interactive Bedtime Behaviour Scale ("How often do you settle in parent's bed?"). Therefore, in the current study, item 8 of the ISQ was excluded from the calculation of the total score so that mothers were asked 8 questions yielding a possible total score of 31. The alphas level for the modified scale was .75 indicating moderate internal consistency.

3.3 Procedure

3.3.1 Ethics Approval

Approval for this research project was obtained from Victoria University Ethics Committee.

3.3.2 Recruitment of Participants

The sample was recruited through Maternal Child Health (MCH) Centres in Western Melbourne. Permission to approach MCH nurses attending a monthly supervision meeting in the region was obtained from the MCH Unit Leader for the City of Wyndham. The MCH nurses, who represented fourteen MCH Centres of the selected region, were provided with information about the study and eight agreed to assist with recruitment on site. Each MCH nurse was provided with a recruitment poster (see

Appendix I) for display in the waiting area of each centre and brochures for distribution to interested mothers (see Appendix J).

The recruitment of participants took place over a 12 month period. Mothers who met the inclusion criteria were invited by the MCH nurse to participate in the research project about the effects of selected maternal factors on infant sleep. Each mother was provided with a participant brochure (see Appendix J) and asked if they would be willing to have the researcher contact them to explain the study. If the mothers agreed, the following contact details were recorded by the MCH nurse on the Recruitment Sheet (see Appendix K): mother's first name, infant's date of birth and telephone number. The completed Recruitment Sheet was faxed to the researcher every few weeks. Mothers who had provided their telephone number were contacted by the researcher to explain the project, answer any questions and invite the mothers to participate. For those mothers interested in participating a time was arranged to meet (either in her home or at her local MCH Centre), obtain a signed consent (see Appendix L) and administer the questionnaire.

3.3.3 Data Collection

All of the information used in this study was supplied by mothers who completed the questionnaire booklet in the following order:

- Demographic data
- Edinburgh Postnatal Depression Scale
- Trait Anxiety Inventory
- Parental Bonding Instrument
- Maternal Sleep History
- Maternal Cognitions about Infant Sleep
- Active Physical Comforting
- The Infant Sleep Questionnaire

Completion of the questionnaire booklet took approximately 25 minutes.

The researcher was present during the administration of the questionnaire and therefore available to answer any questions or provide assistance. In circumstances where the participant became distressed or expressed a wish to discuss personal issues arising from the questionnaire, relevant referral options were provided to the participant (see Appendix M). When the participant had completed the questionnaire the researcher checked the Edinburgh Postnatal Depression Scale (EPDS) (see Appendix B). When an EPDS score was ≥ 13 , the researcher suggested that the mother may like to consult her General Practitioner or access support from one of the free counselling or information services from the list provided (see Appendix M).

3.3.4 Design and Statistical Analysis

The study used a cross-sectional design. Data was entered into Statistical Package for the Social Sciences Version 14 (SPSS for Windows, 2006) for statistical analyses. A-priori power analysis was conducted, using the free on-line program G*Power 3.1.3 (Faul, Erdfelder, Buchner, & Lang, 2009). For the bivariate correlations required to test the hypotheses (Section 2.3.1) based on a medium effect size (f^2) of .15 and power of 0.80, an estimated sample size of 85 was required to detect significant correlation coefficients at an alpha level 0.05. Guidelines provided by Cohen (1988) were followed for the multiple regression analysis with seven predictors. With power of 0.80, an alpha level of 0.05 and a medium effect size (f^2) of .15 the number of participants required was calculated at 103.

Pearson's Product Moment Correlations coefficients were generated to describe the strength and direction of the linear relationships between the variables specified in the hypotheses. Hierarchical multiple regression analysis was used to test the relationships between the independent variables and the outcome variable as shown in

the proposed model. Hierarchical multiple regression assesses the influence of the predictor variables in a sequential way, such that the relative importance of each predictor may be judged on the basis of how much it adds to the prediction of a criterion, over and above that contributed by predictor variables entered earlier in the analysis. The assessment of indirect pathways was conducted using the procedure outlined by Baron & Kenny (1986). This method is described in the results section.

4 Results

4.1 Data Screening and Preliminary Analyses

Before conducting the main analyses the data was checked for accuracy and missing data. Frequency tables, histograms and box plots were generated to examine the data for out of range values. No out-of-range values were found and the means and standard deviations were within an acceptable range. Examination of data revealed no missing data.

Univariate outliers were identified as cases with standardised z scores above + 3.29 or below - 0.29 (Tabachnick & Fidell, 2007). Only one case was found to have a score in excess of 3.29 standard deviations from the mean of the distribution: perception of past maternal care (case 92). It was decided to keep this case as it appeared to be part of the population studied. Box-plots and histograms were also generated and inspected.

Multivariate outliers were checked by inspecting Mahalanobis distance statistic. Using a criterion value of $P < .001$, as suggested by Tabachnick & Fidell (2007) no multivariate outliers were identified among the cases. The assumption of normality of residuals was not violated.

Assumptions of normality were assessed by examining histograms, probability plots and skewness statistics. An inspection of the histograms indicated that none of the variables were normally distributed. Some skewness was expected given it was a community sample, with variables tending to show skewness toward the functional end of the scale. Previous research has suggested that appropriate skewness values are those that range from -1 to +1 (Lovibond & Lovibond, 1995). Skewness statistics were

obtained, and it was noted that only one of the seven independent variables had a skew greater than -1.00. The most heavily skewed variable was perceived past maternal care with a skew of -1.28. A one-sample Kolmogorov-Smirnov test indicated that the assumption of normality was satisfied as the observed p -value (.175) exceeded the 0.5 level of significance required to accept the null hypothesis, allowing the data to be fitted by a multiple regression model.

Multicollinearity and singularity were investigated by inspecting the intercorrelations between variables (Hair, Black, Babin, Anderson, & Tatham, 2006; Tabachnick & Fidell, 2007). Inspection of data indicated no evidence of multicollinearity and singularity. While it was observed that maternal trait anxiety and depressive symptoms were highly correlated ($r = .71, p < .01$), this correlation was less than the recommended r -value of .90 (Tabachnick & Fidell, 2007) used to assess independence of variables. As a further check, collinearity statistics (variance inflation factor and the tolerance statistic) were also run with results indicating acceptable tolerance levels.

Analyses were conducted with demographic variables to ascertain the existence of any factors that needed to be specified as covariates in the main analysis where infant sleep outcome was the dependent variable. A significance level of .05 was specified for the analyses. All demographic variables were considered for possible associations with the dependent variable, though different tests were utilised according to whether the variable was categorical (using one-way analysis of variance) or continuous (using Pearson r correlations). None of the demographic variables were significantly associated with infant sleep outcome.

4.2 Sample Characteristics

A total of 128 mothers were invited to participate in the study by a MCH Nurse while attending their MCH Centre. Of those mothers approached, 119 (93%) agreed to be contacted by the researcher. Table 1 shows the total number of mothers recruited from the various MCH centres.

Table 1 *Recruitment of Participants from MCH Centres*

| MCH Centre | Location | Invited | Contacted | Completed Booklet | % Completed /Contacted |
|-----------------|------------------|------------|------------|-------------------|------------------------|
| Heathdale | Werribee | 18 | 14 | 11 | 78.6 |
| Iramoo | Wyndham Vale | 7 | 5 | 5 | 100.0 |
| Mossfiel | Hoppers Crossing | 15 | 15 | 10 | 66.7 |
| Quantin Binnah | Werribee | 17 | 17 | 14 | 82.3 |
| Sr Rita Douglas | Werribee | 10 | 9 | 7 | 77.8 |
| The Grange | Hoppers Crossing | 3 | 2 | 2 | 100.0 |
| Wilmington | Hoppers Crossing | 4 | 3 | 2 | 66.7 |
| Yerambooe | Hoppers Crossing | 54 | 54 | 49 | 90.7 |
| Total | | 128 | 119 | 100 | |

Of the 119 mothers contacted, 19 subsequently withdrew their support citing the following reasons: three reported being too stressed; seven were no longer interested and nine mothers could not be contacted. One hundred mothers completed the questionnaire booklet giving a response rate of 84%; 99 mothers completed it at home and one participant at the MCH centre.

As the sample recruited had only five infants aged 10 months or over it was decided that to ensure a more homogeneous sample they would not be included in the data analyses.

The final sample consisted of 95 primiparous women who ranged in age from 19 to 43 years with a mean age of 29.74 years ($SD = 4.82$). The infants ranged in age from 6 to 9 months, with a mean age of 7.76 months ($SD = 1.15$). Female infants ($n = 53$) outnumbered male infants who represented 44% ($n = 42$) of the sample.

The marital status and living arrangements of the participants are presented in Table 2 below. The majority of mothers (97%) reported that they were married ($n = 67$) or in a de facto relationship ($n = 25$). Three mothers reported that they were not in a relationship; two lived with parents and one lived alone.

Table 2 *Marital Status and Living Arrangements*

| Variable | Number ($N = 95$) | Percentage (%) |
|--------------------|------------------------|-------------------|
| Marital status | | |
| Married | 67 | 70.5 |
| De facto | 25 | 26.3 |
| Single | 3 | 3.2 |
| Living arrangement | | |
| With partner | 92 | 94.7 |
| With parent | 2 | 2.1 |
| Alone | 1 | 3.2 |

There were 9 different ethnic backgrounds and 14 different countries of birth represented in the sample. Ethnic categories were based on the Australian Standard

Classification of Cultural and Ethnic Groups (Australian Bureau of Statistics., 2005).

The majority of participants ($n = 76$, 80%) were born in Australia and 75 (79%) described themselves as Australian. The remaining twenty women (21%) reported the following ethnicity: North-West European ($n = 9$), North African (Non-Arab) ($n = 1$), East Asian ($n = 2$), Far East Asian & South East Asian ($n = 3$), Polynesia ($n = 1$), South America ($n = 1$), Southern & Eastern Europe ($n = 7$) and New Zealand ($n = 1$). The 20 women born outside Australia were from the following countries: Ireland ($n = 2$), Laos ($n = 1$), Russia ($n = 1$), United Kingdom ($n = 3$), Bosnia ($n = 2$), Germany ($n = 1$), Sri Lanka ($n = 2$), Philippines ($n = 1$), Indonesia ($n = 2$), Samoa ($n = 1$), Hungary ($n = 1$), Cyprus ($n = 1$) and Singapore ($n = 1$).

Education level of the participants is reported in Table 3 below. The majority of mothers ($n = 70$, 74 %) reported that they had completed post-secondary education with 36 mothers having gained a Bachelor's degree or higher and 34 having completed Technical and Further Education (TAFE) courses. Seven mothers had not completed secondary education with 2 of these mothers leaving school before the end of year 10.

Table 3 *Participation in Education*

| Variable | Number ($N = 95$) | Percentage (%) |
|---------------------------------|------------------------|-------------------|
| Incomplete Secondary Education | 7 | 7.4 |
| Completed Secondary Education | 18 | 18.9 |
| Technical and Further Education | 34 | 35.8 |
| Tertiary Education | 36 | 37.9 |

Mothers were also asked about their usual occupation. Responses categorised according to the Australian and New Zealand Standard Classification of Occupations

(Australian Bureau of Statistics, 2007) are reported in Table 4 below. Slightly more than half the participants worked in the more “traditional” female fields of clerical, sales and service related jobs ($n = 61$, 64%). Just over one-fifth of participants ($n = 22$, 23%) worked in professional occupations while 8% ($n = 8$) worked in a trade.

Table 4 *Maternal Occupation*

| Variable | Number ($N = 95$) | Percentage (%) |
|-----------------------------------|------------------------|-------------------|
| Manager | 3 | 3.2 |
| Professional | 22 | 23.2 |
| Technicians and trade workers | 8 | 8.4 |
| Community & personal services | 10 | 10.5 |
| Clerical & administrative workers | 35 | 36.8 |
| Sales workers | 16 | 16.8 |
| Machinery operators and drivers | 1 | 1.1 |

Maternal employment status is reported below in Table 5. At the time of recruitment, nearly 67% of mothers ($n = 61$) were engaged in the full-time care of their infant. Forty-one per cent ($n = 39$), reported being on maternity leave, another 15% ($n = 14$) had resigned before the birth of their infant and six mothers (6%) were receiving social security benefits. Two women (2%) were neither employed nor received a government pension because of visa restrictions. Three participants (3%) were studying and thirty-one mothers (31%) were employed outside the home. Six (6%) had returned to full-time employment, 25 mothers (26%) were employed part-time. Mothers engaged in part-time employment worked a range of hours. Nine mothers worked limited hours (1 to 15 hours per week) while the remaining 16 participants worked between 16 to 32 hours per week.

Table 5 *Maternal Employment Status*

| Variable | Number | Percentage (%) |
|--|--------|----------------|
| Maternity leave | 39 | 41.1 |
| Left employment in anticipation of birth | 14 | 14.7 |
| Unemployed, on social security benefit | 6 | 6.3 |
| Student | 3 | 3.2 |
| Not usually employed | 2 | 2.1 |
| Part-time employment | 25 | 26.3 |
| Full-time employment | 6 | 6.3 |

4.3 Descriptive Statistics and Correlations

Descriptive statistics, including range, mean and standard deviation for each variable are reported in Table 6 below.

Table 6 *Descriptive data for maternal variables*

| Variable | Possible Range | Min. score | Max. score | <i>M</i> | <i>SD</i> |
|--|----------------|------------|------------|----------|-----------|
| Depressive symptoms | 0-30 | 0 | 19 | 7.23 | 3.97 |
| Trait anxiety | 20-80 | 20 | 59 | 32.76 | 8.27 |
| Perceived past maternal care | 0-36 | 0 | 36 | 28.38 | 7.85 |
| Perceived past maternal overprotection | 0-39 | 0 | 33 | 11.61 | 7.29 |
| Maternal sleep history | 0-24 | 0 | 21 | 6.66 | 4.50 |
| Maternal cognitions about infant sleep-SAD | 0-75 | 6 | 44 | 24.02 | 9.66 |
| Active physical comforting | 0-24 | 0 | 23 | 9.68 | 5.17 |
| Infant sleep outcome | 0-31 | 0 | 24 | 8.15 | 6.41 |

The mean depressive symptoms score for the sample was 7.23 ($SD = 3.97$).

Scores ≥ 13 were the threshold identified by Cox & Holden (1987) as indicating women likely to be experiencing PND. The EPDS identified 7 mothers (8%) with a score above

the recommended cut-off score and one mother described feeling suicidal. As specified in the procedure these mothers were directed to appropriate services.

The mean trait anxiety score was 32.76 ($SD = 8.27$) which was slightly lower than the norms reported by Spielberger (2003) for adult working females ($M = 34.79$, $SD = 9.22$).

The mean perceived past maternal care score for the sample was 28.38 ($SD = 7.85$) while the mean perceived past maternal overprotection score was 11.61 ($SD = 7.29$). The mean perceived past maternal care score was slightly higher than those for the General Practice female adult patient ($M = 27.10$) and student ($M = 26.30$) samples, while the mean perceived past maternal overprotection score was lower than those for both female general practice patients ($M = 12.90$) and students ($M = 13.80$) reported by Parker et al. (1979).

Maternal sleep history was assessed using the Maternal Sleep History Questionnaire. The mean score for the sample was 6.66 ($SD = 4.50$, range 0-21). The distribution of scores, as displayed in Figure 2 below, indicates that most of the participants in the sample did not consider themselves to have a sleep problem prior to becoming pregnant, as indicated by the clustering of scores at the lower end of the scale.

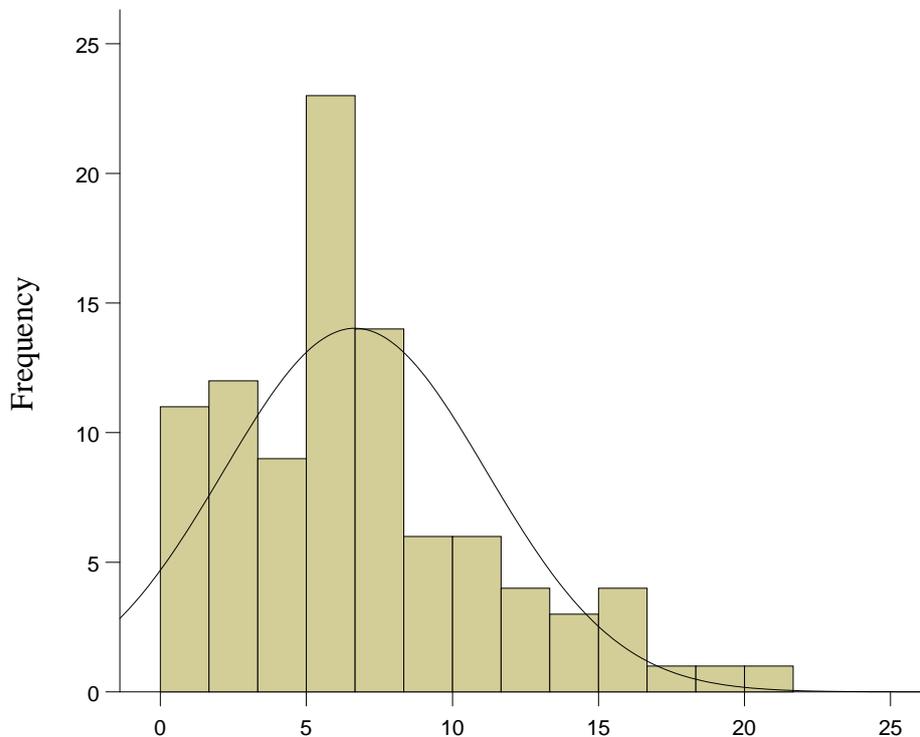


Figure 2. Distribution of maternal sleep history scores.

Information relating to maternal sleep habits and expectations for sleep before pregnancy are displayed in Table 7 below. Data from participants indicated that they had little difficulty in initiating and /or maintaining sleep. The mean time for going to bed was 21:48 ($SD = 3.44$). Participants took, on average, just 00:21 minutes to fall asleep ($SD = 0.17$) with 53% of mothers falling asleep within 15 minutes. The average rising time was 07.02 ($SD = 1.12$). While 87 mothers (92%) thought they should have eight hours or more sleep each night, only 53 (56%) participants had actually slept for this amount of time prior to becoming pregnant. The average sleep time at night was 7.5 hours.

Table 7 *Maternal pre-pregnancy sleep habits*

| Variable | <i>M</i> | <i>SD</i> |
|---------------------|----------|-----------|
| Bed Time | 21:48 | 3.44 |
| Falling Asleep | 00:21 | 0.17 |
| Rising Time | 07:02 | 1.12 |
| Actual Sleep Time | 07:49 | 1.18 |
| Expected Sleep Time | 08:09 | 0.37 |

The mean for the MCISQ-SAD scale (Settling Limits, Anger and Doubt) in the current study was 24.02 ($SD = 9.66$, range 6-44). In the original validation study, Morrell (1999b) did not report separate descriptive statistics for the Settling Limits, Anger and Doubt subscales.

The amount of physical comforting employed by mothers to settle their infant was measured with the Active Physical Comforting subscale of the Parent Interactive Bedtime Behaviour Scale (PIBBS) (Morrell & Cortina-Borja, 2002). The mean score was 9.68 ($SD = 5.17$, range 0-23). In the original validation study, Morrell and Cortina-Borja (2002) did not report descriptive statistics for the Active Physical Comforting subscale.

The percentage of mothers choosing each particular settling strategy of the Active Physical Comforting sub-scale was also calculated and is displayed in Table 8 below. Almost all mothers (95%) used at least one or more active physical comforting strategies to settle their infant at bedtime. Of these mothers only one mother used a single strategy (stroking) to settle her infant at bedtime. Stroking (76%), feeding (68%) and cuddling (66%) were the most commonly employed strategies, while settling the

infant on the sofa (33%) or in the parental bed (29.5%) and carrying around the house (23%) were the least commonly employed strategies. Morrell & Cortina-Borja (2002) reported the following endorsement frequencies using the Active Physical Comforting sub-scale of the PIBBS: feeding (72%), cuddling (50%), stroking (50%), settling on the sofa (27%), settling in the parental bed (20%) and carrying around the house (10%).

Table 8 *Endorsement Frequencies (%) of Active Physical Comforting Strategies, Ranked from the most Common Strategy to the least Common Strategy*

| Variable | Never | Rarely | Some -times | Often | Very Often | Frequently |
|-----------------------------|-------|--------|----------------|-------|---------------|-------------|
| Stroking | 13.7 | 10.5 | 27.4 | 20.0 | 28.4 | 75.8 |
| Feeding | 21.1 | 10.5 | 23.2 | 18.9 | 26.3 | 68.4 |
| Cuddling | 15.8 | 17.9 | 31.6 | 9.5 | 25.3 | 66.4 |
| Settling on sofa | 52.6 | 14.7 | 14.7 | 11.6 | 6.3 | 32.6 |
| Settling in parental bed | 44.2 | 26.3 | 13.7 | 6.3 | 9.5 | 29.5 |
| Carrying around house | 54.7 | 22.1 | 13.7 | 2.1 | 7.4 | 23.2 |

Note. **Frequently** = Sometimes + Often + Very often.

Infant sleep outcome was measured using the total score from the ISQ (Morrell, 1999a). The mean score for the ISQ was 8.15 ($SD = 6.41$, range 0-24). Morrell did not report the mean ISQ total score for the Infant Sleep Questionnaire. All statistical analyses were based on ISQ as a continuous measure as the main focus of this study was on sleep outcome. However, because most studies have focussed on infants with problematic sleep the proportion of infants with sleep problems was also calculated. In order to make comparisons with the Morrell study in which a cut-off score of 12 on the

ISQ was used to detect sleep problems, the total ISQ score was recalculated to include question 8 (which had been omitted – see Section 3.2.8). Based on the recalculated ISQ total score 34 infants (36%) had scores at or above the recommended cut-off point of 12 indicating that these infants may have a sleep problem. Mothers reported that 37 infants (39%) had a sleep problem (23% mild, 13% moderate and 3% severe). The results are similar to maternal ratings reported by Morrell (1999b) where 37.8% had a sleep problem (25% mild, 9% moderate and 3% severe).

Pearson Bivariate Correlation analysis was conducted to assess the relationship between the variables included in the model (see Table 9). The correlational matrix revealed seven significant coefficients among the independent variables of interest and infant sleep outcome. The strength and direction of the associations, however, varied. The strongest association was between active physical comforting and infant sleep outcome ($r = .47, p < .01$). Other variables significantly correlated with infant sleep outcome included: maternal cognitions about infant sleep-SAD ($r = .42, p < .01$); maternal sleep history ($r = .29, p < .01$); depressive symptoms ($r = .28, p < .01$); trait anxiety ($r = .28, p < .01$); perceived past maternal overprotection ($r = .27, p < .01$), perceived past maternal care ($r = -.23, p < .05$); depressive symptoms ($r = .28, p < .01$).

Other maternal variables hypothesised to be associated included: perceived past maternal care and depressive symptoms ($r = -.38, p < .01$); trait anxiety and maternal cognitions about infant sleep-SAD ($r = .37, p < .01$); maternal cognitions about infant sleep-SAD and active physical comforting ($r = .36, p < .01$); perceived past maternal overprotection and trait anxiety ($r = .35, p < .01$); depressive symptoms and maternal cognitions about infant sleep-SAD ($r = .33, p < .01$) and trait anxiety and maternal sleep

history ($r = .31, p < .01$). Contrary to expectation, maternal sleep history was not significantly associated with maternal cognitions about infant sleep-SAD ($r = .16, ns$).

In summary, all the variables of interest were significantly correlated with infant sleep outcome. Only the hypothesised association between maternal sleep history and maternal cognitions about infant sleep-SAD was not significant.

Table 9 *Pearson Correlations between Maternal Factors and Infant Sleep Outcome*

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|--|---|--------|--------|--------|-------|--------|-------|-------|
| 1 Perceived past maternal care | - | -.67** | -.38** | -.42** | -.19 | -.28** | -.05 | -.23* |
| 2 Perceived past maternal overprotection | | - | .39** | .35** | .07 | .26** | -.04 | .27** |
| 3 Depressive symptoms | | | - | .71** | .22* | .33** | .12 | .28** |
| 4 Trait anxiety | | | | - | .31** | .37** | .07 | .28** |
| 5 Maternal sleep history | | | | | - | .16 | .10 | .29** |
| 6 Maternal cognitions about infant sleep-SAD | | | | | | - | .36** | .43** |
| 7 Active physical comforting | | | | | | | - | .47** |
| 8 Infant sleep outcome | | | | | | | | - |

* $P < .05$. ** $P < .01$.

4.4 Testing the Model of Infant Sleep Outcome

The analysis to test the model was initially run (see Appendix N) with the inclusion of all variables as shown in Figure 1 however results seemed to indicate that some variables were cancelling out the contribution of other variables due to intercorrelations between them. Examination of the results from the correlation analysis (see Table 9 above) showed that there was a strong, positive association between trait anxiety and depressive symptoms ($r = .74, p < .01$) and a strong negative correlation between perceived past maternal care and perceived past maternal overprotection ($r = -.67, p < .01$). Due to the high intercorrelation between perceived past maternal care and perceived past maternal overprotection and trait anxiety and depressive symptoms, it was decided to exclude perceived past maternal care and depressive symptoms from subsequent analyses.

Parker (1989; 1979), in earlier studies also found a negative correlation between perceived past maternal care and perceived past maternal overprotection scales in the order of $-.4$. and commented that this correlation suggested that the Care and Overprotection constructs of the PBI “are not independent and that Overprotection is associated with a lack of Care” (Parker, 1979b, p. 261). Parker (1999) further stated that “our experience encourages us to the view that Overprotection may frequently supplant or disallow Care thus explaining the association between scores on the two scales” (p. 2). In personal communication with Parker (October 31, 2011), he affirmed that the correlation of $-.67$ between the Care and Overprotection factors in the current study “was unusually high”.

In relation to trait anxiety and depressive symptoms it was decided to exclude depressive symptoms from further analyses and test a more parsimonious model in an effort to increase statistical power. While both variables had significant bivariate associations with infant sleep outcome, the decision to retain trait anxiety was based on consideration of the following issues:

- a) Anxiety is known to be very frequent among women during the postpartum period (Kessler, Keller, & Wittchen, 2001) though estimates vary depending on sample characteristics and instruments used to measure anxiety. Matthey et al. (2003) using the DSM-IV criteria (American Psychiatric Association, 2000) found rates of anxiety disorders such as phobia, panic disorder, or generalized anxiety disorder of up to 16% in a community sample of 216 primiparous mothers at six weeks postpartum. In a study of postpartum women at 8 weeks, Heron et al. (2004) reported that 16.5% of mothers had scores above the cut-off score for anxiety on the Crown-Crisp Experimental Index.
- b) Studies have also shown that the prevalence of anxiety disorders in the postpartum period may be higher than the incidence of postnatal depression (Matthey et al., 2003; Wenzel et al., 2003). For instance, Matthey et al. (2003), in the study described above, reported that rates of anxiety exceeded the rate of pure depression without anxiety by more than three times. Wenzel et al. (Wenzel et al., 2003) also reported a higher prevalence of generalized anxiety than the incidence of postpartum depression in their community study.
- c) Depression has been shown to be comorbid with trait anxiety (Britton, 2008; Heron et al., 2004), but anxiety is more present without depression (Heron et

al., 2004) and, as highlighted by a number of authors (Heron et al., 2004; Matthey et al., 2003; Ross et al., 2003) the EPDS, as with other measures of depressive symptoms, has been shown to include anxiety items thus confounding the independent contribution of depression.

Compared to the large body of research that has investigated the effects of postpartum depression on children (Rapee, 1997), including the effects of infant sleep (Armstrong, Van Haeringen, et al., 1998; Bayer et al., 2007; Hiscock & Wake, 2001; Karraker & Young, 2007; Morrell & Steele, 2003), there has been relatively little research attention given to the potential impact on children of maternal anxiety symptoms in the postpartum period (Glasheen, Richardson, & Fabio, 2010; Nicol-Harper, Harvey, & Stein, 2007). Consistent with findings that demonstrate altered interaction patterns between parents with anxiety and their school-aged children, Nicole-Harper et al. (2007) found that in a community sample of mothers, those with high trait anxiety had reduced sensitive responsiveness to their infants compared to mothers with low trait anxiety. Glasheen et al. (2010) conducted a recent systematic review of studies published between 1950 and 1980 that have examined the effects of postnatal maternal anxiety (PMA) on children. Only 18 articles (14 studies) were identified for inclusion with most involving community samples of healthy mother-infant dyads. Many of the studies were prospective and almost all studies used scores on the STAI (Spielberger, 1983) as the measure of maternal anxiety, while child outcome measures varied depending on the age of the child when assessed. In the review the child outcomes studies were categorised into three domains:

somatic, developmental and psychological. In studies focussed on the somatic domain outcomes were measured in the first year of life and while results suggested that PMA may be associated with colic and abdominal pain, the low number of studies precluded reliable conclusions. Importantly, none of the studies examined the effect of PMA on infant sleep. There is theoretical and empirical evidence suggesting a link between maternal anxiety and infant sleep (Morrell, 1999b; Thunström, 1999), but as noted in the literature review the main exploration of maternal anxiety and infant sleep has been specific to maternal separation anxiety (Hock et al., 1989; Hsu, 2004; Scher, 2008; Scher & Blumberg, 1999).

The model of infant sleep outcome (Figure 1) (with depressive symptoms and perceived past maternal care excluded) was tested using hierarchical regression. Infant sleep outcome was the outcome variable in the hierarchical multiple regression with the independent variables added in the following order: perceived past maternal overprotection (step 1), trait anxiety (step 2), maternal sleep history (step 3), maternal cognitions about infant sleep-SAD (step 4) and active physical comforting (step 5). In this way, the unique variance contributed by the more recent variables, over and above early variables, could be ascertained. Results of the hierarchical regression, unstandardized regression coefficients (B), standard error of the regression coefficients (SE_B), the standardised regression coefficients (β), the proportion of variance in infant sleep outcome explained by the set of predictor variables added at each step (R^2 change) are shown in Table 10 below.

Table 10 *Summary of Hierarchical Multiple Regression Analysis for Maternal Variables Predicting Infant Sleep Outcome*

| Independent variable | <i>B</i> | <i>SE_B</i> | <i>B</i> | <i>R²/ΔR²</i> | <i>F</i> change |
|--|----------|-----------------------|----------|-------------------------------------|-----------------|
| Step 1 | | | | .08 | 7.49** |
| Perceived past maternal overprotection | .24 | .09 | .27** | | |
| Step 2 | | | | .04 | 4.00* |
| Perceived past maternal overprotection | .18 | .09 | .20 | | |
| Trait anxiety | .16 | .08 | .21* | | |
| Step 3 | | | | .05 | 5.33* |
| Perceived past maternal overprotection | .19 | .09 | .21* | | |
| Trait anxiety | .10 | .08 | .14 | | |
| Maternal sleep history | .33 | .14 | .23* | | |
| Step 4 | | | | .10 | 11.75** |
| Perceived past maternal overprotection | .14 | .09 | .16 | | |
| Trait anxiety | .03 | .08 | .03 | | |
| Maternal sleep history | .30 | .14 | .21* | | |
| Maternal cognitions about infant sleep–SAD | .23 | .07 | .34** | | |
| Step 5 | | | | .13 | 18.90*** |
| Perceived past maternal overprotection | .18 | .08 | .21* | | |
| Trait anxiety | .04 | .08 | .06 | | |
| Maternal sleep history | .27 | .13 | .19* | | |
| Maternal cognitions about infant sleep–SAD | .12 | .07 | .18 | | |
| Active physical comforting | .49 | .11 | .39*** | | |

Note. *df* Step1 = 1, 93; *df* Step2 = 1, 92; *df* Step3 = 1, 90; *df* Step 4 = 1, 89; *df* Step 5 = 1, 88.

* $P < .05$ ** $P < .01$ *** $P < .001$.

The hierarchical regression analysis indicated that the model as a whole accounted for a significant proportion of the variance in infant sleep outcome ($F(5, 89) = 11.32, p < .001$). Overall, the total variance explained by the predictor variables (perceived past maternal overprotection, trait anxiety, maternal sleep history, maternal cognitions about infant sleep-SAD, active physical comforting) was 39%.

The addition of perceived past maternal overprotection at step 1 reliably, though modestly, improved prediction of infant sleep outcome ($F \text{ Change}(1, 93) = 7.49, p < .01; \Delta R^2 = .08$) and explained 8% of the variance in infant sleep outcome. The direction of the beta coefficient indicated that an increase in the perceived past maternal overprotection score corresponded to an increase in problematic infant sleep scores ($\beta = .21, p < .05$).

The addition of trait anxiety at step 2 also improved the model fit and accounted for significant $F \text{ Change}(1, 92) = 4.0, p < .05; \Delta R^2 = .04$). The R square increased by .04 explaining 4% of the total variance in infant sleep outcome. Review of the beta coefficients indicated, however, that only trait anxiety was uniquely associated with infant sleep outcome ($\beta = .21, p < .05$). Perceived past maternal overprotection did not make a unique contribution to the variance in infant sleep outcome.

The addition of maternal sleep history at step 3 also improved model fit and accounted for significant $F \text{ Change}(1, 91) = 5.33, p < .05; \Delta R^2 = .05$). The R square increased by .05 explaining 5% of the total variance in infant sleep outcome. The direction of the beta coefficient indicated that an increase in maternal sleep history scores corresponded to an increase in problematic infant sleep scores ($\beta = .23, p < .05$).

Examination of the beta coefficients indicated that perceived past maternal overprotection was uniquely associated with infant sleep outcome ($\beta = .21, p < .05$). Trait Anxiety no longer made a significant independent contribution to infant sleep outcome.

The addition of maternal cognitions about infant sleep-SAD at step 4 also improved the model fit and accounted for significant F Change (1, 90) = 11.75, $p < .001$; $\Delta R^2 = .10$). The R square increased by .10 explaining 10% of the total variance in infant sleep outcome. The direction of the beta coefficient indicated that problematic maternal cognitions about infant sleep was significantly associated with higher infant sleep outcome scores after controlling for the other predictor variables ($\beta = .34, p < .001$). Examination of the beta coefficients indicated that maternal sleep history was uniquely associated with infant sleep outcome ($\beta = .21, p < .05$). Perceived past maternal overprotection and trait anxiety were not uniquely associated with infant sleep outcome.

In the final step, the addition of active physical comforting improved the model fit and accounted for a significant proportion of the variance in infant sleep outcome F Change (1, 89) = 18.90, $p < .001$; $\Delta R^2 = .13$). The R square increased by .13 explaining 13% of the total variance in infant sleep outcome. Perceived past maternal overprotection, maternal sleep history and active physical comforting were significantly associated with infant sleep outcome after controlling for the other independent variables with active physical comforting making a stronger contribution than maternal sleep history and perceived past maternal overprotection to the variance in infant sleep outcome. The direction of the beta coefficient indicated that increased use of active

physical comforting strategies corresponded to higher infant sleep outcome scores ($\beta = .39, p < .001$). The direction of the beta coefficient also indicated that an increase in the degree of perceived past maternal overprotection was associated with higher infant sleep outcome scores ($\beta = .21, p < .05$). Likewise, the direction of the beta coefficient indicated that a history of maternal sleep difficulties corresponded to higher infant sleep outcome scores ($\beta = .19, p < .05$).

Therefore, while trait anxiety and maternal cognitions about infant sleep–SAD were both salient predictors of infant sleep outcome, in combination with active physical comforting, perceived past maternal overprotection, maternal sleep history their effect was found to be non-significant. Overall, the statistical analyses indicated that the current data did not provide a totally good fit for the proposed model.

Part correlations were examined and squared in order to give the unique variance in the outcome variable infant sleep outcome explained by each independent variable. Active physical comforting was found to account for the largest proportion of unique variance (13%) in the full model. Perceived past maternal overprotection accounted for 4% of the variance in infant sleep outcome while maternal sleep history accounted for 3%. A revised version of the model is shown in Figure 3 below.

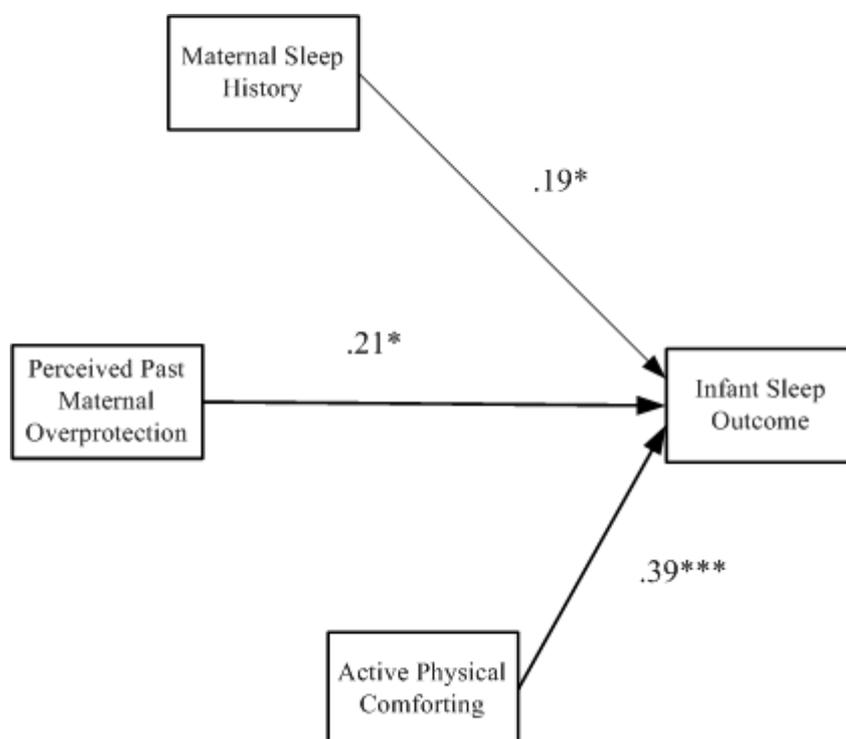


Figure 3. Revised model of maternal factors influencing infant sleep outcome.

4.5 Indirect Pathways

To examine potential indirect pathways, Baron & Kenny's (1986) guidelines for testing mediation models were followed to determine full or partial mediated pathways. According to Baron and Kenny (1986) a variable is confirmed as a mediator variable if the following four conditions are satisfied:

1. The independent variable must be significantly associated with the mediating variable (Path A).
2. The proposed mediating variable must be significantly associated with the dependent variable (Path B).
3. The independent variable must be significantly associated with the dependent variable (Path C).
4. In the fourth condition the beta coefficient for the independent variable must be non-significant in the presence of the mediating variable (mediation) (see Figure 4). If the beta coefficient is reduced but still significant, then it can be concluded that the effect of the independent variable on the dependent variable is only partially mediated.

To perform mediated hierarchical regression Tabachnick & Fidell (2007) recommended using an alpha level of .05 to test conditions 1 to 3 and .01 to assess condition 4. The more conservative level compensates for the experiment wise error rate associated with a multiple number of regression analyses.

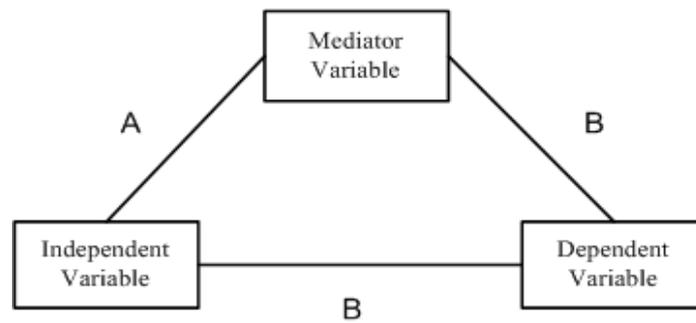


Figure 4. Schematic diagram of a mediated relationship.
(adapted from Baron & Kenny (1986, p. 1176)

The following hypotheses, related to the mediating role of maternal cognitions about infant sleep-SAD and the mediating role of active physical comforting, were tested.

15. The positive association between trait anxiety and infant sleep outcome will be mediated by maternal cognitions about infant sleep-SAD.
16. The positive association between maternal sleep history and infant sleep outcome will be mediated by maternal cognitions about infant sleep-SAD.
17. The positive association between maternal cognitions about infant sleep-SAD and infant sleep outcome will be mediated by active physical comforting.

The results from the testing of these hypotheses are presented below with the statistical output for hypotheses 15 and 17 included as Appendices O and P.

Results from the testing of hypothesis 15 showed that trait anxiety was significantly associated with maternal cognitions about infant sleep-SAD thus satisfying condition 1 for establishing maternal cognitions about infant sleep-SAD as a mediator

between trait anxiety and infant sleep outcome ($\beta = .37, p < .001$). Maternal cognitions about infant sleep–SAD were found to be significantly associated with the outcome variable infant sleep outcome ($\beta = .43, p < .001$). Thus, condition two for inferring mediation was met. Condition three was also satisfied as trait anxiety was significantly associated with infant sleep outcome ($\beta = .28, p < .01$).

In order to infer full mediation, the association between the independent variable, trait anxiety, and the dependent variable, infant sleep outcome, needed to be non-significant when the effects of the mediator variable, maternal cognitions about infant sleep–SAD was entered into the model. The direct effect of trait anxiety on infant sleep outcome, after controlling for maternal cognitions about infant sleep–SAD, was not statistically significant ($\beta = .14, p > .05$), indicating no relationship between trait anxiety and infant sleep outcome when controlling for maternal cognitions about infant sleep–SAD. This result indicates that maternal cognitions about infant sleep–SAD fully mediated the relationship between trait anxiety and infant sleep outcome. The mediation result was confirmed by a Sobel test (Aroian, 1947) conducted using the calculation tool provided by Preacher and Leonardelli (2006). The z score (2.94, $p < .01$) indicated the significance of the mediation effect. The effect of the mediator variable, maternal cognitions about infant sleep-SAD, on the association between trait anxiety and infant sleep outcome is depicted in Figure 5 below.

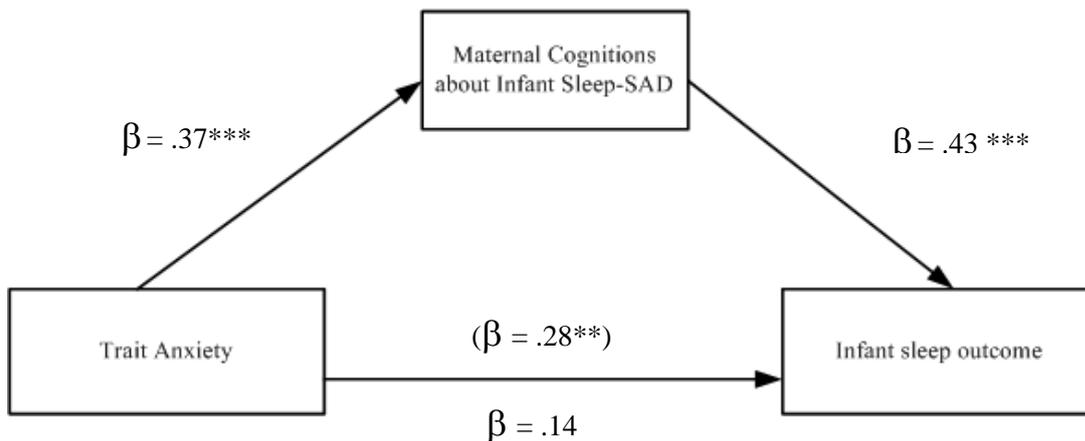


Figure 5. Maternal cognitions about infant sleep-SAD as a mediator of the association between trait anxiety and infant sleep outcome.

Note. The number in parentheses is the standardized beta weight for the direct pathway between the independent and outcome variable.

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

It was hypothesised that maternal cognitions about infant sleep-SAD would mediate the association between maternal sleep history and infant sleep outcome. Maternal sleep history, however, was not significantly associated with maternal cognitions about infant sleep-SAD ($\beta = .16, p > .1$). Thus condition 1 for establishing maternal cognitions about infant sleep-SAD as a mediator between maternal sleep history and infant sleep outcome was not satisfied. As condition 1 was not satisfied further testing was not relevant.

Results from the testing of hypothesis 17 indicated that condition one was met with maternal cognitions about infant sleep-SAD being significantly associated with the mediator variable active physical comforting ($\beta = .36, p < .001$). Active physical comforting was significantly associated with the outcome variable infant sleep outcome ($\beta = .47, p < .001$). Thus, condition two for inferring mediation was met. Condition

three was also satisfied as maternal cognitions about infant sleep–SAD was significantly associated with infant sleep outcome ($\beta = .42, p < .001$).

In order to infer full mediation the beta coefficient for the association between the independent variable maternal cognitions about infant sleep–SAD and the outcome variable infant sleep outcome must be non-significant when the mediator variable active physical comforting is entered into the model. The effect of maternal cognitions about infant sleep–SAD on infant sleep outcome, after controlling for active physical comforting was reduced but remained statistically significant ($\beta = .30, p < .01$), indicating a relationship between maternal cognitions about infant sleep–SAD and infant sleep outcome when controlling for active physical comforting. Results indicate that the association between infant sleep outcome and maternal cognitions about infant sleep–SAD was partially mediated by active physical comforting. The partial mediation result was confirmed by a Sobel test (Aroian, 1947) conducted using the calculation tool provided by Preacher and Leonardelli (2006). The z score (3.56, $p < .001$) indicated the significance of the partial mediation effect. The effects of the mediator variable active physical comforting on the association between maternal cognitions about infant sleep–SAD and infant sleep outcome is depicted in Figure 6 below.

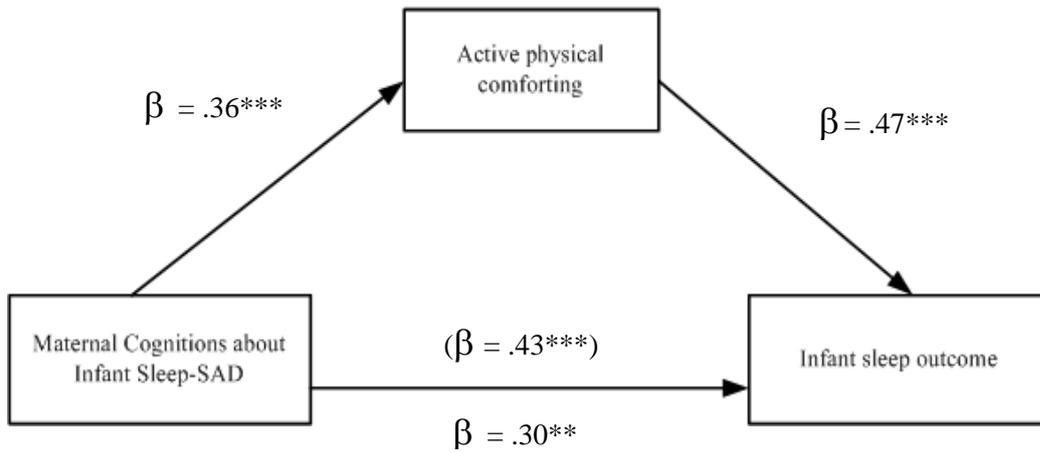


Figure 6. Active physical comforting as a mediator of the association between maternal cognitions about infant sleep-SAD and infant sleep outcome.

Note. The number in parentheses is the standardized beta weight for the direct relationship between the independent and outcome variable.

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

A revised version of the Model showing direct and indirect pathways is shown in Figure 7 below.

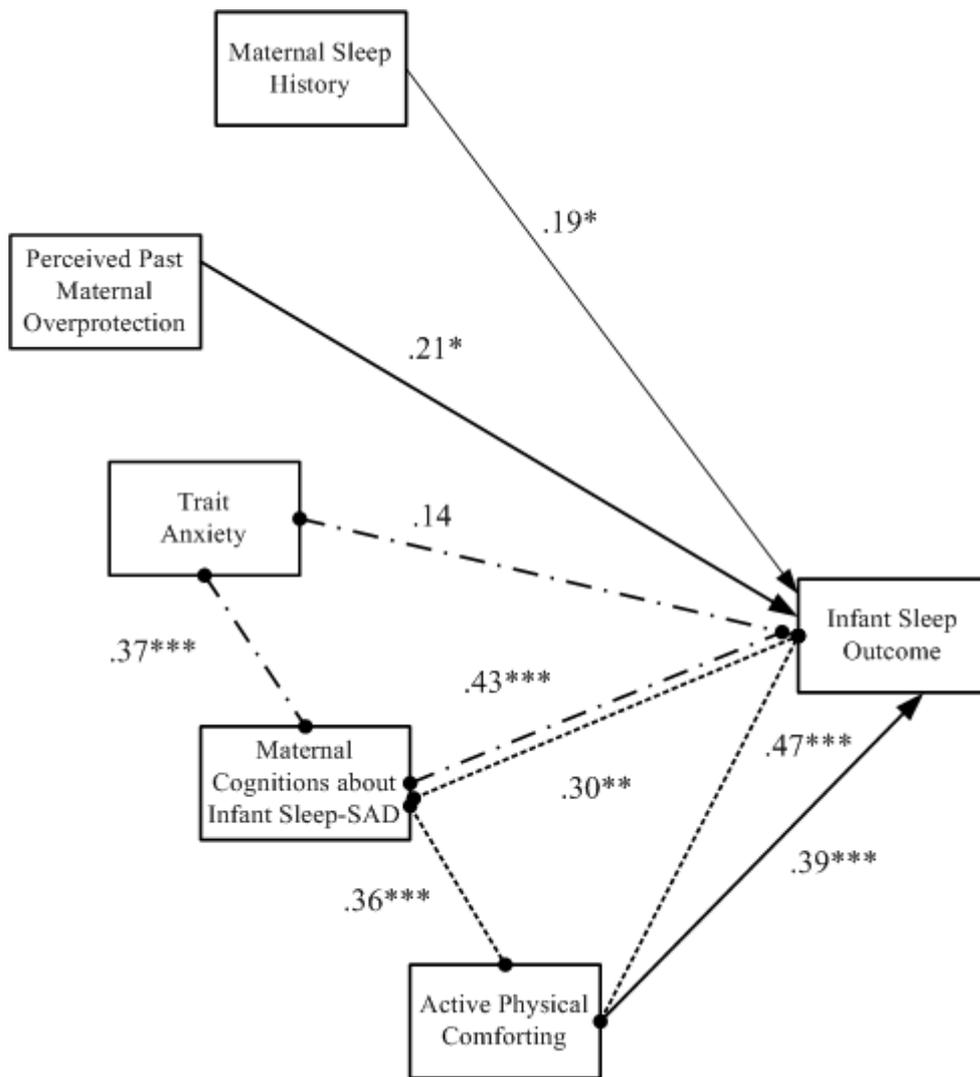


Figure 7. Revised model of the maternal factors influencing infant sleep outcome.

Note. Direct Pathways ————
 Indirect Pathway — . — . — (Maternal cognitions about infant sleep-SAD as a mediator of the association between trait anxiety and infant sleep outcome).
 Indirect Pathway (Active physical comforting as a mediator of the association between maternal cognitions about infant sleep-SAD and infant sleep outcome).

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

4.6 Post Hoc Analysis

As demonstrated above, maternal cognitions about infant sleep-SAD were involved as a mediating variable for the predictor variable, trait anxiety. In order to further interpret and understand the data relevant to the model, it was decided to conduct a post hoc analysis to examine whether there was a mediated relationship present for the association between perceived past maternal overprotection and infant sleep outcome. The statistical output for the assessment of the post hoc analysis is presented in Appendix Q.

Perceived past maternal overprotection was significantly associated with maternal cognitions about infant sleep-SAD ($\beta = .26, p < .01$) thus satisfying condition 1 for establishing maternal cognitions about infant sleep-SAD as a mediator between perceived past maternal overprotection and infant sleep outcome. Maternal cognitions about infant sleep-SAD was found to be significantly associated with the outcome variable infant sleep outcome ($\beta = .43, p < .001$). Thus, condition two for inferring mediation was met. Condition three was also satisfied as perceived past maternal overprotection was significantly associated with infant sleep outcome ($\beta = .27, p < .01$).

In order to infer full mediation, the association between the independent variable, perceived past maternal overprotection, and the dependent variable, infant sleep outcome, needed to be non-significant when the mediator variable, maternal cognitions about infant sleep-SAD was entered into the model. The effect of perceived past maternal overprotection on infant sleep outcome, after controlling for maternal cognitions about infant sleep-SAD, was not statistically significant ($\beta = .05, p > .05$), indicating no relationship between perceived past maternal overprotection and infant

sleep outcome when controlling for maternal cognitions about infant sleep-SAD. This result indicates that maternal cognitions about infant sleep-SAD fully mediated the relationship between perceived past maternal overprotection and infant sleep outcome. The mediation result was confirmed by a Sobel test (Aroian, 1947) conducted using the calculation tool provided by Preacher and Leonardelli (2006). The z score (1.88, $p < .05$) indicated the significance of the mediation effect. The effects of the mediator variable maternal cognitions about infant sleep-SAD on the association between active physical comforting and infant sleep outcome is depicted in Figure 8 below.

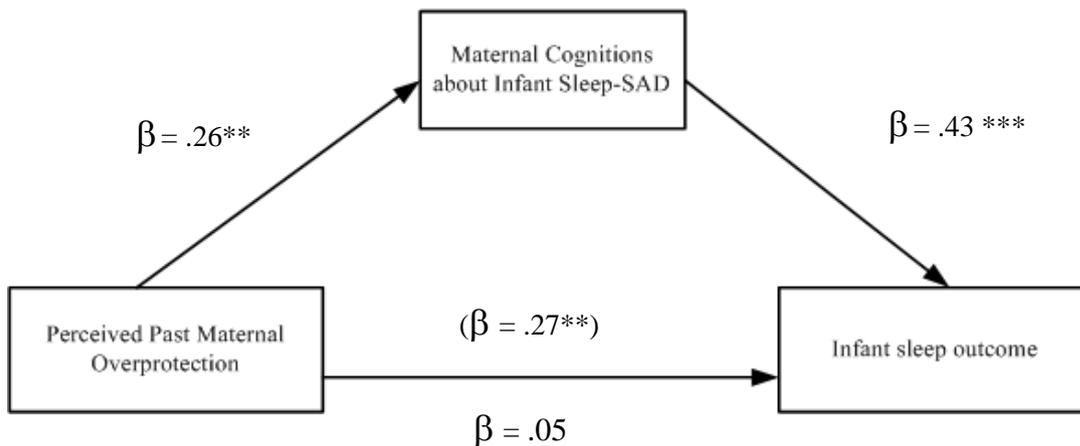


Figure 8. Maternal cognitions about infant sleep-SAD as a mediator of the association between perceived past maternal overprotection and infant sleep outcome.

Note. The number in parentheses is the standardized beta weight for the direct relationship between the independent and outcome variable.

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

5 Discussion

The current study took a broad approach to the study of infant sleep and focussed on a range of maternal factors that affect infant sleep outcome based on maternal report. A particular interest in conducting this study was to investigate whether maternal sleep related cognitions influence maternal-infant bedtime interactions and the predictors that are associated with such cognitions.

5.1 Overview of Main Research Aims and Findings

The primary aim of this study was to examine the relative contribution of maternal factors, including perception of past parenting received, current maternal psychological functioning, sleep history and night settling behaviour, to infant sleep outcome (based on maternal report) in a sample of mothers of infants aged 6 to 9 months. A conceptual model of infant sleep outcome was developed to address this aim. An additional aim was to investigate the extent to which these variables affect infant sleep through their link to maternal cognitions about infant sleep. Consistent with most of the major studies in this area (Hiscock & Wake, 2001; Lam et al., 2003; Mindell, Sadeh, Kohyama, et al., 2010; Mindell, Sadeh, Wiegand, et al., 2010; Sadeh, 2004; Sadeh, Mindell, et al., 2009; Scott & Richards, 1990; Teng et al., 2011) infant sleep and all maternal factors were measured using information obtained from mothers.

Hypotheses were generated from the proposed model in terms of associations between infant sleep outcome and the following variables: Perceived past maternal care, perceived past maternal overprotection, depressive symptoms, trait anxiety, maternal sleep history, maternal cognitions about infant sleep-SAD and active physical comforting. These hypotheses were all supported. Further hypotheses related to associations between maternal cognitions about infant sleep-SAD and trait anxiety and

active physical comforting were also supported. The hypothesis that maternal sleep history would be associated with maternal cognitions about infant sleep-SAD was not supported but as hypothesised trait anxiety was associated with maternal sleep history.

The multivariate model proposed to predict sleep outcome in infants aged 6 to 9 months (see Figure 1) was not a totally good fit for the data obtained from this sample. The final model, after all variables had been entered, explained 39% of the total variance in infant sleep outcome. Of the five factors hypothesised to be predictors of infant sleep outcome, only active physical comforting (13% of variance explained), perceived past maternal overprotection (8% of variance explained) and maternal sleep history (5% of variance explained) contributed directly to infant sleep outcome. In contrast, Morrell and Steele (2003) reported that their model explained a total of 66% of the variance in infant sleep disturbance. The variance explained by the individual predictor variables in the Morrell and Steele (2003) study included, problematic cognitions - setting limits and doubt (36%); fussy-difficult temperament (10%); depressed mood (7%); infant age (6%); ambivalent attachment (4%) and active physical comforting (3%). It is possible that the different result may be attributable to methodological issues. For instance, in the current study the data set was analysed using hierarchical multiple regression and a continuous variable, infant sleep outcome was the criterion variable, while Morrell and Steele used Logistic Regression to identify predictors of infant sleep disturbance vs. no infant sleep disturbance. Also of relevance to the findings from this thesis are the results reported from the previously cited cross-cultural large cohort study (Mindell, Sadeh, Kohyama, et al., 2010). As part of this study regression analyses were conducted to determine the contribution made by demographic and sleep context variables to the variance in a number of sleep outcome

variables (nocturnal sleep duration, daytime sleep duration, longest sleep episode, and the number of night waking). As with previous smaller studies of Caucasian children, when only children from primarily Caucasian countries were considered, parental behaviours, particularly feeding, were the strongest predictors in regard to length of night time sleep, number of night waking and sleep consolidation. The variables, breast-feeding back to sleep (11.6%), falling asleep independently at bedtime (6.2%), bottle-feeding back to sleep (2.0%) and being put in the parents' bed to return to sleep (1.1%) accounted for a total of 22.6% of the variance in night awakenings. The set of variables predicting sleep consolidation was similar, falling asleep independently at bedtime (17.7%), nursing back to sleep (7.2%), bottle-feeding back to sleep (3.3%) and having a bedtime routine (2.3%) in total explained 39% of the variance. While the data were for children across a wide age range, according to the authors the reported associations were present even after controlling for child age.

In the sections below the results from these analyses are considered against findings from previous research studies in this area. Theoretical and research implications are considered and discussed and recommendations for future research are made in the context of the strengths and limitations of the current study.

5.2 Infant Sleep Outcome

As noted above the current study focussed on infant sleep outcome as a continuum. Results showed that for this sample the mean score for infant sleep outcome as measured by the ISQ (Morrell, 1999a) was 8.2 (*SD* 6.41, range 0-24). While the ISQ has been used in a number of studies (Cronin et al., 2008; Morrell, 1999a, 1999b; Morrell & Steele, 2003) only the study by Cronin et al. gave any indication of the mean score obtained for this measure. As in the current study, Cronin et al. also used a

modified version of the ISQ to measure infant sleep outcome. Mean scores for infants aged 12 months, interpreted from a histogram, were reported according to maternal adversity status (high adversity $M = 7.00$; low adversity $M = 3.50$). The mean infant sleep outcome score was higher in the current study than the mean scores reported by Cronin. One possible reason for this difference may be related to infant age. Infants in the current study were younger with a mean age of only seven months compared to Cronin's study where the infants were aged 12 months when infant sleep outcome was measured.

In contrast to the approach taken in this thesis of infant sleep outcome as a continuum, much of the literature in regard to infant sleep has focussed on infant sleep problems (Bayer et al., 2007; Burnham et al., 2002; Morrell, 1999a; Sadeh & Anders, 1993). Findings from these studies have confirmed that night awakenings are common in infants during the second half of the first year although there is not a direct equivalence between maternal reports, sleep diary scores and actigraph recordings. Mothers' perception of whether their infant has a sleep problem has been regarded as an important factor and as previously noted most studies (Adair et al., 1991; Adams et al., 2004; Bayer et al., 2007; Goodlin-Jones & Anders, 2001; Hiscock & Wake, 2001; Scott & Richards, 1990; Tikotzky & Sadeh, 2009) have relied solely on information obtained from mothers.

In the current study, 39% of mothers reported their infant as having a sleep problem. This finding is comparable with the figures of 32% (Lam et al., 2003), 34% (Bayer, et al., 2007) and 46% (Hiscock & Wake, 2001) reported in other Australian community studies of infants in the second 6 months of life. While no results specific to

Australian children were reported, findings based on the combined Australian and New Zealand samples of the large global internet study (Teng et al., 2011) showed that parents of 33.85% of 6–8 month olds and 38.94% of 9–11 month olds believed their infant had a sleep problem. In overseas community studies infant sleep problems have been reported by 38% (1999b) and 22% (Zuckerman et al., 1987) of parents. Cross cultural differences in parents' perceptions of sleep problems in children aged from birth to 3 years are also evident (Mindell, Sadeh, Wiegand, et al., 2010) with more than 50% of parents from primarily Asian countries compared to 26% of parents from primarily Caucasian countries reporting that their child had a sleep problem. The findings from the current study also demonstrated that infant sleep problems as defined by mothers (39%) are more common than infant sleep problems based on research criteria (Morrell, 1999a). According to the ISQ Research Criteria derived from Richman (Morrell, 1999a), in the current study 25% of infants had a possible settling and/or waking problem. More infant night waking problems ($n = 23$) than settling problems ($n = 9$) were present for infants in the current sample although eight infants had both waking and settling problems. This result is somewhat higher than the figure of 19% reported by Morrell (1999b) in a sample of 13 month old infants using the same outcome measure. Richman (1981) reported a prevalence rate of 20% for infants aged between 1 and 2 years with waking problems only. The difference in findings may be age related. Infants in the current study had a mean age of seven months and some may not have developed a pattern of longer sleep during the night (Adair et al., 1991; Bayer et al., 2007).

The discrepancy between infant sleep problems according to ISQ research criteria derived from Richman (Morrell, 1999a), (based on information provided by

mothers) and maternal beliefs that their infant has a sleep problem could result from the fact that the research criteria, contained several specific conditions that had to be met before the infant could be classified as having a sleep problem. While the research criteria identified more severe sleep problems than the problems based on maternal perception, complete reliance on such criteria may miss an important group of mothers who are nevertheless distressed by their infant's settling and/or night awakening problems. This result confirms what has already been raised by other authors, that it is not necessarily the objective infant settling or awakening problem per se that matters but rather how the sleep problem impacts on the mother in her own unique circumstances that determines the severity of a sleep problem in her mind (Goodlin-Jones et al., 2000; Morrell, 1999b).

Much of the previous research in this area has examined individual predictors of infant sleep. To fully address the multiple complex processes associated with infant sleep outcome comprehensive, conceptual models of infant sleep (Morrell & Steele, 2003; Sadeh & Anders, 1993; Tikotzky & Sadeh, 2009) have been proposed. The current study tested a limited model of infant sleep outcome based on the maternal psychosocial factors, perceived past maternal care and perceived past maternal overprotection (i.e. the mother's own experience of being parented), depressive symptoms and trait anxiety, maternal sleep history, maternal cognitions about infant sleep-SAD and the maternal behaviour of active physical comforting.

5.3 Active Physical Comforting

Most of the studies that have explored the range of maternal settling strategies used at bedtime and following a night awakening have been carried out in the United Kingdom (Morrell & Cortina-Borja, 2002) the United States (Anders, 1994), Israel (Sadeh et al., 2007; Scher, 2008) and Italy (Toselli et al., 1998). However, recent large cross cultural studies (Mindell, Sadeh, Kohyama, et al., 2010) have provided comprehensive data on parental behaviours across a diverse range of countries. While there is no comprehensive information on parent settling behaviours specific to Australia, data from combined Australian and New Zealand samples (Teng et al., 2011) indicate that for infants aged 6 to 11 months, feeding and holding were common active parental interventions for settling infants at bedtime and after a night waking. Hiscock and Wake (2001) reported that infants with a sleep problem were more likely to be nursed to sleep and to sleep in the parent's bed but no Australian studies have been conducted that have specifically examined this issue.

In the current study, maternal settling strategies were measured using the Active Physical Comforting sub-scale of the Parent Interactive Bedtime Behaviour Scale (PIBBS) (Morrell & Cortina-Borja, 2002). Nearly all mothers (95%) reported using one or more active physical comforting strategies to settle their infant at bedtime with most mothers reporting that stroking was the strategy used most frequently. Adair et al. (1991), in a community sample, reported that one-third of mothers of infants aged 8 to 12 months ($M = 9.40$ months) were routinely present when their infant fell asleep at bedtime. The authors used the category, Parental Presence, to represent the active involvement of parents via strategies such as feeding, rocking, walking, lying down with child, singing and being present in child's room. A positive response to the use of

any of these settling strategies was categorised as Parent Present. In the current study 'singing' and 'being present in the child's room' were not specified in the measure of active physical comforting strategies.

As mothers in the current study could endorse one or more of the six settling strategies, the information collected for each strategy was not independent. Stroking (76%), feeding (69%) and cuddling (66%) were used by mothers most of the time, while settling the infant on the lounge (33%) or in the parental bed (30%) and carrying around the house (23%) were used less frequently. These results are broadly similar to those reported by Morrell and Cortina-Borja (2002) who also found that feeding (72%), cuddling (50%) and stroking (50%) were the most common strategies chosen by mothers to settle their infants to sleep. As with the current study, settling on the sofa (27%), settling in the parental bed (20%) and carrying around the house (10%) were the least commonly employed settling strategies. Other studies have also explored a broader range of strategies that involved the active participation of mothers at bedtime (Cronin et al., 2008; Sadeh, Mindell, et al., 2009; Tikotzky & Sadeh, 2009; Toselli et al., 1998; Touchette et al., 2005). Direct comparison with the results from these studies is not possible because none of these studies have used the Active Physical Comforting sub-scale of the PIBBS (Morrell & Cortina-Borja, 2002) as used in this study.

Maternal interactions at bedtime have been linked to infant sleep outcomes. While this relationship has received wide research attention in countries outside Australia (Goodlin-Jones et al., 2000; Morrell & Cortina-Borja, 2002; Sadeh & Anders, 1993; Sadeh, Tikotzky, et al., 2009) few previous studies have investigated the

association between maternal behaviours involving active physical comforting and infant sleep outcome specifically in Australian children (Hiscock & Wake, 2001).

The hypothesised association between active physical comforting and infant sleep outcome was confirmed with increased active physical comforting scores being moderately associated with increased infant sleep outcome scores. This finding is consistent with results reported by Morrell and Cortina-Borja (2002). In contrast, Cronin et al. (2008) did not find a significant relationship between the Active Physical Comforting sub-scale of the PIBBS (Morrell & Cortina-Borja, 2002) and Infant Sleep Outcome, measured with the ISQ (Morrell, 1999a), using a sample of infants aged 18 months. A possible explanation for this discrepant finding may be in the way the authors defined the Active Physical Comforting factor. Cronin et al. defined Active Physical Comforting to include strategies of stroking, cuddling, rocking and talking softly to infant. Notably they excluded feeding and sleeping in the parental bed from the Active Physical Comforting factor. These settling techniques were instead included in the Parental Presence strategy. Interestingly, parental presence strategies were significantly related ($r = .32, p < .001$) to infant sleep outcome as rated by the ISQ (Morrell, 1999a). Based on the sample of 18 month old infants used in this study feeding and sleeping in the parental bed were more powerful predictors of problematic infant sleep than some of the other strategies that comprised the Active Physical Comforting factor.

A large number of studies have also found bivariate associations between strategies that involve active physical comforting and infant sleep outcome (Adair et al., 1991; Anders et al., 1992; Johnson, 1991; Richman, 1981; Scott & Richards, 1990;

Tikotzky & Sadeh, 2009; Van Tassell, 1985; Zuckerman et al., 1987). None of these studies, however, had used the Active Physical Comforting sub-scale of the PIBBS (Morrell & Cortina-Borja, 2002).

The current study examined the effect of active physical comforting strategies on infant sleep outcome after taking into account other variables thought to influence infant sleep outcome. Multivariate analysis confirmed that Active Physical Comforting made the greatest contribution to the variance in Infant Sleep Outcome. It is noteworthy that the magnitude of the contribution of Active Physical Comforting to Infant Sleep Outcome was relatively small, accounting for only 13% of the total variance. This result was higher than that reported by Morrell & Steele (2003) who found that Active Physical Comforting accounted for a very small proportion of (3%) of the variance in Infant Sleep Outcome in 13 month old infants. It is possible that other aspects of what mothers do to settle their infants to sleep have not been measured by the Active Physical Comforting factor. Direct comparisons are not possible with other studies that have also found that active physical comforting strategies were an important predictor of infant sleep outcome (Mindell, Sadeh, Kohyama, et al., 2010; Sadeh, Mindell, et al., 2009; Van Tassell, 1985) as none of these studies had used the same Active Physical Comforting scale (Morrell & Cortina-Borja, 2002). This finding adds to the large body of research, which highlights the importance of active physical comforting strategies as one of the key predictors of infant sleep outcome. As reported in the results, apart from the contribution of active physical comforting only perceived past maternal overprotection and maternal sleep history made a direct contribution to Infant Sleep Outcome. The revised model of infant sleep outcome (see Figure 3) therefore did not include trait anxiety or maternal cognitions about infant sleep-SAD.

5.4 Perceived Past Maternal Overprotection

The influence of mothers' own history of being parented on infant sleep outcome has not previously been examined in an Australian sample. As reported above in the current study after controlling for the influence of other variables perceived past maternal overprotection explained 8% of the variance in infant sleep outcome. In contrast in an overseas study Morrell and Steele (2003) found that perceived past maternal overprotection was not a significant predictor of sleeping problems in 13 month old infants. Methodological differences between the two studies may account for the discrepancy in the findings. Morrell and Steele used logistic regression analysis and within each block used a stepwise procedure to extract the variable of most significance. The factors that comprised the second block included anxiety and depression (GHQ-28, Goldberg & Hillier, 1979) and perception of parenting received during childhood as measured by the Care and Overprotection scales of the PBI (Parker, 1979b). Of these variables only depression was a significant predictor of infant sleep problems. The stepwise procedure in logistic regression has been criticised because this method can be heavily influenced by random variation in the data, with variables being included or removed from the model on purely statistical grounds (Tabachnick & Fidell, 2007). If for instance, Care and Overprotection factors were strongly negatively correlated as found in the current study and as has been reported in other studies (Parker, 1979b, 1989, 1999), it is possible that the effect of each could have been diluted resulting in them being removed from the model.

5.5 Maternal Sleep History

In general, the focus of research attention has been on maternal sleep quality during pregnancy and/or the postpartum period (Lee et al., 2000; Swanson et al., 2011). While there have been comprehensive reviews of women's sleep across the life-cycle

(Moline et al., 2003) and research that has shown that women experience considerable sleep disruption during pregnancy and postpartum (Lee, 1998; Santiago et al., 2001) there has been no research that has explored how women's sleeping patterns prior to pregnancy affect infant sleep outcome. A history of insomnia symptoms may play an important role in shaping a mother's expectations and parenting behaviour regarding her infant's sleep.

The current study was the first to investigate the influence of a mother's sleep history (prior to pregnancy) on infant sleep outcome. The mean score for maternal sleep history was 6.66 ($SD = 4.50$, range 0-21). The distribution of maternal sleep history scores indicated that most of the mothers did not consider that they had sleep problems prior to becoming pregnant. Anecdotal evidence confirmed this finding as mothers frequently commented that they could not remember details of their sleep history. It is unlikely that a mother who has a history of sleeping poorly will so easily dismiss her sleep difficulties. The hypothesised association between maternal sleep history and infant sleep outcome was confirmed with problematic sleep scores associated with increased infant sleep scores. The current study also sought to examine the effect of maternal sleep history on infant sleep outcome after taking into account other variables thought to influence infant sleep outcome. While multivariate analysis confirmed that maternal sleep history had made a small contribution (5%) to the variance in infant sleep outcome further exploration of this link seems warranted.

A particular aim of the current study was to investigate the extent to which the studied variables affect infant sleep through their link to maternal cognitions about infant sleep. For example, while findings from this study confirmed the previously well-

established link between active parental involvement and infant sleep outcome, less understood are the reasons that lead some mothers to be more actively involved with their infants at bedtime while others seem able to limit bedtime involvement (Sadeh, Tikotzky, et al., 2009). In the current thesis it was proposed that the well-established link between maternal comforting strategies and infant sleep outcome may be related to the cognitions the mother holds about her infant's sleep.

5.6 The Role of Maternal Cognitions

The hypothesised association between maternal cognitions about infant sleep (Morrell, 1999b) as assessed by the MCISQ-SAD and active physical comforting (Morrell & Cortina-Borja, 2002) was confirmed with increased problematic maternal cognitions moderately associated with increased maternal involvement at bedtime. This finding is consistent with the robust association between maternal cognitions about infant sleep and maternal involvement at bedtime reported by Morrell and Steele (2003) based on univariate analysis. The difference in the strength of the associations in the two studies (.36 vs .57) may be because Morrell used the MCISQ total score (five subscales) whereas in the current study maternal cognitions about infant sleep-SAD were represented by summing the scores of three subscales (Limit Setting, Anger and Doubt). The decision to use only the three subscales was based on findings from previous research (Morrell, 1999b). In this earlier study, Morrell (1999b) reported a strong association between infant sleep outcome as measured by the ISQ Research Criteria as derived from Richman (Morrell, 1999a) and limit setting cognitions, moderate associations between cognitions related to anger and doubt and infant sleep outcome but non-significant associations between infant sleep outcome and cognitions regarding feeding and safety. In a later study, Sadeh et al. (2007) reported a significant positive association between maternal cognitions reflecting maternal limit setting and

infant sleep outcome as measured by Sadeh's (1994) sleep diary scores. However, it is important to note that the infants in the studies (Morrell et al., 2003; Sadeh et al., 2007) cited above had a mean age of 13 months compared with the younger age of infants ($M = 7.80$ months) in the current study. Other studies have also found bivariate associations between maternal sleep related cognitions and infant sleep outcome (Lozoff et al., 1985; Scott & Richards, 1990). None of these studies, however had used the modified MCISQ (Morrell, 1999b).

As noted above in the current study, maternal cognitions about infant sleep did not make a significant direct contribution to infant sleep outcome after taking into account other variables thought to influence infant sleep. When first entered into the hierarchical regression analysis, maternal cognitions about infant sleep reflecting limit setting, anger and doubt made a significant contribution to infant sleep outcome but with the entry of active physical comforting in the final step of the model, maternal cognitions about infant sleep-SAD did not remain a significant contributor to infant sleep outcome. While this result might not be unexpected, given the moderate correlation between maternal cognitions about infant sleep-SAD and active physical comforting, it is not consistent with other studies that have found a link between maternal cognitions about infant sleep and infant sleep outcome (Morrell, 1999a) using multivariate analyses. Morrell and Cortina-Borja (2002), using repeated measures general linear model analysis, found a significant interaction between mothers identified as having problematic cognitions regarding limit setting, anger and doubt and infants with sleep problems. In another study, Morrell and Steele (2003), using logistic regression analysis, reported that maternal cognitions reflecting limit setting and anger were significant factors in explaining the variance in infant sleep problems (25% and

11% respectively). Sadeh et al. (2007), using stepwise multivariate discriminate analysis, found that only maternal cognitions reflecting limit setting was a significant predictor of problematic sleep, explaining 8% of the variance. Methodological differences between the studies may have accounted for the discrepancy in the findings. For instance, the outcome variable in the current study was continuous, while a group (clinical vs. control) criterion variable was used in the other studies and so different statistical analyses were employed.

As there is a large body of literature that has suggested that the influence of parental cognitions on children's behaviour was mediated by the way parents behave towards their children the current study proposed that the association between maternal cognitions about infant sleep and infant sleep outcome would be mediated by active physical comforting. This hypothesis was confirmed in that active physical comforting partially mediated the link between maternal cognitions about infant sleep-SAD and infant sleep outcome. As the finding was one of partial mediation it raises the possibility that mothers may hold different perceptions of their infant's sleep behaviour that may not have been fully captured by the MCISQ. The current study did not distinguish between maternal cognitions related to settling to sleep and those associated with settling after a night awakening. Sadeh et al. (2007) found that mothers only reported increased difficulty with limit setting following a night awakening. Thus it is possible that mothers may hold different beliefs about their infant's sleep behaviour at sleep onset compared with a night awakening. Cognitions reflecting limit setting, anger and doubt may be activated in response to a night awakening which may influence the way parents react and respond to a night awakening.

In the current study maternal cognitions about infant sleep (as assessed by the MCISQ-SAD) also acted as a mediator variable between some of the other independent variables and Infant Sleep Outcome. While according to the hierarchical multiple regression, perceived past maternal overprotection made a significant unique contribution to infant sleep outcome, further post-hoc analysis showed that this relationship was fully mediated by maternal cognitions about infant sleep-SAD. As noted above, from a theoretical perspective there is evidence that a mother's own experience of being parented becomes internalised and therefore is likely to influence her parenting behaviour (Crowell & Feldman, 1991; George & Solomon, 1996). These internal working models could manifest themselves in the form of maternal sleep related cognitions, associated with limit setting, anger and doubt, and influence the mothers' parenting behaviours particularly those related to bedtime settling strategies. For instance, Sadeh et al. (2007) claimed that a mother who perceives that her infant feels distress or anxiety, following a night awakening, is more likely to intervene and actively soothe her infant to sleep. On the other hand, a mother who believes in the importance of limit setting, is less likely to intervene, and will more easily allow her infant to soothe him/herself to sleep without her assistance.

In contrast, the hypothesised bivariate association between maternal sleep history and maternal cognitions about infant sleep was not confirmed. A possible explanation for this non-significant finding may be attributable to the instruments used to measure both maternal cognitions about infant sleep and maternal sleep history. The MCISQ-SAD (adapted from the MCISQ (Morrell, 1999b) was designed to measure cognitions related to limit setting, anger and doubt in the context of infant sleep. Thus, the MCISQ-SAD cannot tap into the broader range of beliefs, attributions and worry

that are associated with insomnia and are part of major research findings relating to the importance of cognition in insomnia (Harvey et al., 2005; Morin et al., 2003). Mothers with insomnia symptoms may hold dysfunctional sleep related cognitions which may become heightened in the context of infant night awakening. These dysfunctional cognitions may impact negatively on the mother-infant relationship. For instance, a mother may hold the unhelpful belief that she will not be able to function the next day if she does not get sufficient sleep as a result of being wakened during the night. She may perceive her infant's night awakenings as a sleep interruption and may respond to her infant's signalling with frustration and/or anger. As a result of sleep disruption a mother may have unreasonable expectations about her infant's sleep behaviour and experience doubt and uncertainty about herself as a competent parent.

The lack of an association between maternal sleep history and maternal cognitions about infant sleep meant that it was not possible to test for possible mediated pathways between maternal sleep history, maternal cognitions about infant sleep (reflecting limit setting, anger and doubt) and infant sleep outcome. It is also important to note that while the MSHQ (Edinger, 1987) had face validity, only a subset of the questionnaire was used for the purpose of this study and therefore it was not necessarily a valid and reliable measure of maternal sleep history.

While as hypothesised results from the bivariate analysis showed that trait anxiety was positively associated with infant sleep outcome, it did not make a significant contribution to infant sleep outcome after taking into account the influence of other variables. It is possible that this result was due to the overlap with variables such as perceived past maternal overprotection and maternal sleep history. In addition to

the direct connection between a mother's experience of being parented and the parenting she provides for her child, early childhood experiences may influence maternal settling strategies at bedtime through their influence on maternal anxiety. Mothers with high levels of anxiety generally recall being reared in a rejecting and controlling manner (Carter et al., 2001). Building on this relational template, they too may become an overprotective parent. For instance, separating from her infant at bedtime may be perceived by the mother as threatening because, from her perspective, her ability to protect and provide care for her child is diminished. It is possible that the separation experience may elicit strong emotions within the mother such as guilt, worry and sadness. Consequently, in the stressful situation of a night awakening a mother with unresolved traumatic recollection about the way she perceived her own parenting experience during childhood (Morrell, 1999b) may experience overwhelming anxiety that could interfere with her ability to respond sensitively to her child. She might experience difficulties setting limits for her infant. She might also experience doubt about her parenting competence or become angry if she perceived her infant to be demanding.

Consistent with previous research that has shown significant associations between the longitudinal course of insomnia and the development of anxiety disorders (Neckelmann et al., 2007) there was a moderate bivariate association between trait anxiety and maternal sleep history ($r = .31, p < .05$). Evidence for an indirect pathway between trait anxiety and infant sleep outcome was demonstrated in that, as hypothesised maternal cognitions about infant sleep, as assessed by the MCISQ-SAD, fully mediated the association between trait anxiety and infant sleep outcome. Perceived past maternal overprotection was moderately associated ($r = .35$) with trait

anxiety. The only other community study (Carter et al., 2001) that has reported on the link between these two variables also reported a moderate correlation ($r = .32$) between perceived past maternal overprotection and trait anxiety.

A limitation of the few studies that have assessed parental cognitions related to infant sleep has been the emphasis on maternal cognitions ignoring the importance of paternal cognitions in shaping infant sleep. To redress this situation Sadeh et al. (2007) compared mother's and father's sleep related cognitions about infant sleep using the Infant Sleep Vignettes Interpretation Scale (ISVIS – Limits factor) (Sadeh et al., 2007). In response to a set of vignettes, it was reported that fathers were more likely than mothers to emphasize the importance of a limit-setting approach. When asked about their own cognitions regarding their child, (PCISQ-Limit setting factor) (Morrell, 1999b), both mothers and fathers in the clinical group reported more difficulties with limit setting than the control parents. In addition, it was also found that the cognitions of fathers, reflecting difficulties in limit setting, were linked to more infant sleep disturbance, in addition to and independently of maternal cognitions.

5.7 Study Limitations and Future Directions

There were several limitations of this study that need to be taken into account in interpreting the findings. Consideration is given to limitations in sampling, measurement, and design. The implications of findings from the current study for further research are also considered.

5.7.1 Sampling

There are two main limitations regarding the recruitment of the sample for the current study. Maternal Child Health nurses were enlisted to recruit participants for the

study during a routine health care visit and their diligence in this matter was essential for the recruitment of a representative sample. Anecdotal evidence suggested that not all nurses informed all eligible mothers of the study. Possible reasons cited included heavy workload, professional decisions around suitability of mother for study, or recruitment not considered a priority. In addition, some MCH nurses declined to inform their clients of the study, resulting in just over half the participants being recruited from only one Maternal and Child Health Centre. It is possible that participants may not be totally representative of the population of primiparous mothers in the western suburbs of Melbourne.

The mothers who volunteered to be involved in the current research were a relatively homogenous sample. Mothers were generally well-educated, middle class and predominately Caucasian. They consisted of two-parent families and gave the impression of being well-motivated and confident in the parenting role. These well-functioning, intact families are not necessarily representative of the population of the western suburbs so generalizability of the results to families with lower socio-economic status, single-parent families and families of different ethnicity, may be limited.

5.7.2 Measures

The findings of this study are based on maternal self-report. Self-report measures are useful for collecting large amounts of information quickly but they are subject to the problem of shared method variance, socially desirable responding or response anxiety emanating from the personal nature of the questions. Further, given the retrospective nature of the data gathered from the maternal sleep history questionnaire information may also be subject to inaccuracies due to difficulty remembering fully and accurately key information. While the Parenting Bonding Instrument (Parker et al.,

1979) also asked for retrospective information on mothers' experience of being parented the information is regarded as the mother's perception (Lopez & Gover, 1993) of her experience of being parented and does not rely on an objective reporting of her early childhood experience.

Some researchers are critical of using maternal report to measure infant sleep outcome (Anders et al., 1992; Sadeh, 1994, 1996) as studies have shown that maternal reports of infant sleep are not consistent with objective measures but rather are influenced by the mother's perception of what constitutes a sleep disturbance (Anders, 1979; Minde et al., 1993). These criticisms concern perceived inaccuracies arising from mother's underreporting of night awakenings in good sleepers (Minde et al., 1993; Sadeh, 1996) and the overestimation of the duration of sleep (Sadeh, 1996). Objective measures of infant sleep, such as time-lapse video recordings or actigraphy could be utilised in future studies to improve the accuracy of infant sleep outcome measures.

While self-report measures are standardised and may demonstrate strong reliability there are also potential limitations associated with the ecological validity of such measures. It is possible that some of the instruments used in this study may not have adequately conceptualised the constructs they were designed to measure. For instance, in the current study the MCISQ-SAD based on the MCISQ (Morrell, 1999b) targeted only three specific infant sleep related cognitions. As mothers are likely to experience a broad range of cognitions when settling their infant to sleep this measure may be too narrow in its categorisation of sleep related cognitions. For instance, Benoit et al. (1997) found that mothers of infants with sleep problems had unbalanced and disengaged perceptions about their infants. Tikotzky et al. (2009) found that mothers

expressed concerns about infant distress following a night awakening. A mother with a history of sleep disturbance is also likely to have unwanted intrusive and worrisome thought about their own sleep and that of their infant. For instance, a mother may hold unhelpful beliefs about the negative consequences of insomnia. Thus, for such mothers a different set of cognitions is likely to be activated in relation to their infant's sleep disturbance. The assessment of the role of maternal cognitions in infant sleep outcome is complex and suggests the need for further research.

The Active Physical Comforting sub-factor of the PIBBS (2002) was also limited in its capacity to assess the full range of active physical comforting strategies mothers used to settle their infant to sleep and the context in which they are used. Such settling strategies are not independent as mothers are likely to combine techniques such as 'rocking' and 'carrying in arms'. Further, settling strategies may be used inconsistently. Goodlin-Jones (2001) highlighted the variability that existed in maternal settling strategies not only on a nightly and weekly basis but also at sleep onset and in response to a night awakening. The PIBBS did not distinguish between those active physical comforting strategies employed at sleep onset and after a night awakening so it was not possible to know whether mothers used different settling strategies at bedtime than those used to respond to a signalled night awakening. Research (Sadeh, Mindell, et al., 2009) has found that strategies such as feeding and being brought into the parental bed are strategies that are more likely to be associated with managing a night awakening. A further limitation was that the PIBBS was developed for use with infants in the second year of life. Younger infants are more likely to require parental intervention, in the form of active comforting strategies to return to sleep, while older infants are more likely to exhibit a greater proportion of self-soothing behaviours.

Observational studies (such as Goodlin-Jones et al., 2001) are needed to fully assess what mothers actually do when settling their infant to sleep and the circumstances under which particular settling strategies are used.

The Maternal Sleep History questionnaire, based on Edinger's (1987) Sleep History Questionnaire, was not a strong measure of maternal sleep history as it had not been subjected to formal tests of reliability or validity. Edinger (1987) claimed however, that the items had face validity. In future studies, it would be preferable to use an established instrument to measure insomnia symptoms rather than adapting a measure that was designed to screen for insomnia complaints. A further limitation was that the measure relied on retrospective maternal self-report. Longitudinal studies are needed, to describe changes in women's sleep from pre-pregnancy to postpartum. Further research is also needed to understand how a person with a history of sleep disturbance (and the associated cognitive and behavioural changes) may perceive their own infant's sleep disturbance.

Due to the high intercorrelations with other variables and, in an effort to increase statistical power, the variables perceived past maternal care and depressive symptoms were not included in testing the model of infant sleep outcome. After reducing the number of independent variables in the regression analysis from seven to five, power was adequate for the N=95 sample size. However, by omitting these variables it is possible that some explanatory information may have been lost.

5.7.3 Design

Restriction of the number of participants because of thesis time requirements meant that the model developed and tested could only examine a selection of maternal factors, with these factors explaining 39% of the total variance in infant sleep outcome. Clearly the remaining unexplained variance means that other factors were also having some influence on infant sleep and these need to be explored in future research. The transactional model adapted by Sadah and Anders (1993) includes not only parental and infant factors, but the broader context within which the family lives. Culture, environment and family contexts may also have an indirect influence on infant sleep outcome (Goodlin-Jones et al., 2000; Lozoff et al., 1985; McKenna & Volpe, 2007; Sadeh, Tikotzky, et al., 2009).

Research shows that cultures vary in their parenting practices and expectations regarding infant sleep (Sadeh, Tikotzky, et al., 2009). Ideas vary, for example in regard to sleeping arrangements as noted by other authors (Goodlin-Jones et al., 2000; Sadeh, Tikotzky, et al., 2009) as well as what constitutes a sleep problem (Anders, 1994; Anders & Eiben, 1997). For instance, parents whose infants are not able to sleep alone and “through the night” are unlikely to consider this a sleep problem if this is culturally acceptable (Anders & Taylor, 1994). In the current study the majority of women were born in Australia and the small numbers from other ethnic backgrounds meant it was not possible to explore potential cultural differences.

Family factors, such as marital conflict or family stress were not measured in the current study but have been shown to influence sleep outcomes. Fisher, Feekery and Rowe-Murray (2002) found that the quality of the relationship between a woman and

her partner was correlated with psychological distress in a sample of women admitted with their infants to a mother-baby unit with sleeping or feeding difficulties. Mothers who perceived they had insufficient support from their partners, and to a lesser extent from their mothers, experienced higher levels of distress. Anecdotal evidence from the mothers in the current study would suggest that their support networks may have been impoverished. Mothers stated that they felt isolated because they had taken up home ownership in the 'new' suburbs that were distant from family support. It is possible that lack of practical and emotional support may have indirectly influenced infant sleep outcome.

Environmental factors such as economic pressures and other socio-economic factors, such as maternal employment (Scher et al., 1995; Van Tassell, 1985) have also been associated with infant sleep outcome. While the majority of mothers in the current study were not in paid employment no information was obtained in regard to economic pressures and women's preference to be at home, so it is possible that these factors could have also accounted for some of unexplained variance in infant sleep outcome.

In order to limit the number of variables the current study focussed on one category of maternal settling strategies, active physical comforting, as previous studies had reported strong links between active parent involvement and infant sleep problems. However a number of studies (Goodlin-Jones et al., 2001; Morrell & Cortina-Borja, 2002; Scher & Blumberg, 1999) have emphasised the importance of parent settling strategies that promote the development of infant self-soothing. Such strategies may include offering an object such as a special toy, cloth, or pacifier/dummy as well as leaving the infant to cry. In a one-year longitudinal study of the effects of 'sleepaids'

(particularly T-shirts that had been worn by mothers) on infant sleep (Goodlin-Jones et al., 1997) the authors reported that infants showed no preference for T-shirts impregnated with maternal odour and equally used the cloth T-shirts, pacifiers and thumbs for self-soothing. Anecdotal evidence from participants in the current study also suggested that a pacifier/dummy/ was commonly used by mothers to encourage self-soothing at bedtime and following a night awakening. The use of only active physical comforting in the current study could be seen as a limitation in that previous studies have shown that mothers may rely on more than one category of settling behaviours.

Morrell and Cortina-Borja (2002) using the Encourage Autonomy subscale of the Parent Interactive Bedtime Behaviour Scale (PIBBS) demonstrated that strategies that encourage autonomy are linked to more consolidated sleep. While results indicated that compared to mothers of 'problem sleepers' mothers of 'non-problem' sleepers were more likely to use strategies that encouraged autonomy, mothers in the 'non-problem' sleepers group also frequently used active physical comforting. In contrast there was excessive reliance on providing physical comforting by the mothers of infants with sleep problems. Such results suggest that the promotion of infant consolidated sleep may depend on balancing the use of both types of strategies. Hence, the inclusion of a further category of settling behaviour that was aimed at encouraging infant autonomy, measured for example by the Encourage Autonomy subscale of the PIBBS, may have provided a better understanding of the link between settling strategies and infant sleep. It is important to note that in developing the PIBBS the authors discarded the pacifier/dummy item from the final PIBBS scale because endorsement frequencies showed a bimodal distribution whereby mothers either used it frequently or not at all. However as noted above in the study limitations related to measures, the PIBBS was

developed for use with infants in the second year of life and previous research and anecdotal reports suggest that pacifiers/dummies are commonly used by mothers of younger infants.

The current study used a cross-sectional design so it was not possible to measure changes in maternal factors in response to infant sleep development. Studies using longitudinal designs and objective measures are needed in order to clarify the role of maternal behaviours in the development of infant sleep outcome over time as well as the influence of infant sleep on maternal behaviours, thus enabling the assessment of bidirectional influences. Although an adequate number of mother-infant dyads were recruited to conduct the study, the modest size of the current sample precluded the use of more sophisticated data analysis techniques. Future studies based on larger samples would allow the use of structural equation modelling in order to allow for the testing of both direct and indirect relationships by means of path analysis, as well as allowing comparisons between alternative models.

5.8 Future Directions

As with the current study most of the research on infant sleep and parenting has focussed on mothers. The role of fathers in influencing infant sleep outcome has been largely unexplored (Tikotzky, Sadeh, et al., 2010). Studies have shown that fathers contribute to the management of infant night awakenings. For instance, Goodlin-Jones et al. (2001) reported that in 38% of families, both mothers and fathers were involved in settling their infants to sleep and in soothing them during the night. In a recent study, Tikotzky et al. (2010) found that paternal involvement in infant care was associated with more consolidated infant sleep. Sadeh et al. (2007) found fathers find it easier than mothers to adopt an approach that encourages infant self-soothing. Thus, fathers may

influence maternal settling behaviour by encouraging mothers to reduce the amount of time they spend settling their infants to sleep. Further, supportive paternal involvement in infant care may reduce maternal stress which has been found to exert a negative influence on infant sleep outcome (Sadeh & Anders, 1993). The findings from these studies emphasize the importance of including fathers in further research exploring the relationships between parental involvement and infant sleep outcome.

Further research is needed to clarify the causal relationships between maternal cognitions related to infant sleep, such as limit setting, anger and doubt, physical comforting strategies and infant sleep outcome to contribute to the development of appropriate assessment tools and intervention programs aimed at assisting parents to manage their infant's sleep. Current interventions, such as controlled crying programs, are typically aimed at reducing parental involvement at bedtime but pay less attention to the underlying cognitions and how these cognitions contribute to the causes and continuance of infant sleep disturbance (Sadeh, 2005). Recognition of the importance of cognitions in influencing parent bedtime settling strategies and addressing parent's expectations, interpretations and emotions related to their infant's sleep-related behaviour would add an extra dimension to these programs. Thus, interventions aimed at helping mothers develop better mental representations of their infants may have greater long-term benefits and be more cost effective than interventions that focus exclusively on the modification of maternal behaviours.

Research has not adequately addressed the issue of how mothers' own experience of being parented might shape maternal cognitions about infant sleep and indirectly maternal infant sleep related behaviour (Tikotzky, Sharabany, et al., 2010).

While Tikotzky et al. suggested that a “parent’s early childhood sleeping experiences explain their current perceptions and beliefs regarding infant sleep” and that “early experience of parents and their current cognitions are associated with the sleeping patterns of their infants” (p. 325) further research is needed to understand how a mother’s early history may influence her bedtime settling behaviour and consequently her infant’s sleep regulation. Large scale longitudinal studies commencing before pregnancy are required to rigorously examine the contribution made by maternal perceptions of past parenting and mothers’ own childhood sleeping experiences to infant sleep outcome.

The relationship between maternal sleep history and infant sleep outcomes has been entirely neglected in the literature. Research on adult insomnia has shown, however, the important role that dysfunctional cognitions have in the maintenance of insomnia symptoms (Harvey et al., 2005). A few studies have reported changes in sleep quality during pregnancy and postpartum (Lee et al., 2000; Swanson et al., 2011). However, longitudinal studies, commencing before pregnancy, are required to explore how a mother’s problematic sleep history may shape her expectations and parenting behaviour regarding her infant’s sleep.

5.9 Conclusion

The incentive for this research flowed from contemporary interest in infant sleep behaviour. Struggles at bedtime and night awakening pose serious problems for families and may impact negatively on the mother and her relationship with her infant. In this study a range of maternal factors and their relationship with infant sleep outcome were explored. Instead of focussing on individual predictors or particular categories of

predictors, the current study explored a model which was based on several maternal factors which were considered important to infant sleep outcome. The findings of this study suggest that both present and past maternal experiences may influence how a mother approaches the task of parenting her infant at bedtime. The complex interactions between the tested variables and the importance of both direct and indirect pathways in the prediction of infant sleep outcome were highlighted in this study.

There have been no previous Australian studies that have explored possible predictors of infant sleep by proposing and testing a model with a community sample of first-time mothers. No previous data has been available for the specific maternal strategies used by Australian mothers to settle their infants and there have been no previous studies of infant sleep that have collected detailed information on mothers' sleep history prior to pregnancy. Despite the modest effect of some of the findings the current study has made a contribution to this important area of research. Using a selected group of maternal variables the results of this study have added to the knowledge of how maternal cognitions influence maternal-infant bedtime interactions and hence infant sleep. Consideration of the factors that are associated with such cognitions, has received limited research attention and so this study has been an initial attempt to address this gap.

6 References

- Adair, R., & Bauchner, H. (1993). Sleep problems in childhood. *Current Problems in Pediatrics*, 23(4), 147-170. doi: 10.1016/0045-9380(93)90011-Z
- Adair, R., Bauchner, H., Philip, B., Levenson, S., & Zuckerman, B. (1991). Night waking during infancy: Role of parental presence at bedtime. *Pediatrics*, 87 (4), 500-504.
- Adams, S. M., Jones, D. R., Esmail, A., & Mitchell, E. A. (2004). What affects the age of first sleeping through the night? *Journal of Paediatrics and Child Health*, 40(1), 96-101. doi: 10.1111/j.1440-1754.2004.00317.x
- Ainsworth, M. D., Blehar, M. C., Waters, E., & Wall, S. (1978). *Patterns of attachment: A psychological study of the strange situation*. Hillsdale: Lawrence Erlbaum.
- American Psychiatric Association. (2000). *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV-TR* (4th ed.). Washington, DC: American Psychiatric Association.
- Anders, T. F. (1979). Night waking in infants during the first year of life. *Pediatrics*, 63(6), 860-864
- Anders, T. F. (1982). Biological rhythms in development. *Psychosomatic Medicine*, 44(1), 61-72.
- Anders, T. F. (1994). Infant sleep, nighttime relationships and attachment. *Psychiatry*, 57(1), 11-21.
- Anders, T. F., & Eiben, L. (1997). Pediatric sleep disorders: A review of the past 10 years. *American Academy of Child and Adolescent Psychiatry*, 36(1), 9-20. doi: 10.1097/00004583-199701000-00012
- Anders, T. F., Halpern, L. F., & Hua, J. (1992). Sleeping through the night: A developmental perspective. *Pediatrics*, 90(4), 554-560.
- Anders, T. F., & Keener, M. A. (1985). Developmental course of nighttime sleep-wake patterns in full-term and premature infants during the first year of life. *Sleep* 8(3), 173-192.
- Anders, T. F., Sadeh, A., & Appareddy, V. (1995). Normal sleep in neonates and children. In M. Kryger, T. Roth & W. Dement (Eds.), *Principles and practice of sleep medicine in the child* (4th Edition ed., pp. 7-19). Philadelphia: W.B. Saunders.
- Anders, T. F., & Taylor, T. R. (1994). Babies and their sleep environment. *Children's Environments*, 11(2), 123-134.
- Armstrong, K. L., O'Donnell, H., McCallum, R., & Dadds, M. (1998). Childhood sleep problems: Association with prenatal factors and maternal distress/depression. *Journal of Paediatrics & Child Health*, 34(3), 263-266. doi: 10.1046/j.1440-1754.1998.00214.x
- Armstrong, K. L., Quinn, R. A., & Dadds, M. (1994). The sleep patterns of normal children. *The Medical Journal of Australia*, 161(1), 202-206.
- Armstrong, K. L., Van Haeringen, A., Dadds, M., & Cash, R. (1998). Sleep deprivation or postnatal depression in later infancy: Separating the chicken from the egg. *Journal of Paediatrics and Child Health*, 34(3), 260-262. doi: 10.1046/j.1440-1754.1998.00213.x
- Aroian, L. A. (1947). The probability function of the product of two normal distributed variables. *Annals of Mathematical Statistics*, 18(2), 265-271. doi: doi:10.1214/aoms/1177730442

- Australian Bureau of Statistics. (2007). *Forms of employment*. Canberra: Australian Bureau of Statistics.
- Australian Bureau of Statistics. (2005). *Australian standard classification of cultural and ethnic groups*. Canberra: Australian Bureau of Statistics.
- Banks, S., & Dinges, D. F. (2007). Behavioural and physiological consequences of sleep restriction. *Journal of Clinical Sleep Medicine*, 3(5), 519-528.
- Barnes, L. L. B., Harp, D., & Jung, W. S. (2002). Reliability generalization of scores on the Spielberger State-Trait Anxiety Inventory. *Educational and Psychological Measurement*, 62(4), 603-618. doi: 10.1177/0013164402062004005
- Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182. doi: 10.1037/0022-3514.51.6.1173
- Bartholomew, K., & Horowitz, L. M. (1991). Attachment styles among young adults: A test of a four-category model. *Journal of Personality and Social Psychology*, 61(2), 226-244. doi: 10.1037/0022-3514.61.2.226
- Bastien, C. H., & Morin, C. M. (2000). Familial incidence of insomnia. *Journal Of Sleep Research*, 9(1), 49-54. doi: 10.1046/j.1365-2869.2000.00182.x
- Bastien, C. H., Vallires, A., & Morin, C. M. (2001). Validation of the Insomnia Severity Index as an outcome measure for insomnia research. *Sleep Medicine* 2(4), 297-480. doi: 10.1016/S1389-9457(00)00065-4
- Bayer, J. K., Hiscock, H., Hampton, A., & Wake, M. (2007). Sleep problems in young infants and maternal mental and physical health. *Journal of Paediatrics & Child Health*, 43(1-2), 66-73. doi: 10.1111/j.1440-1754.2007.01005.x
- Beaulieu-Bonneau, S., LeBlanc, M., Mérette, C., Dauvilliers, Y., & Morin, C. M. (2007). Family history of insomnia in a population-based sample. *Sleep*, 30(12), 1739-1745.
- Beck, A. T. (1976). *Cognitive therapy and the emotional disorders*. New York: International Universities.
- Beck, A. T., Ward, C. H., Mendelson, M., Mock, J. E., & Erbaugh, J. K. (1961). An inventory for measuring depression *Archives of General Psychology*, 4(6), 561-571. doi: 10.1234/12345678
- Bei, B., Milgrom, J., Ericksen, J., & Trinder, J. (2010). Subjective perception of sleep, but not its objective quality, is associated with immediate postpartum mood disturbances in healthy women. *Sleep*, 33(4), 531-538.
- Belsky, J. (1984). The determinants of parenting: A process model. *Child Development*, 55(1), 83-96. doi: 10.2307/1129836
- Benhamou, I. (2000). Sleep disorders of early childhood: A review. *Israel Journal of Psychiatry and Related Sciences*, 37 (3), 190-196.
- Benoit, D., & Parker, K. C. (1994). Stability and transmission of attachment across three generations. *Child Development*, 65(5), 1444-1456. doi: 10.1111/j.1467-8624.1994.tb00828.x
- Benoit, D., Parker, K. C. H., & Zeanah, C. (1997). Mothers' representations of their infants assessed prenatally: Stability and association with infant's attachment classifications. *Journal of Child Psychology & Psychiatry*, 38(3), 307-313. doi: 10.1111/j.1469-7610.1997.tb01515.x
- Benoit, D., Zeanah, C. H., Boucher, C., & Minde, K. K. (1992). Sleep disorders in early childhood: Association with insecure maternal attachment. *Journal of the American Academy of Child and Adolescent Psychiatry*, 31(1), 86-93. doi: 10.1097/00004583-199201000-00013

- Benoit, D., Zeanah, C. H., Parker, K. C., Nicholson, E., & Coolbear, J. (1997). "Working model of the child interview": Infant clinical status related to maternal perceptions. *Infant Mental Health Journal*, *18*(1), 107-121. doi: 10.1002/(SICI)1097-0355(199721)18:1<107::AID-IMHJ8>3.0.CO;2-N
- Berlin, L. J., Cassidy, J., & Appleyard, K. (2008). The influence of early attachment on other relationships. In J. Cassidy & P. Shaver (Eds.), *Handbook of attachment* (2nd ed.). New York: Guilford Press.
- Bernal, J. F. (1973). Night waking in infants during the first 14 months. *Developmental Medicine and Child Neurology*, *15*(6), 760-769. doi: 10.1111/j.1469-8749.1973.tb04911.x
- Birtchnell, J. (1988). Depression and family relationships. *British Journal of Psychiatry*, *153*(6), 758-769. doi: 10.1192/bjp.153.6.758
- Blatt, S. J., & Homann, E. (1992). Parent-child interaction in the etiology of dependent and self-critical depression. *Clinical Psychology Review*, *12*(1), 47-91. doi: 10.1016/0272-7358(92)
- Bowlby, J. (1969). *Attachment and loss* (1st ed. Vol. 1). New York: Basic Books.
- Bowlby, J. (1973). *Attachment and loss* (Vol. 2). New York: Basic Books.
- Bowlby, J. (1980). *Attachment and loss* (Vol. 3). New York: Basic Books.
- Bowlby, J. (1988). *A secure base: Parent-child attachment and healthy human development*. New York: Basic Books.
- Boyce, P., Hickie, I., & Parker, G. (1991). Parents, partners or personality? Risk factors for post-natal depression. *Journal of Affective Disorders*, *21*(4), 245-255. doi: 10.1016/0165-0327(91)90004-C
- Boyce, P., Stubbs, J., & Todd, A. (1993). The Edinburgh Postnatal Depression Scale: Validation for an Australian sample. *Australian and New Zealand Journal of Psychiatry*, *27*(3), 472-476. doi: 10.3109/00048679309075805
- Boyd, R. C., Le, H. N., & Somberg, R. (2005). Review of screening instruments for postpartum depression. *Archives Of Women's Mental Health*, *8*(3), 141-153. doi: 10.1007/s00737-005-0096-6
- Breslau, N., Roth, T., Rosenthal, L., & Andreski, P. (1997). Sleep disturbance and psychiatric disorders: A longitudinal epidemiological study of young adults. *Biological Psychiatry*, *39*(6), 411-418. doi: 10.1016/0006-3223(95)00188-
- Bretherton, I. (1992). The origins of attachment theory: John Bowlby and Mary Ainsworth. *Developmental Psychology*, *28*(5), 759-775. doi: 10.1037/0012-1649.28.5.759
- Britton, J. R. (2008). Maternal anxiety: Course and antecedents during the early postpartum period. *Depression and Anxiety*, *25*(9), 793-800. doi: 10.1002/da.20325
- Brown, S., Bruinsma, F., Darcy, M., Small, R., & Lumley, J. (2004). Early discharge: No evidence of adverse outcomes in three consecutive population-based Australian surveys of recent mothers, conducted in 1989, 1994 and 2000. *Paediatric And Perinatal Epidemiology*, *18*(3), 202-213. doi: 10.1111/j.1365-3016.2004.00558.x
- Bugental, D. B., & Johnston, C. (2000). Parental and child cognitions in the context of the family. *Annual Review Of Psychology*, *51*(3), 315-344. doi: 10.1146/annurev.psych.51.1.315
- Burnham, M. M., Goodlin-Jones, B. L., Gaylor, E. E., & Anders, T. F. (2002). Nighttime sleep-wake patterns and self-soothing from birth to one year of age: A longitudinal intervention study. *Journal of Child Psychology and Psychiatry, and Allied Disciplines*, *43*(6), 713-725. doi: 10.1111/1469-7610.00

- Buysse, D. J., Angst, J., Gamma, A., Ajdacic, V., Eich, D., & Rössler, W. (2008). Prevalence, course and comorbidity of insomnia and depression in young adults. *Sleep, 31*(4), 473-480.
- Buysse, D. J., Germain, A., Moul, D., & Nofzinger, E. A. (2005). Insomnia. *Focus The Journal of Lifelong Learning in Psychiatry, 3*(4), 568-584.
- Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1988). The Pittsburgh sleep quality index: A new instrument for psychiatric practice and research *Psychiatry Research, 28*(2), 193-213. doi: 10.1016/0165-1781(89)90047-4
- Canetti, L., Bachar, E., Galili-Weisstub, E., De-Nour, A. K., & Shalev, A. Y. (1997). Parental bonding and mental health in adolescence. *Adolescence, 32*(126), 381-394.
- Carey, W. B. (1974). Night waking and temperament in infancy. *Journal of Pediatrics 84*(5), 756-758. doi: 10.1016/S0022-3476(74)80027-2
- Carey, W. B., & McDevitt, S. C. (1978). Revision of the infant temperament questionnaire. *Pediatrics, 61*(5), 735-739.
- Carter, M. M., Sbrocco, T., Lewis, E. L., & Friedman, E. K. (2001). Parental bonding and anxiety: Differences between African American and European American college students. *Journal of Anxiety Disorders, 15*(6), 555-569. doi: 10.1016/S0887-6185(01)00081-0
- Church, N. F., Brechman-Toussaint, M. L., & Hine, D. W. (2005). Do dysfunctional cognitions mediate the relationship between risk factors and postnatal depression symptomatology? *Journal of Affective Disorders, 87*(1), 65-72. doi: 10.1016/j.jad.2005.03.009
- Collins, N., & Read, S. (1990). Adult attachment, working models and relationship quality in dating couples. *Journal of Personality and Social Psychology, 58*(4), 644-663. doi: 10.1037/0022-3514.58.4.644
- Coons, S., & Guilleminault, C. (1982). Development of sleep-wake patterns and non-rapid eye movement sleep states during the first six months of life in normal infants. *Pediatrics, 69*(6), 793-798.
- Costello, C. G., & Comrey, A. L. (1967). Scales for measuring depression and anxiety. *The Journal of Psychology, 66*(2), 303-313.
- Cox, J. L., & Holden, J. M. (2003). *Perinatal mental health: A guide to the Edinburgh Postnatal Depression Scale*. London: Gaskell.
- Cox, J. L., Holden, J. M., & Sagovsky, R. (1987). Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *The British Journal of Psychiatry, 150*(6), 782-786. doi: 10.1192/bjp.150.6.782
- Cronin, A., Halligan, S. L., & Murray, L. (2008). Maternal psychosocial adversity and the longitudinal development of infant sleep. *Infancy, 13*(5), 469-495. doi: 10.1080/15250000802329404
- Crowell, J. A., & Feldman, S. S. (1989). Assessment of mothers' working models of relationships: Some clinical implications. *Infant Mental Health Journal, 10*(3), 173-184. doi: 10.1002/1097-0355(198923)
- Crowell, J. A., & Feldman, S. S. (1991). Mothers' working models of attachment relationships and mother and child behavior during separation and reunion. *Developmental Psychology, 27*(4), 597-605. doi: 10.1037/0012-1649.27.4.597
- Dalton, W., Frick-Horbury, D., & Kitzmann, K. (2006). Young adults' retrospective reports of parenting by mothers and fathers: Associations with current relationship quality. *The Journal of General Psychology, 133*(1), 5-18.

- del Carmen, R., Pedersen, F. A., Huffman, L., & Bryan, Y. E. (1993). Dyadic distress management predicts subsequent security of attachment. *Infant Behaviour and Development, 16*(2), 131-147. doi: 10.1016/0163-6383(93)80014-Y
- DeLeon, C. W., & Karraker, K. H. (2007). Intrinsic and extrinsic factors associated with night waking in 9-month-old infants. *Infant Behaviour and Development, 30*(4), 596-605. doi: doi:10.1016/j.infbeh.2007.03.009
- Dennis, C. L. (2005). Psychosocial and psychological interventions for prevention of postnatal depression: systematic review. *British Medical Journal, 331*(7507), 15-22. Retrieved from <http://www.bmj.com/cgi/content/abstract/331/7507/15> doi:10.1136/bmj.331.7507.15
- Derogatis, L., & Cleary, T. (1977). Confirmation of the dimensional structure of the SCL-90: A study in construct validation. *Journal of Clinical Psychology, 33*(4), 981-989. doi: 10.1002/1097-4679(197710)33:4<981::AID-JCLP2270330412>3.0.CO;2-0
- Dørheim, S. K., Bondevik, G. T., Eberhard-Gran, M., & Bjorvatn, B. (2009). Sleep and depression in postpartum women: A population-based study. *Sleep, 32*(7), 847-855.
- Edhborg, M., Lundh, W., Seimyr, L., & Widström, A. M. (2003). The parent-child relationship in the context of maternal depressive mood. *Archives Of Women's Mental Health, 6*(3), 211-216. doi: 10.1007/s00737-003-0020-x
- Edinger, J. D. (1987). Sleep history questionnaire for evaluating insomnia complaints. In P. A. Keller & S. R. Heyman (Eds.), *Innovations in Clinical Practice: A source book* (Vol. 6, pp. 295-303). Sarasota: Professional Resource Exchange.
- Edinger, J. D., & Means, M. K. (2005). Cognitive-behavioral therapy for primary insomnia. *Clinical Psychology Review, 25*(5), 539-558. doi: 10.1016/j.cpr.2005.04.003
- Enns, M. W., Cox, B. J., & Clara, I. (2002). Parental bonding and adult psychopathology: Results from the US National Comorbidity Survey. *Psychological Medicine, 32*(6), 997-1008. doi: 10.1017/S0033291702005937
- Epstein, S. (1983). *Mother-Father-Peer Scale*. University of Massachusetts. Amherst.
- Espie, C. A. (2002). Insomnia: Conceptual issues in the development, persistence and treatment of sleep disorders in adults. *Annual Review of Psychology, 53*, 215-243. doi: 10.1146/annurev.psych.53.100901.135243
- Faul, F., Erdfelder, E., Buchner, A., & Lang, A. (2009). G*Power.
- Ficca, G., Fagioli, I., Giganti, F., & Salzarulo, P. (1999). Spontaneous awakenings from sleep in the first year of life. *Early Human Development, 55*(3), 219-228. doi: 10.1016/S0378-3782(99)00016-X
- Fichten, C. S., Creti, L., Amsel, R., Brender, W., Weinstein, N., & Libman, E. (1995). Poor sleepers who do not complain of insomnia: Myths and realities about psychological and lifestyle characteristics of older good and poor sleepers. *Journal of Behavioral Medicine, 18*(2), 189-223. doi: 10.1007/bf01857869
- Field, T. (1995). Infants of depressed mothers. *Infant Behaviour and Development, 18*(1), 1-13. doi: 10.1016/0163-6383(95)
- Fisher, J. R., Feekery, C. J., & Rowe-Murray, H. J. (2002). Nature, severity and correlates of psychological distress in women admitted to a private mother-baby unit. *Journal of Paediatrics and Child Health, 38*(2), 140-145. doi: 10.1046/j.1440-1754.2002.00723.x

- Fisher, J. R., Feekery, C. J., & Rowe, H. J. (2004). Treatment of maternal mood disorder and infant behaviour disturbance in an Australian private mothercraft unit: A follow-up study. *Archives of Women's Mental Health*, 7(1), 89-93. doi: 10.1007/s00737-003-0041-5
- Fisher, J. R., Murray, H. J., & Feekery, C. J. (2004). Temperament and behaviour of infants aged 4-12 months on admission to a private mother-baby unit and at 1 and 6 months follow-up. *Clinical Psychologist*, 8(1), 15-21. doi: 10.1080/13284200410001672928
- Ford, D. E., & Kamerow, D. B. (1989). Epidemiologic study of sleep disturbances and psychiatric disorders: An opportunity for prevention? *Journal of the American Medical Association* 262, 1479-1184. doi: 10.1001/jama.1989.03430110069030
- Gallagher, B., & Cartwright-Hatton, S. (2008). The relationship between parenting factors and trait anxiety: Mediating role of cognitive errors and metacognition. *Journal of Anxiety Disorders*, 22(4), 722-733. doi: 10.1016/j.janxdis.2007.07.006
- George, C., & Solomon, J. (1996). Representational models of relationships: Links between caregiving and attachment. [Article]. *Infant Mental Health Journal*, 17(3), 18-36.
- Gerlsma, C., Arrindell, W. A., van der Veen, N., & Emmerlamp, P. M. (1991). A parental rearing style questionnaire for use with adolescents: Psychometric evaluation of the EMBU-A. *Personality and Individual Differences*, 12(12), 1245-1253. doi: 10.1016/0191-8869(91)90196-I
- Gerlsma, C., Emmelkamp, P. M., & Arrindell, W. A. (1990). Anxiety, depression and perception of early parenting: A meta-analysis. *Clinical Psychology Review*, 10(3), 251-277. doi: 10.1016/0272-7358(90)90062-F
- Gillin, J. C. (1998). Are sleep disturbances risk factors for anxiety, depressive and addictive disorders? *Acta Psychiatrica Scandinavica*, 98(Suppl. 393), 39-43. doi: 10.1111/j.1600-0447.1998.tb05965.x
- Gittleman, M. G., Klein, M. H., Smider, N. A., & Essex, M. J. (1998). Recollections of parental behaviour, adult attachment and mental health: Mediating and moderating effects. *Psychological Medicine*, 28(6), 1443-1455. doi: 10.1017/s0033291798007533
- Gladstone, G. L., & Parker, G. B. (2005). The role of parenting in the development of psychopathology: An overview of research using the parental bonding instrument. In J. L. Hudson & R. M. Rapee (Eds.), *Psychopathology and the family* (pp. 21-33). New York: Elsevier Science.
- Glasheen, C., Richardson, G., & Fabio, A. (2010). A systematic review of the effects of postnatal maternal anxiety on children. *Archives of Women's Mental Health*, 13(1), 61-74. doi: 10.1007/s00737-009-0109-y
- Goldberg, D. P., & Hillier, V. F. (1979). A scaled version of the General Health Questionnaire. *Psychological Medicine*, 9(1), 139-145. doi: 10.1017/S0033291700021644
- Goodlin-Jones, B. L., & Anders, T. F. (2001). Relationship disturbances and parent-child therapy. *Child and Adolescent Psychiatric Clinics of North America*, 10(3), 487-499.
- Goodlin-Jones, B. L., & Anders, T. F. (2004). Sleep disorders. In R. Del Carmen-Wiggins & A. Carter (Eds.), *Handbook of infant, toddler and preschool mental health assessment* (pp. 271-288). Oxford, UK: Oxford University Press.

- Goodlin-Jones, B. L., Burnham, M. M., & Anders, T. F. (2000). Sleep and sleep disturbance. In A. J. Sameroff, M. Lewis & S. Miller (Eds.), *Handbook of developmental psychopathology* (2nd ed.). New York: Kluwer Academic/Plenum Publishers.
- Goodlin-Jones, B. L., Burnham, M. M., Gaylor, E. E., & Anders, T. F. (2001). Night waking, sleep-wake organization and self-soothing in the first year of life. *Journal of Developmental and Behavioral Pediatrics, 22*(4), 226-233.
- Goodlin-Jones, B. L., Eiben, L. A., & Anders, T. F. (1997). Maternal well-being and sleep-wake behaviors in infants: An intervention using maternal odor. *Infant Mental Health Journal, 18*(4), 378-393. doi: 10.1002/(SICI)1097-0355(199724)
- Grusec, J. E. (2006). Parents' attitudes and beliefs: Their impact on children's development. In R. Tremblay, R. Barr & R. Peters (Eds.), *Encyclopedia on early childhood development* (pp. 1-5). Montreal: Centre of Excellence for Early Childhood Development.
- Guedeney, N., Fermanian, J., Guelfi, J. D., & Kumar, R. C. (2000). The Edinburgh postnatal depression scale (EPDS) and the detection of major depressive disorders in early postpartum: some concerns about false negatives. *Journal of Affective Disorders, 61*(1), 107-112.
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis* (6th ed.). London: Pearson Prentice Hall
- Harvey, A. G. (2001). Insomnia: Symptom or diagnosis? *Clinical Psychology Review, 21*(7), 1037-1059. doi: 10.1016/S0272-7358(00)00083-0
- Harvey, A. G. (2002). A cognitive model of insomnia. *Behaviour Research and Therapy, 40*(8), 869-893. doi: 10.1016/S0005-7967(01)00061-4
- Harvey, A. G., Tang, N. K., & Browning, L. (2005). Cognitive approaches to insomnia. *Clinical Psychology Review, 25*(5), 593-611. doi: 10.1016/j.cpr.2005.04.005
- Hauri, P., & Olmstead, E. (1980). Childhood-onset insomnia. *Sleep, 3*(1), 59-65.
- Hayes, M. J., Roberts, S. M., & Stowe, R. (1996). Early childhood co-sleeping: Parent-child and parent-infant nighttime interactions. *Infant Mental Health Journal, 17*(4), 348-357. doi: 10.1002/(SICI)1097-0355(199624)17:4<348::AID-IMHJ6>3.0.CO;2-I
- Hazan, C., & Shaver, P. (1987). Romantic love conceptualised as an attachment process. *Journal of Personality and Social Psychology, 52*(3), 511-524. doi: 10.1037/0022-3514.52.3.511
- Heron, J., O'Connor, T. G., Evans, J., Golding, J., & Glover, V. (2004). The course of anxiety and depression through pregnancy and the postpartum in a community sample. *Journal of Affective Disorders, 80*(1), 65-73. doi: 10.1016/j.jad.2003.08.004
- Hiscock, H., & Wake, M. (2001). Infant sleep problems and postnatal depression: A community-based study. *Pediatrics, 107*(6), 1317-1322. doi: 10.1542/peds.107.6.1317
- Hiscock, H., & Wake, M. (2002). Randomised controlled trial of behavioural infant sleep intervention to improve infant sleep and maternal mood. *British Medical Journal, 324*(May), 1062-1065.
- Hock, E., McBride, S., & Gnezda, M. T. (1989). Maternal separation anxiety: Mother-infant separation from the maternal perspective. *Child Development, 60*(3), 793-802.
- Hogg, C., Rutter, M., & Richman, N. (1997). Emotional and behavioural problems in children. In I. Sclare (Ed.), *Child psychology portfolio* (pp. 1-13). London: NFER-Nelson.

- Hoza, B., Owens, J. S., Pelham, W. E., Swanson, J. M., Conners, C. K., Hinshaw, S. P., Kraerner, H. C. (2000). Parent cognitions as predictors of child treatment response in attention-deficit/hyperactivity disorder. *Journal of Abnormal Child Psychology*, 28(6), 569-583. doi: 10.1023/A:1005135232068
- Hsu, H. C. (2004). Antecedents and consequences of separation anxiety in first-time mothers: Infant, mother and social-contextual characteristics. *Infant Behaviour and Development*, 27(2), 113-133. doi: 10.1016/j.infbeh.2003.09.005
- Ingram, R. E. (2003). Origins of cognitive vulnerability to depression. *Cognitive Therapy and Research*, 27(1), 77-88. doi: 10.1023/A:1022590730752
- Ingram, R. E., & Ritter, J. (2000). Vulnerability to depression: cognitive reactivity and parental bonding in high-risk individuals. *Journal of Abnormal Psychology*, 109(4), 588-596. doi: 10.1037/0021-843X.109.4.588
- International Classification of Sleep Disorders. (2001). *International Classification of Sleep Disorders, revised: Diagnostic and coding manual*. Chicago: American Academy of Sleep Medicine.
- Jaffa, T., Scott, S., Hendriks, J. H., & Shapiro, C. M. (1993). ABC of sleep disorders. Sleep disorders in children. *British Medical Journal* 306(March 6), 640-643.
- Jansson, M., & Linton, S. J. (2007). Psychological mechanisms in the maintenance of insomnia: Arousal, distress, and sleep-related beliefs. *Behaviour Research and Therapy*, 45(3), 511-521. doi: 10.1016/j.brat.2006.04.003
- Jefferis, P. G., & Oliver, C. (2006). Associations between maternal childrearing cognitions and conduct problems in young children. *Clinical Child Psychology and Psychiatry*, 11(1), 83-102. doi: 10.1177/1359104506059125
- Johnson, C. M. (1991). Infant and toddler sleep: A telephone survey of parents in one community. *Journal of Developmental and Behavioral Pediatrics*, 12(2), 108-114.
- Karacan, I., Williams, R. L., Hirsch, C. J., McCaulley, M., & Heine, M. W. (1969). Some implications of the sleep patterns of pregnancy for postpartum emotional disturbances. *British Journal of Psychiatry*, 115(525), 929-935. doi: 10.1192/bjp.115.525.929
- Karraker, K., & Young, M. (2007). Night waking in 6-month old infants and maternal depressive symptoms *Journal of Applied Developmental Psychology*, 28(5-6), 493-498. doi: 10.1016/j.appdev.2007.06.002
- Keener, M. A., Zeanah, C. H., & Anders, T. F. (1988). Infant temperament, sleep organisation and night-time parental intervention. *Pediatrics*, 81(6), 762-771.
- Kessler, R., Keller, M., & Wittchen, H.-U. (2001). The epidemiology of generalized anxiety disorder. *Psychiatric Clinics of North America*, 24(1), 19-39. doi: 10.1016/S0193-953X(05)70204-5
- Kleitman, N., & Engelmann, T. G. (1953). Sleep characteristics of infants. *Journal of Applied Physiology*, 6(5), 269-282.
- Klink, M., Quan, S., Kaltenborn, W., & Lebowitz, M. (1992). Risk factors associated with complaints of insomnia in a general adult population. *Archives of Internal Medicine*, 152, 1634-1637.
- Komada, Y., Adachi, N., Matsuura, N., Mizuno, K., Hirose, K., Aritomi, R., & Shirakawa, S. (2009). Irregular sleep habits of parents are associated with increased sleep problems and daytime sleepiness of children. *The Tohoku Journal of Experimental Medicine*, 219(2), 85-89. doi: 10.1620/tjem.219.85

- Lam, P., Hiscock, H., & Wake, M. (2003). Outcomes of infant sleep problems: A longitudinal study of sleep, behaviour and maternal well-being. *Pediatrics*, *111*(3), e203-e207. doi: 10.1542/peds.111.3.e203
- Lee-Chiong, T. (2006). *Sleep: A comprehensive handbook*. Hoboken, NJ: John Wiley & Sons.
- Lee, K. A. (1998). Alterations in sleep during pregnancy and postpartum: A review of 30 years of research. *Sleep Medicine Reviews*, *2*(4), 231-242. doi: 10.1016/S1087-0792(98)90010-7
- Lee, K. A., Zaffke, M. E., & McEnany, G. (2000). Parity and sleep patterns during and after pregnancy. *Obstetrics and Gynecology*, *95*(1), 14-18. doi: 10.1016/S0029-7844(99)00486-X
- León, C., & León, A. (1990). Panic disorder and parental bonding. *Psychiatric Annals*, *20*(9), 503-507.
- Lopez, F., & Gover, M. (1993). Self-report measures of parent-adolescent and separation-individuation: A selective review. *Journal of Counseling & Development*, *71*(5), 560-569. doi: 10.1002/j.1556-6676.1993.tb02243.x
- Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales*. Sydney: Psychology Foundation.
- Lozoff, B., Wolf, A. W., & Davis, N. S. (1985). Sleep problems seen in pediatric practice. *Pediatrics*, *75*(3), 477-483.
- MacKinnon, A. J., Henderson, A. S., Scott, R., & Duncan-Jones, P. (1989). The Parental Bonding Instrument (PBI): An epidemiological study in a general population sample. *Psychological Medicine*, *19*(4), 1023-1034. doi: 10.1017/S0033291700005754
- Main, M., Kaplan, N., & Cassidy, J. (1985). Security in infancy, childhood and adulthood: A move to the level of representation. *Monographs of the Society for Research in Child Development*, *50*(1/2), 66-104.
- Mäntymaa, M., Tamminen, T., Puura, K., & Salmelin, R. K. (2006). Early mother-infant interaction: Associations with mental health. *Journal of Reproductive and Infant Psychology*, *24*(3), 213-231.
- Mao, A., Burnham, M. M., Goodlin-Jones, B. L., Gaylor, E. E., & Anders, T. F. (2004). A comparison of the sleep-wake patterns of cosleeping and solitary-sleeping infants. *Child Psychiatry And Human Development*, *35*(2), 95-105. doi: 10.1007/s10578-004-1879-0
- Mares, S., Newman, L., & Warren, B. (2005). *Clinical skills in infant mental health*. Camberwell: ACER Press.
- Matthey, S., Barnett, B., Howie, P., & Kavanagh, D. J. (2003). Diagnosing postpartum depression in mothers and fathers: Whatever happened to anxiety? *Journal of Affective Disorders*, *74*(2), 139-147. doi: 10.1016/S0165-0327(02)00012-5
- Mayes, L. C., & Leckman, J. F. (2007). Parental representations and subclinical changes in postpartum mood. *Infant Mental Health Journal*, *28*(3), 281-295. doi: 10.1002/imhj.20136
- McBride, S., & Belsky, J. (1988). Characteristics, determinants and consequences of maternal separation anxiety. *Developmental Psychology*, *24*(3), 407-414. doi: 10.1037/0012-1649.24.3.407
- McKenna, J. J., & Volpe, L. E. (2007). Sleeping with baby: an internet-based sampling of parental experiences, choices, perceptions, and interpretations in a western industrialized context. *Infant & Child Development*, *16*(4), 359-385. doi: 10.1002/icd.525

- McMahon, C., Barnett, B., Kowalenko, N., Tennant, C., & Don, N. (2001). Postnatal depression, anxiety and unsettled infant behaviour. *Australian and New Zealand Journal of Psychiatry*, 35(5), 581-588. doi: 10.1046/j.1440-1614.2001.00942.x
- McNair, D. M., Lorr, M., & Droppleman, L. F. (1971). *Manual of the Profile of Mood States*. San Diego: Educational and Industrial Testing Service.
- Meyer, T. J., Miller, M. L., Metzger, R. L., & Borkovec, T. D. (1990). Development and validation of the Penn State Worry Questionnaire. *Behaviour Research and Therapy*, 28(6). doi: 10.1016/0005-7967(90)90135-6
- Milgrom, J., Ericksen, J., Negri, L. M., & Gemmill, A. W. (2005). Screening for postnatal depression in routine primary care: Properties of the Edinburgh Postnatal Depression Scale in an Australian sample. *Australian & New Zealand Journal of Psychiatry*, 39(9), 833-839. doi: 10.1111/j.1440-1614.2005.01660.x
- Milgrom, J., Martin, P. R., & Negri, L. M. (1999). *Treating Postnatal Depression: A psychological approach for health care practitioners*. Chichester: John Wiley & Sons, Ltd.
- Miller, S. A. (1995). Parents' attributions for their children's behaviour. *Child Development*, 66, 1557-1584. doi: 10.1111/j.1467-8624.1995.tb00952.x
- Minde, K., Popiel, K., Leos, N., Falkner, S., Parker, K., & Handley-Derry, M. (1993). The evaluation and treatment of sleep disturbances in young children. *The Journal of Child Psychology and Psychiatry*, 34, 521-533. doi: 10.1111/j.1469-7610.1993.tb01033.x
- Mindell, J. A., & Jacobson, B. J. (2000). Sleep disturbances during pregnancy. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*, 29(6), 590-597. doi: 10.1111/j.1552-6909.2000.tb02072.x
- Mindell, J. A., Kuhn, B., Lewin, D., Meltzer, L., & Sadeh, A. (2006). Behavioural treatment of bedtime problems and night wakings in infants and young children: An American academy of sleep medicine review. *Sleep*, 29, 1263-1276.
- Mindell, J. A., & Owens, J. A. (2003). *A clinical guide to pediatric sleep: Diagnosis and management of sleep problems in children and adolescents*. Philadelphia: Lippincott Williams & Wilkins.
- Mindell, J. A., Sadeh, A., Kohyama, J., & How, T. H. (2010). Parental behaviours and sleep outcomes in infants and toddlers: A cross-cultural comparison *Sleep Medicine*, 11(4), 393-399. doi: 10.1016/j.sleep.2009.11.011
- Mindell, J. A., Sadeh, A., Wiegand, B., How, T. H., & Goh, D. Y. T. (2010). Cross-cultural difference in infant and toddler sleep *Sleep Medicine*, 11(3), 274-280. Retrieved from doi:10.1111/j.1440-1754.2011.02251.x
- Mindell, J. A., Telofski, L. S., Wiegand, B., & Kurtz, E. S. (2009). A nightly bedtime routine: Impact on sleep in young children and maternal mood. *Sleep*, 32(5), 599-606.
- Moline, M. L., Broch, L., Zak, R., & Gross, V. (2003). Sleep in women across the life cycle from adulthood through menopause. *Sleep Medicine Reviews*, 7(2), 155-177. doi: 10.1016/j.mcna.2004.01.009
- Moore, T., & Ucko, L. E. (1957). Night waking in early infancy: Part 1. *Archives of Disease in Childhood*, 32, 333-343.
- Morin, C. M. (1993). *Insomnia: Psychological assessment and management*. New York: Guilford Press.
- Morin, C. M. (2000). The Nature of insomnia and the need to refine our diagnostic criteria. *Psychosomatic Medicine*, 62(4), 483-485.

- Morin, C. M., Rodrigue, S., & Ivers, H. (2003). Role of stress, arousal, and coping skills in primary insomnia. *Psychosomatic Medicine*, *65*(2), 259-267. doi: 10.1097/01.psy.0000030391.09558.a3
- Morin, C. M., Stone, J., Trinkle, D., Mercer, J., & Remsberg, S. (1993). Dysfunctional beliefs and attitudes about sleep among older adults with and without insomnia complaints. *Psychology and Aging*, *8*(3), 463-467. doi: 10.1037/0882-7974.8.3.463
- Morphy, H., Dunn, K. M., Lewis, M., Boardman, H. K., & Croft, P. R. (2007). Epidemiology of insomnia: A longitudinal study in a UK population *Sleep*, *30*(3), 274-280.
- Morrell, J. M. (1999a). The Infant Sleep Questionnaire: A new tool to assess infant sleep problems for clinical and research purposes. *Child and Adolescent Mental Health*, *4*(1), 20-26. doi: 10.1111/1475-3588.00246
- Morrell, J. M. (1999b). The role of maternal cognitions in infant sleep problems as assessed by a new instrument, the Maternal Cognitions about Infant Sleep Questionnaire. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, *40*(2), 247-258. doi: 10.1111/1469-7610.00438
- Morrell, J. M., & Cortina-Borja, M. (2002). The developmental change in strategies parents employ to settle young children to sleep, and their relationship to infant sleeping problems, as assessed by a new questionnaire: The Parental Interactive Bedtime Behaviour Scale. *Infant and Child Development*, *11*(1), 17-41. doi: 10.1002/icd.251
- Morrell, J. M., & Steele, H. (2003). The role of attachment security, temperament, maternal perception, and care-giving behavior in persistent infant sleeping problems. *Infant Mental Health Journal*, *24*(5), 447-466. doi: 10.1002/imhj.10072
- Moul, D. E., Nofzinger, E. A., Pilkonis, P. A., Houck, P. R., Miewald, J. M., & Buysse, D. J. (2002). Symptom reports in severe chronic insomnia. *Sleep*, *25*(5), 553-563.
- Murray, L. (1991). Intersubjectivity, object relations theory, and empirical evidence from mother-infant interactions. *Infant Mental Health Journal*, *12*(3), 219-232. doi: 10.1002/1097-0355(199123)
- Neckelmann, D., Mykletun, A., & Dahl, A. A. (2007). Chronic insomnia as a risk factor for developing anxiety and depression. *Sleep*, *30*(7), 873-880.
- Nicol-Harper, R., Harvey, A., & Stein, A. (2007). Interactions between mothers and infants: Impact of maternal anxiety. *Infant Behavior and Development*, *30*(1), 161-167. doi: 10.1016/j.infbeh.2006.08.005
- Nover, A., Shore, M., Timberlake, E., & Greenspan, S. (1984). The relationship of maternal perception and maternal behaviour: A study of normal mothers and their infants. *American Journal of Orthopsychiatry*, *54*(2), 210-223. doi: 10.1111/j.1939-0025.1984.tb01489.x
- Nutt, D., & Wilson, S. (2008). Anxiety and insomnia - Bidirectional associations. *European Psychiatric Review* *1*(2), 35-37.
- O'Hara, M. W. (1997). The nature of postpartum depressive disorders. In P. Cooper (Ed.), *Postpartum depression and child development* (pp. 3-31). New York: Guilford.
- Ohayon, M. M. (2002). Epidemiology of insomnia: What we know and what we still need to learn. *Sleep Medicine Reviews*, *6*(2), 97-111. doi: 10.1053/smr.2002.0186

- Parker, G. (1979a). Parental characteristics in relation to depressive disorders. *British Journal of Psychiatry*, *134*(2), 138-147. doi: 10.1192/bjp.134.2.138
- Parker, G. (1979b). Reported parental characteristics in relation to trait depression and anxiety levels in a non-clinical group. *Australian and New Zealand Journal of Psychiatry*, *13*(3), 260-264.
- Parker, G. (1989). The Parental Bonding Instrument: Psychometric properties reviewed *Psychiatric Developments*, *7*(4), 317-335.
- Parker, G. (1999). *Annotated bibliography of Parental Bonding Instrument research*. Sydney: Black Dog Institute.
- Parker, G., Tupling, H., & Brown, L. B. (1979). A parental bonding instrument. *British Journal of Medical Psychology*, *52*(1), 1-10. doi: DOI: 10.1111/j.2044-8341.1979.tb02487.x
- Pilcher, J. J., & Huffcutt, A. J. (1996). Effects of sleep deprivation on performance: A meta-analysis. *Sleep: Journal of Sleep Research and Sleep Medicine*, *19*(4), 318-401.
- Pope, S. (2000). *Postnatal depression : A systematic review of published scientific literature to 1999: An information paper*. (1864960086). Canberra: National Health and Medical Research Council Retrieved from <http://www.nhmrc.gov.au/publications/synopses/wh29syn.htm>.
- Preacher, K. J., & Leorardelli, G. J. (2006). Calculation for the Sobel Test. Retrieved October 16, 2011, from <http://www.people.ku.edu/~preacher/sobel/sobel.htm>
- Priel, B., & Besser, A. (2000). Adult attachment styles, early relationships, antenatal attachment and perceptions of infant temperament: A study of first-time mothers. *Personal Relationships*, *7*(3), 291-310. doi: 10.1111/j.1475-6811.2000.tb00018.x
- Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement* *1*(3), 385-401. doi: 10.1177/014662167700100306
- Rapee, R. (1997). Potential role of childrearing practices in the development of anxiety and depression. *Clinical Psychology Review*, *17*(1), 47-67. doi: 10.1016/S0272-7358(96)00040-2
- Richman, N. (1981). A community survey of characteristics of one- to two-year-olds with sleep disruptions. *Journal of American Academy of Child Psychiatry*, *20*(2), 281-291. doi: 10.1016/S0002-7138(09)60989-4
- Ross, L. E., Gilbert Evans, S. E., Sellers, E. M., & Romach, M. K. (2003). Measurement issues in postpartum depression part 1: Anxiety as a feature of postpartum depression. *Archives of Women's Mental Health*, *6*(1), 51-57. doi: 10.1007/s00737-002-0155-1
- Roth, T., & Roehrs, T. (2003). Insomnia: Epidemiology, characteristics and consequences. *Clinical Cornerstone*, *5*(3), 5-15. doi: 10.1016/S1098-3597(03)90031-7
- Sadeh, A. (1994). Assessment of intervention for infant nightwaking: Parental reports and activity-based home monitoring. *Journal of Consulting and Clinical Psychology*, *62* (1), 63-68.
- Sadeh, A. (1996). Stress, trauma and sleep in children. *Child and Adolescent Psychiatric Clinics of North America*, *5*(3), 685-700.
- Sadeh, A. (2004). A brief screening questionnaire for infant sleep problems: Validation and findings for an internet sample. *Pediatrics*, *113*(6), e570-e577.
- Sadeh, A. (2005). Cognitive-behavioral treatment for childhood sleep disorders. *Clinical Psychology Review*, *25*(5), 612-628. doi: 10.1016/j.cpr.2005.04.006

- Sadeh, A. (2007). Maturation of sleep patterns during infancy and childhood. In C. Marcus, J. Carroll, D. Donnelly & G. Loughlin (Eds.), *Sleep in children: Developmental changes in sleep patterns* (2nd ed., pp. 77-93). New York: Informa Healthcare.
- Sadeh, A., & Anders, T. F. (1993). Infant sleep problems: Origins, assessment, interventions. *Infant Mental Health Journal, 14*(1), 17-34. doi: 10.1002/1097-0355(199321)
- Sadeh, A., Dark, I., & Vohr, B. R. (1996). Newborn's sleep-wake patterns: The role of maternal, delivery and infant factors. *Early Human Development, 44*(2), 113-126. doi: 10.1016/0378-3782(95)01698-8
- Sadeh, A., Flint-Ofir, E., Tirosh, T., & Tikotzky, L. (2007). Infant sleep and parental sleep-related cognitions. *Journal of Family Psychology, 21*(1), 74-87. doi: 10.1037/0893-3200.21.1.74
- Sadeh, A., Lavie, P., & Scher, A. (1994). Sleep and temperament: Maternal perceptions of temperament of sleep-disturbed toddlers. *Early Education and Development, 5*(4), 311-322. doi: 10.1207/s15566935eed0504_6
- Sadeh, A., Mindell, J. A., Luedtke, K., & Wiegand, B. (2009). Sleep and sleep ecology in the first 3 years: A web-based study. *Journal of Sleep Research, 18*(1), 60-73. doi: 10.1111/j.1365-2869.2008.00699.x
- Sadeh, A., Tikotzky, L., & Scher, A. (2009). Parenting and infant sleep. *Sleep Medicine Reviews* Retrieved doi:10.1016/j.smrv.209.05.003
- Sameroff, A. J., & Chandler, M. (1975). Reproductive risk and the continuum of caretaking causality. In F. D. Horowitz, E. M. Hetherington, S. Scarr-Salapatek & G. Soegel (Eds.), *Review of child development research* (Vol. 4, pp. 187-244). Chicago: University of Chicago Press.
- Santiago, J., Nolleto, M., Kinzler, W., & Santiago, T. (2001). Sleep and sleep disorders in pregnancy. *Annals of Internal Medicine, 134*(5), 396-408.
- Schaefer, E. S. (1965). Children's reports of parental behaviour: An inventory. *Child Development, 36*(2), 413-424.
- Scher, A. (2008). Maternal separation as a regulator of infants' sleep. *Journal of Child Psychology and Psychiatry, 49*(6), 618-625. doi: 10.1111/j.1469-7610.2007.01872.x
- Scher, A., & Blumberg, O. (1999). Night waking among 1-year olds: A study of maternal separation anxiety. *Child: Care, Health and Development, 25*(5), 323-334. doi: 10.1046/j.1365-2214.1999.00099.x
- Scher, A., Tirosh, E., Jaffe, M., Rubin, L., Sadeh, A., & Lavie, P. (1995). Sleep patterns of infants and young children in Israel. *International Journal of Behavioural Development, 18*(4), 701-711. doi: 10.1177/016502549501800407
- Schuetze, P., Lawton, D., & Eiden, R. (2006). Prenatal cocaine exposure and infant sleep at 7 months of age: The influence of the caregiving environment. *Infant Mental Health Journal, 27*(4), 383-404. doi: 10.1002/imhj.20097
- Schwichtenberg, A. J. M., & Poehlmann, J. (2008). A transactional model of sleep-wake regulation in infants born preterm or low birthweight. *Journal of Pediatric Psychology, 34*(8), 1-13. doi: 10.1093/jpepsy/jsn132
- Scott, G., & Richards, M. P. (1990). Night waking in 1-year-old children in England. *Child: Care, Health and Development, 16*(5), 283-302. doi: 10.1111/j.1365-2214.1990.tb00662.x

- Serbin, L., & Karp, J. (2003). Intergenerational studies of parenting and the transfer of risk from parent to child. *Current Directions in Psychological Science, 12*(4), 138-142. doi: 10.1111/1467-8721.01249
- Skouteris, H., Wertheim, E. H., Rallis, S., Milgrom, J., & Paxton, S. J. (2009). Depression and anxiety through pregnancy and the early postpartum: An examination of prospective relationships. *Journal of Affective Disorders, 113*(3), 303-308. doi: 10.1016/j.jad.2008.06.002
- Slade, A., Belsky, J., Aber, J. L., & Phelps, J. L. (1999). Mothers' representations of their relationships with their toddlers: Links to adult attachment and observed mothering. *Developmental Psychology, 35*(3), 611-619.
- Slep, A. M., & O'Leary, S. G. (1998). The effects of maternal attributions on parenting: An experimental analysis. *Journal of Family Psychology, 12*(2), 234-243. doi: 10.1037/0893-3200.12.2.234
- Smith, M. T., Smith, L. J., Nowakowski, S., & Perlis, M. (2003). Primary insomnia: Diagnostic issues, treatment and future directions. In M. Perlis & K. Lichstein (Eds.), *Treating sleep disorders: Principles and practice of behavioural sleep medicine* (pp. 214-261). New Jersey: John Wiley & Sons, Inc.
- Spielberger, C. (1983). *Manual for the State-Trait Anxiety Inventory (Form Y)*. Palo Alto, CA: Consulting Psychological Press.
- Spielberger, C. (1989). *State-Trait Anxiety Inventory: A comprehensive bibliography*. Palo Alto, CA: Consulting Psychologists Press.
- SPSS for Windows. (2006). SPSS. Chicago: SPSS Inc.
- Stifter, C. A., Coulehan, C. M., & Fish, M. (1993). Linking employment to attachment: The mediating effects of maternal separation anxiety and interactive behaviour. *Child Development, 64*(5), 1451-1460. doi: 10.2307/1131545
- Stuart, S., Couser, G., Schilder, K., O'Hara, M. W., & Gorman, L. (1998). Postpartum anxiety and depression: onset and comorbidity in a community sample. *The Journal of Nervous and Mental Disease, 186*(7), 420-424.
- Swanson, L. M., Pickett, S. M., Flynn, H., & Armitage, R. (2011). Relationships among depression, anxiety and insomnia symptoms in perinatal women seeking mental health treatment. *Journal of Women's Health, 20*(4), 553-558. doi: 10.1089/jwh.2010.2371
- Tabachnick, B. G., & Fidell, L. (2007). *Using multivariate statistics* (5th ed.). Boston: Pearson/Allyn & Bacon.
- Teng, A., Bartle, A., Sadeh, A., & Mindell, J. A. (2011). Infant and toddler sleep in Australia and New Zealand. *Journal of Paediatrics and Child Health*. doi: 10.1111/j.1440-1754.2011.02251.x
- Teti, D. M., & Gelfand, D. (1997). Maternal cognitions as mediators of child outcomes in the context of postpartum depression In L. Murray & P. Cooper (Eds.), *Postpartum depression and child development* (pp. 136-164). New York: Guilford Press.
- Teti, D. M., Kim, B. R., Mayer, G., & Countermine, M. (2010). Maternal emotional availability at bedtime predicts infant sleep quality. *Journal of Family Psychology, 24*(3), 307-315. doi: 10.1037/a0019306
- Thome, M. (2000). Predictors of postpartum depression symptoms in Icelandic women. *Archives of Women's Mental Health, 3*(1), 7-14. doi: 10.1007/PL00010326
- Thunström, M. (1999). Severe sleep problems among infants in a normal population in Sweden: prevalence, severity and correlates. *Acta Paediatrica, 88*(12), 1356 - 1363. doi: 10.1111/j.1651-2227.1999.tb01051.x

- Tikotzky, L., & Sadeh, A. (2009). Maternal sleep-related cognitions and infant sleep: A longitudinal study from pregnancy through the 1st year. *Child Development, 80*(3), 860-874. doi: 10.1111/j.1467-8624.2009.01302.x
- Tikotzky, L., Sadeh, A., & Glickman-Gavrieli, T. (2010). Infant sleep and parental involvement in infant caregiving during the first 6 months of life. *Journal of Pediatric Psychology, 35*(10), 1-11. doi: 10.1093/jpepsy/jsq036
- Tikotzky, L., Sharabany, R., Hirsch, I., & Sadeh, A. (2010). "Ghosts in the Nursery:" Infant sleep and sleep-related cognitions of parents raised under communal sleeping arrangements. *Infant Mental Health Journal, 31*(3), 312-334.
- Toselli, M., Farneti, P., & Salzarulo, P. (1995). Infant sleep representation in the pregnant woman. *Journal of Reproductive and Infant Psychology, 13*(1), 47-50. doi: 10.1080/02646839508403231
- Toselli, M., Farneti, P., & Salzarulo, P. (1998). Maternal representation and care of infant sleep. *Early Development and Parenting, 7*(2), 73-78. doi: 10.1002/(SICI)1099-0917(199806)
- Touchette, E., Petit, D., Paquet, J., Boivin, M., Japel, C., Tremblay, R., & Montplaisir, J. (2005). Factors associated with fragmented sleep at night across early childhood. *Archives of Pediatrics and Adolescent Medicine 159*(3), 242-249.
- Tronick, E., Ricks, M., & Cohn, J. (1992). Maternal and infant affective exchange: Patterns of adaptation. In T. Field & A. Fogel (Eds.), *Emotion and early interaction: Normal and high-risk infants* (pp. 83-100). Hillsdale: Lawrence Erlbaum.
- Van IJzendoorn, M. H. (1992). Intergenerational transmission of parenting: A review of studies in nonclinical populations. *Developmental Review, 12*(1), 76-99. doi: 10.1016/0273-2297(92)90004-L
- Van IJzendoorn, M. H. (1995). Adult attachment representation, parent responsiveness and infant attachment: A meta-analysis on the predictive validity of the Adult Attachment Interview. *Psychological Bulletin, 117*(3), 387-403.
- Van Tassell, E. B. (1985). The relative influence of child and environmental characteristics on sleep disturbances in the first and second years of life. *Journal of Developmental and Behavioural Pediatrics, 6*(2), 81-86. doi: 10.1097/00004703-198504000-00006
- Warner, R., Appleby, L., Whitton, A., & Faragher, B. (1997). Attitudes towards motherhood in postnatal depression: Development of the maternal attitudes questionnaire. *Journal of Psychosomatic Research, 43*(4), 351-358. doi: 10.1016/S0022-3999(97)00128-1
- Warren, S., Howe, G., Simmens, S. J., & Dahl, R. E. (2006). Maternal depressive symptoms and child sleep: Models of mutual influence over time. *Development and Psychopathology, 18*(1), 1-16. doi: 10.1017/S0954579406060019
- Wenzel, A., Haugen, E. N., Jackson, L. C., & Brendle, J. R. (2003). Prevalence of generalized anxiety at eight weeks postpartum. *Archives of Women's Mental Health, 6*(1), 43-39. doi: 10.1007/s00737-002-0154-2
- Wilhelm, K., Niven, H., Parker, G., & Hadzi-Pavolic, D. (2005). The stability of the parental bonding instrument over a 20-year period. *Psychological Medicine, 35*(3), 387-393. doi: 10.1017/S0033291704003538
- Wolke, D., Meyer, R., Ohrt, B., & Riegel, K. (1995). The incidence of sleeping problems in preterm and fullterm infants discharged from neonatal special care units: an epidemiological investigation. *Journal of Child Psychology & Psychiatry, 36*(2), 203-223. doi: 10.1111/j.1469-7610.1995.tb01821.x

- Zigmond, A. S., & Snaith, R. P. (1983). The hospital anxiety and depression scale. *Acta Paediatrica*, *67*(6), 361-370. doi: 10.1111/j.1600-0447.1983.tb09716.x
- Zuckerman, B., Stevenson, J., & Bailey, V. (1987). Sleep problems in early childhood: Continuities, predictive factors and behavioural correlates. *Pediatrics*, *80*(5), 664-671.

7 List of Appendices

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7.1 Appendix A:
Demographic Data Questionnaire

For each question, either fill in the blank, or place a **CROSS** in the box

| | | |
|----|--|--|
| 1 | Your date of birth: | __ / __ / __ (day month year) |
| 2 | Infant's date of birth: | __ / __ / __ (day month year) |
| 3 | Infant's sex | <input type="checkbox"/> Male <input type="checkbox"/> Female |
| 4 | Which of the following ethnic groups best describes you? | <input type="checkbox"/> Aboriginal/Torres Strait Islander <input type="checkbox"/> Australian <input type="checkbox"/> African (non-Arabic) <input type="checkbox"/> North African (Middle East Region) <input type="checkbox"/> East Asian (e.g. India, Pakistan, Bangladesh, Sri Lanka) <input type="checkbox"/> Far East Asian and South East Asian (e.g. China, Japan, Korea, Philippines, Indonesia) <input type="checkbox"/> Polynesia <input type="checkbox"/> North-West European (e.g. English, Irish, Scottish) <input type="checkbox"/> Southern and Eastern Europe (e.g. Maltese, Greek, Bosnia) <input type="checkbox"/> Other _____ (Please specify) |
| 5 | What is your country of birth? | <input type="checkbox"/> Australia <input type="checkbox"/> Other _____ (Please specify) |
| 6 | Your highest education | <input type="checkbox"/> Completed Primary School only <input type="checkbox"/> Completed secondary school to grade <input type="checkbox"/> 7 <input type="checkbox"/> 8 <input type="checkbox"/> 9 <input type="checkbox"/> 10 <input type="checkbox"/> 11 <input type="checkbox"/> 12 <input type="checkbox"/> Tertiary Education _____ (Please specify) |
| 7 | What is your marital status? | <input type="checkbox"/> Single <input type="checkbox"/> Married <input type="checkbox"/> Divorced/Separated <input type="checkbox"/> De-Facto <input type="checkbox"/> Widowed <input type="checkbox"/> Other _____ (Please specify) |
| 8 | Your living arrangements | <input type="checkbox"/> With parent(s) <input type="checkbox"/> With housemate <input type="checkbox"/> With partner <input type="checkbox"/> Alone <input type="checkbox"/> Other _____ (Please specify) |
| 9 | What is your employment status? | <input type="checkbox"/> Not usually employed <input type="checkbox"/> Unemployed, on benefits <input type="checkbox"/> Full-time employment as _____ <input type="checkbox"/> Part-time employment for ___ hours per week as ____ <input type="checkbox"/> Student: <input type="checkbox"/> On maternity leave. Usually employed as _____ <input type="checkbox"/> Left employment in anticipation of birth. Usually employed as _____ |
| 10 | Do you intend to return to work in the next 12 months? | <input type="checkbox"/> No <input type="checkbox"/> Yes If yes, when _____ <input type="checkbox"/> Full time or <input type="checkbox"/> Part time |

7.2 Appendix B:

Edinburgh Postnatal Depression Scale (EPDS)

For each statement, place a **CROSS** in the box that best describes how you have felt in the past **SEVEN** days.

| | |
|--|--------------------------|
| 1 I have been able to laugh and see the funny side: | |
| As much as I always could | <input type="checkbox"/> |
| Not quite so much now | <input type="checkbox"/> |
| Definitely not so much now | <input type="checkbox"/> |
| Not at all | <input type="checkbox"/> |
| 2 I have looked forward with enjoyment to things: | |
| As much as I ever did | <input type="checkbox"/> |
| Rather less than I used to | <input type="checkbox"/> |
| Definitely less than I used to | <input type="checkbox"/> |
| Hardly at all | <input type="checkbox"/> |
| 3 I have blamed myself unnecessarily when things went wrong: | |
| Yes, most of the time | <input type="checkbox"/> |
| Yes, some of the time | <input type="checkbox"/> |
| Not very often | <input type="checkbox"/> |
| No, never | <input type="checkbox"/> |
| 4 I have been anxious or worried for no good reason: | |
| No, not at all | <input type="checkbox"/> |
| Hardly ever | <input type="checkbox"/> |
| Yes, sometimes | <input type="checkbox"/> |
| Yes, very often | <input type="checkbox"/> |
| 5 I have felt scared or panicky for no very good reason: | |
| Yes, quite a lot | <input type="checkbox"/> |
| Yes, sometimes | <input type="checkbox"/> |
| No, not much | <input type="checkbox"/> |
| No, not at all | <input type="checkbox"/> |
| 6 Things have been getting on top of me: | |
| Yes, most of the time I haven't been able to cope at all | <input type="checkbox"/> |
| Yes, sometimes I haven't been coping as well as usual | <input type="checkbox"/> |
| No, most of the time I have coped quite well | <input type="checkbox"/> |
| No, I have been coping as well as ever | <input type="checkbox"/> |

| | |
|---|--------------------------|
| 7 I have been so unhappy that I have had difficulty sleeping: | |
| Yes, most of the time | <input type="checkbox"/> |
| Yes, sometimes | <input type="checkbox"/> |
| Not very often | <input type="checkbox"/> |
| No, not at all | <input type="checkbox"/> |
| 8 I have felt sad or miserable: | |
| Yes, most of the time | <input type="checkbox"/> |
| Yes, quite often | <input type="checkbox"/> |
| Not very often | <input type="checkbox"/> |
| No, not at all | <input type="checkbox"/> |
| 9 I have been so unhappy that I have been crying: | |
| Yes, most of the time | <input type="checkbox"/> |
| Yes, quite often | <input type="checkbox"/> |
| Only occasionally | <input type="checkbox"/> |
| No, never | <input type="checkbox"/> |
| 10 The thought of harming myself has occurred to me: | |
| Yes, quite often..... | <input type="checkbox"/> |
| Sometimes..... | <input type="checkbox"/> |
| Hardly ever..... | <input type="checkbox"/> |
| Never..... | <input type="checkbox"/> |

Note: *Items 1, 2, 4 are scored from 0 to 3.*
Items 3, 5, 6, 7, 8, 9, 10 are reverse scored.

7.3 Appendix C:
State-Trait Anxiety Inventory (STAI-T)

Read each statement and place a **CROSS** in the box to indicate how you generally feel.

| | Almost never | Sometimes | Often | Almost always |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1 I feel pleasant | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 I feel nervous and restless | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 I feel satisfied with myself | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 I wish I could be as happy as others seem to be | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 I feel like a failure | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 I feel rested | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 I am "calm, cool, and collected" | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 I feel that difficulties are piling up so that I cannot overcome them | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 I worry too much over something that really doesn't matter | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10 I am happy | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11 I have disturbing thoughts | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12 I lack self-confidence | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13 I feel secure..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14 I make decisions easily | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Almost never | Sometimes | Often | Almost always |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 15 I feel inadequate | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16 I am content | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17 Some unimportant thought runs through my mind and bothers me | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18 I take disappointments so keenly that I can't put them out of my mind .. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19 I am a steady person | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20 I get in a state of tension or turmoil as I think over my recent concerns and interests | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Note: *Items 2, 4, 5, 11, 12, 15, 17, 18, 20* scored from 1 = *almost never* to 4 = *almost always*

Items 1, 3, 6, 7, 10, 13, 14, 16, 19, are reverse scored

7.4 Appendix D:
The Parental Bonding Instrument (PBI)

Read each statement and place a **CROSS** in the box that best describes your experience of your **MOTHER** in your first 16 years.

| | Very like | Moderately Like | Moderately Unlike | Very unlike |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 1 Spoke to me in a warm and friendly voice ... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 Did not help me as much as I needed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 Let me do those things I liked doing..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 Seemed emotionally cold to me | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 Appeared to understand my problems and worries | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 Was affectionate to me..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 Liked me to make my own decisions..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 Did not want me to grow up | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 Tried to control everything I did | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10 Invaded my privacy..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11 Enjoyed talking things over with me | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12 Frequently smiled at me | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13 Tended to baby me | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14 Did not seem to understand what I needed or wanted | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15 Let me decide things for myself | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Very like | Moderately Like | Moderately Unlike | Very unlike |
|---|--------------------------|----------------------------|------------------------------|--------------------------|
| 16 Made me feel I wasn't wanted | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17 Could make me feel better when I was upset | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18 Did not talk with me very much | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19 Tried to make me feel dependent on her | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20 Felt I could not look after myself unless she was around..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21 Gave me as much freedom as I wanted .. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22 Let me go out as often as I wanted | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23 Was overprotective of me | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24 Did not praise me | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25 Let me dress in any way I pleased..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Note:

Care Items: 1, 5, 6, 11, 12, 17 scored from 3 = *very like* to 0 = *very unlike*

Items 2, 4, 14, 16, 18, 24 are reverse scored

Overprotection Items 8, 9, 10, 13, 19, 20, 23 scored from 3 = *very like* to 0 = *very unlike*

Items 3, 7, 15, 21, 22, 25 are reverse scored

7.5 Appendix E:

Maternal Sleep History Questionnaire (MSHQ)

Part A

The following questions relate to your sleep habits before you became pregnant. Please answer all questions.

- 1 What time did you go to bed at night?
Usual bedtime _____
- 2 How long (in minutes) did it usually take you to fall asleep each night?
Number of minutes _____
- 3 What time did you get up in the morning?
Usual getting up time _____
- 4 How many hours of actual sleep did you get at night? (This may be different than the number of hours you spend in bed) _____
- 5 How much sleep do you think you should get per night (or for each 24-hour period)? _____

Part B

For the remaining questions place a **CROSS** in the box that best described your experience. Before I was pregnant, I had the following experiences.

| | Almost always a problem | Often a problem | Occasionally a problem | Rarely a problem | Not a problem |
|---|--|----------------------------|-----------------------------------|-----------------------------|--------------------------|
| 6 Trouble falling asleep | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 Waking up during sleep | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 Waking up too early in the morning | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 Can't stop thinking while trying to fall asleep | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10 Dread going to bed | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11 Sleepy during the day | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Note: *Almost always a problem* = (4) to *Not a problem* (0).

7.6 Appendix F:

Maternal Cognitions about Infant Sleep Questionnaire – Setting Limits, Anger, Doubt (MCISQ-SAD)

| | Strongly agree | Moderately Agree | Mildly Agree | Mildly disagree | Moderately disagree | Strongly disagree |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 16 I am able to let my child sleep on his/her own | <input type="checkbox"/> |
| 17 When my child cries at night, I can find myself thinking I wish I had never had a child | <input type="checkbox"/> |
| 18 I should respond straightaway when my child wakes crying at night | <input type="checkbox"/> |
| 19 I am able to resist my child's demands when he/she wakes at night | <input type="checkbox"/> |

Note:

Settling Limits

Items: 4, 13, 18, scored from 5 = *strongly agree* to 0 = *strongly disagree*

Items: 6, 19 are reverse scored

Anger

Items 7, 10, 12, 17 scored from 5 = *strongly agree* to 0 = *strongly disagree*

Item: 11 is reverse scored

Doubt

Items: 8, 9, 14, 15, 16 scored from 5 = *strongly agree* to 0 = *strongly disagree*

Item: 16 is reverse scored

The following items were not included in the analysis: Safety factor (Items 1 and 3) and Feeding factor (Items 2, 5, and 20).

7.7 Appendix G:

Active Physical Comforting Subscale of the Parental Interactive Bedtime Behaviour Scale (PIBBS)

Read each statement and place a **CROSS** in the box that indicates how often you use each of the following methods to assist your child to sleep.

| | Never | Rarely | Some- times | Often | Very often |
|--|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| 1 Stroke part of child or pat | <input type="checkbox"/> |
| 2 Cuddling or rocking in arms | <input type="checkbox"/> |
| 3 Carrying around house in arms | <input type="checkbox"/> |
| 4 Walks in pram or stroller | <input type="checkbox"/> |
| 5 Car rides | <input type="checkbox"/> |
| 6 Music tape or musical toy | <input type="checkbox"/> |
| 7 Talking softly to child | <input type="checkbox"/> |
| 8 Singing a lullaby | <input type="checkbox"/> |
| 9 Reading a story to child | <input type="checkbox"/> |
| 10 Playing with child | <input type="checkbox"/> |
| 11 Offer a special toy/cloth | <input type="checkbox"/> |
| 12 Give a feed/drink | <input type="checkbox"/> |
| 13 Leave to cry | <input type="checkbox"/> |
| 14 Stand near cot without picking infant up | <input type="checkbox"/> |
| 15 Settle infant on sofa with parent ... | <input type="checkbox"/> |
| 16 Lie with child next to their cot | <input type="checkbox"/> |
| 17 Settle in parent's bed | <input type="checkbox"/> |
| 18 Other (please specify) | <input type="checkbox"/> |

Note: Active Physical Comforting Factor

Items 1, 2, 3, 12, 15, 17 scored from 0 = never to 4 = very often

7.8 Appendix H:
The Infant Sleep Questionnaire (ISQ)

For each question please put a **CROSS** in the most suitable box. Please base your answers on what you have noticed over the last month.

| | |
|--|--------------------------|
| Going to bed / to sleep | |
| 1 How long does it usually take to settle your baby off to sleep on average? | |
| Less than 10 minutes | <input type="checkbox"/> |
| 10 to 20 minutes | <input type="checkbox"/> |
| 20 to 30 minutes | <input type="checkbox"/> |
| 30 to 40 minutes | <input type="checkbox"/> |
| 40 to 50 minutes | <input type="checkbox"/> |
| 50 to 60 minutes | <input type="checkbox"/> |
| 1 hour or longer | <input type="checkbox"/> |
| 2 How many times a week do you have problems settling him/her on average? | |
| Problems less than once a week | <input type="checkbox"/> |
| Problems 1 night a week | <input type="checkbox"/> |
| Problems 2 nights a week | <input type="checkbox"/> |
| Problems 3 nights a week | <input type="checkbox"/> |
| Problems 4 nights a week | <input type="checkbox"/> |
| Problems 5 nights a week | <input type="checkbox"/> |
| Problems 6 nights a week | <input type="checkbox"/> |
| Problems every night of the week..... | <input type="checkbox"/> |
| 3 How long has the settling problem been going on? months | |
| Waking at night (between midnight and 6.00 a.m.) | |
| 4 How many nights a week does your baby wake on average? | |
| None or less than once a week | <input type="checkbox"/> |
| 1 night a week | <input type="checkbox"/> |
| 2 nights a week | <input type="checkbox"/> |
| 3 nights a week | <input type="checkbox"/> |
| 4 nights a week | <input type="checkbox"/> |
| 5 nights a week | <input type="checkbox"/> |
| 6 nights a week | <input type="checkbox"/> |
| Every night of the week | <input type="checkbox"/> |

| | |
|---|--|
| <p>5 How many times does your baby wake each night and need resettling on average?</p> <p>Does not wake <input type="checkbox"/></p> <p>Once a night..... <input type="checkbox"/></p> <p>Twice a night. <input type="checkbox"/></p> <p>3 times a night..... <input type="checkbox"/></p> <p>4 times a night..... <input type="checkbox"/></p> <p>5 or more times a night..... <input type="checkbox"/></p> | |
| <p>6 If your baby wakes, how long does it take for your baby to go back to sleep on average?</p> <p>Less than 10 minutes..... <input type="checkbox"/></p> <p>10 to 20 minutes..... <input type="checkbox"/></p> <p>20 to 30 minutes..... <input type="checkbox"/></p> <p>30 to 40 minutes..... <input type="checkbox"/></p> <p>40 to 50 minutes..... <input type="checkbox"/></p> <p>50 to 60 minutes..... <input type="checkbox"/></p> <p>1 hour or longer <input type="checkbox"/></p> | |
| <p>7 How long has the waking problem been going on? months</p> | |
| <p>8 Sleeping in parents' bed (part or all of the night)</p> <p>Never, or less than once a week..... <input type="checkbox"/></p> <p>1 night a week..... <input type="checkbox"/></p> <p>2 nights a week..... <input type="checkbox"/></p> <p>3 nights a week.... <input type="checkbox"/></p> <p>4 nights a week..... <input type="checkbox"/></p> <p>5 nights a week.... <input type="checkbox"/></p> <p>6 nights a week..... <input type="checkbox"/></p> <p>Every night of the week..... <input type="checkbox"/></p> | |
| <p>9 How long has the problem been going on? months</p> | |
| <p>Your views</p> | |
| <p>10 Do you think that your baby has sleeping difficulties?</p> <p>No..... <input type="checkbox"/></p> <p>Yes, mild..... <input type="checkbox"/></p> <p>Yes, moderate..... <input type="checkbox"/></p> <p>Yes, severe..... <input type="checkbox"/></p> | |

Note: Items 1, 6 scored from 0 to 6
 Items 2, 4, scored from 0 to 7
 Item 5 scored from 0 to 5
 Item 8 was excluded from analysis

**7.9 Appendix I:
Recruitment Poster**

First-time Mothers



Do you have an infant aged 6 to 12 months?

Are you interested in helping us learn more about infant sleep?

Then you may be interested in taking part in a research study being conducted by Jenny Sheehan and Professor Sandra Lancaster from Victoria University that is looking at factors that influence the development of infant sleep behaviour. All that is required is that you complete a questionnaire, at either your local Maternal Child Health Centre or in your home if you prefer, which will take about 30 minutes of your time. Mothers generally find it interesting to complete the questionnaire about such an important issue as infant sleep.

Information on how you can get involved in the study can be obtained from your Maternal Child Health Nurse. If you have any other questions you can contact the researcher.

Contact

Jenny Sheehan
Doctoral Student
School of Psychology
Victoria University
St Albans, Victoria
0438 742 753



7.10 Appendix J:
Participant Brochure

First-time Mothers



Do you have an infant aged 6 to 12 months?

Are you interested in helping us learn more about infant sleep?

Then you may be interested in taking part in a research study being conducted by Jenny Sheehan and Professor Sandra Lancaster from Victoria University that is looking at factors that influence the development of infant sleep behaviour. All that is required is that you complete a questionnaire, at either your local Maternal Child Health Centre or in your home if you prefer, which will take about 30 minutes of your time. Mothers generally find it interesting to complete the questionnaire about such an important issue as infant sleep.

Information on how you can get involved in the study can be obtained from your Maternal Child Health Nurse. If you have any other questions you can contact the researcher.

Contact

Jenny Sheehan
Doctoral Student
School of Psychology
Victoria University
St Albans, Victoria
0438 742 753



**7.11 Appendix K:
Recruitment Sheet**

**7.12 Appendix L:
Participant Information and Consent Form**



Participant Information Sheet

Project Title: Maternal Factors Affecting Infant Sleep Outcome

Principal Researcher: Professor Sandra Lancaster

Student Researcher: Ms. Jenny Sheehan

1. Your Consent

You are invited to take part in this research project.

This Participant Information contains detailed information about the research project. Its purpose is to explain to you the procedures involved before you decide whether or not to take part in it.

Please read this *Participant Information* carefully. If you have any questions about the information contained in this document do not hesitate to seek clarification.

Once you understand what the project is about and if you agree to take part in it, you will be asked to sign the *Consent Form*. By signing the *Consent Form*, you indicate that you understand the information and that you give your consent to participate in the research project.

You will be given a copy of the *Participant Information* and *Consent Form* to keep as a record.

2. Purpose and Background

Previous research has shown that problems with infant sleep behaviour are common in Australia and other developed countries. The main problems encountered include prolonged and frequent night-waking and excessive time required for night settling. These behaviours can cause significant parental distress. Importantly, sleep problems have been shown to persist into early childhood and beyond.

While the biological basis of sleep is well understood, the influence of external factors is poorly understood. The purpose of this project is, therefore, to explore to what extent external factors, such as mothers' perceptions of the parenting they received, depression and anxiety, beliefs about infant sleep, maternal sleep history, and settling behaviours are associated with sleep outcomes in infants 6-to 12-months old. Few studies (and none from Australia) have conducted a close examination of the role these factors may play in infant sleep behaviour. A total of 100 people will be invited to participate in the study.

2. Purpose and Background

Participation in this project will involve completing a questionnaire booklet consisting of nine sections. Questions will be ask you about how you are feeling, your own sleep experience, the parenting you received from your mother, beliefs about infant sleep, and techniques you use to put your baby to sleep. Background information such as your age and infant's date of birth will also be requested. The questionnaire may be completed at your local Maternal and Child Health Centre or at your home. It will take about 30 minutes to complete the questionnaire. The researcher will be present during the administration of the questionnaire and therefore available to answer any questions that may arise.

3. Possible Benefits

Participating in this study will not benefit you directly; however results from this study may offer benefits to other families in the future. Results from the study, may contribute to a greater understanding of the maternal factors that affect infant behaviour and help professionals offer services to families to help manage infant sleep problems.

4. Possible Risks

There are no expected risks associated with this study. It is possible, however, that you may find certain questions distressing. The researcher will be present during the administration of the questionnaire so if you are upset by any of the questions just let her know and she will suggest ways that you could obtain help.

5. Privacy, Confidentiality and Disclosure of Information

Any information obtained in connection with this project will remain confidential and be seen only by the student researcher and the principal investigator. It will only be disclosed with your permission, except in circumstances as required by law (e.g. possible harm to self or others). Only the results from the group of participants will be written up and published. No individuals will be identified in the writing up of results. Information and data collected will be stored in locked filing cabinets in the psychology department of Victoria University. Only the student researcher and the principal investigator will have access to the data.

6. Further Information of Any Problems

If you require further information of if you have any problems concerning this project you can contact the principal researcher.

Principal researcher: Professor Sandra Lancaster

Ph: (03) 99192397

Email: sandra.lancaster@vu.edu.au

7. Other Issues

If you have any complaints about any aspect of the project, the way it is being conducted or any questions about your rights as a research participant, then you may contact

The Secretary, Human Research Ethics Committee
Office for Research
Victoria University
PO Box 14428, MCMC Melbourne 8001
Telephone: (03) 9919 4710

8. **Other Issues**

Participation in this research study is voluntary. If you do not wish to take part you are not obliged to. If you decide to take part and later change your mind, you can withdraw from the study at any stage. Your decision whether to take part or not to take part, or to take part then withdraw, will not affect your relationship with your Maternal and Child Health Nurse.

Before you make your decision, please ask the student researcher any questions you have about the study. Sign the Consent Form only after you have had a chance to ask your questions and have received satisfactory answers.

If you decide to withdraw from the study, please notify Jenny Sheehan 0438 742 753 before you withdraw.

9. **Ethical Guidelines**

This project will be carried out according to the *National Statement on Ethical Conduct in Research Involving Humans* (June 1999) produced by the National Health and Medical Research Council of Australia. This statement has been developed to protect the interests of people who agree to participate in human research studies.

The ethical aspects of this research project have been approved by the Human Research Ethics Committees of Victoria University.



School of Psychology
St Albans Campus
St Albans Vic

Consent Form

Project Title: Maternal Factors affecting Infant Sleep Outcomes

I have read, and I understand the Participant Information version 2 dated 20.08.07.

Certification by Participant

I,
Participant's Name (Printed)

of
Participant's Suburb

certify that I am at least 18 years old and that I am voluntarily giving my consent to participate in the study: Maternal Factors affecting Infant Sleep Outcomes, being conducted at Victoria University by Professor Sandra Lancaster and Ms Jenny Sheehan.

I certify that the objectives of the study, together with any risks and safeguards associated with the procedures listed hereunder to be carried out in the research, have been fully explained to me by Ms Jenny Sheehan, and that I freely consent to participation involving:

- Completion of a questionnaire booklet.

I certify that I have had the opportunity to have any questions answered and that I understand that I can withdraw from the study at any time and that this withdrawal will not jeopardise me in any way.

I have been informed that the information I provide will be kept confidential.

Signed:
(Participant's Signature)

Date:



School of Psychology
St Albans Campus
St Albans Vic

Revocation of Consent Form

Project Title: Maternal Factors affecting Infant Sleep Outcome

I hereby wish to WITHDRAW my consent to participate in the research proposal described above and understand that such withdrawal WILL NOT jeopardise my involvement with the Maternal Child Health Centre in any way.

.....

Participant's Name (Printed)

Signature

Date

**7.13 Appendix M:
Referral Options**

Referral Options

If you require psychological assistance or support, please contact one of the following services which are available free of charge:

- ✓ Your local GP
(Free if Bulk Billing is available)
- ✓ Mental Health Line – Victoria: 1300 881 104
The Mental Health Foundation of Australia (Victoria) provides telephone information, referral, resource and support service between the hours of 9.00am to 5.00pm Monday to Friday.
- ✓ Lifeline: 131 114
Lifeline is staffed by trained volunteer counsellors and provides a 24 hour a day, seven days a week counselling service.
- ✓ Werribee Mercy Hospital: 9216-8888
Mental Health services are centrally coordinated through the Psychiatric Triage Service located at the hospital. This number will give you direct contact with a mental health clinician 24 hours a day, seven days a week. These clinicians are skilled in providing rapid assessment and triage to the correct service.
- ✓ Beyondblue Infoline 1300 224 636
Beyondblue is not a health service or a crisis service and therefore cannot respond to your specific difficulties. Rather, it provides a website dedicated to increasing awareness and understanding of depression, anxiety and substance-use related disorders in the Australian community.
- ✓ Suicide Helpline Victoria 1300 651 251
Provides a confidential telephone counselling, support and referral service and is available 24 hours a day, seven days a week.

7.14 Appendix N:

Results from Hierarchical Multiple Regression Analysis for all Maternal Factors influencing Infant Sleep Outcome

Table N *Summary of Hierarchical Multiple Regression Analysis for all Maternal Variables Predicting Infant Sleep Outcome*

| Independent variable | <i>B</i> | <i>SE_B</i> | <i>B</i> | <i>R²/ΔR²</i> | <i>F</i> change ^a |
|--|----------|-----------------------|----------|-------------------------------------|------------------------------|
| Step 1 | | | | .08 | 3.96* |
| Perceived past maternal care | -.08 | .11 | -.09 | | |
| Perceived past maternal overprotection | .19 | .20 | .21 | | |
| Step 2 | | | | .04 | 2.00 |
| Perceived past maternal care | -.02 | .11 | -.02 | | |
| Perceived past maternal overprotection | .15 | .12 | .17 | | |
| Depressive symptoms | .17 | .23 | .10 | | |
| Trait anxiety | .11 | .11 | .14 | | |
| Step 3 | | | | .05 | 5.15* |
| Perceived past maternal care | .01 | .11 | -.02 | | |
| Perceived past maternal overprotection | .18 | .12 | .17 | | |
| Depressive symptoms | .15 | .23 | .10 | | |
| Trait anxiety | .06 | .11 | .14 | | |
| Maternal sleep history | .33 | .15 | .23* | | |
| Step 4 | | | | .10 | 11.37*** |
| Perceived past maternal care | .01 | .11 | -.02 | | |
| Perceived past maternal overprotection | .18 | .12 | .17 | | |
| Maternal depressive symptoms | .15 | .23 | .10 | | |
| Trait anxiety | .04 | .08 | .06 | | |
| Maternal sleep history | .27 | .13 | .19* | | |
| Maternal cognitions about infant sleep-SAD | .12 | .07 | .18*** | | |

Table N (continued)

| Independent variable | <i>B</i> | <i>SE_B</i> | <i>B</i> | <i>R²/ΔR²</i> | <i>F</i> change ^a |
|--|----------|-----------------------|----------|-------------------------------------|------------------------------|
| Step 5 | | | | .13 | 18.48*** |
| Perceived past maternal care | .05 | .10 | .07 | | |
| Perceived past maternal overprotection | .22 | .10 | .25* | | |
| Depressive symptoms | .02 | .20 | .01 | | |
| Trait anxiety | .05 | .10 | .06 | | |
| Maternal sleep history | .28 | .13 | .19* | | |
| Maternal cognitions about infant sleep-SAD | .12 | .07 | .18 | | |
| Active physical comforting | .49 | .11 | .40*** | | |

Note. *df* Step1 = 2, 92; *df* Step2 = 2, 90; *df* Step3 = 1, 89; *df* Step 4 = 1, 88; *df* Step 5 = 1, 87.

* $P < .05$ ** $P < .01$ *** $P < .001$.

7.15 Appendix O:

Summary of Multiple Regression Analyses for Maternal Cognitions about Infant Sleep-SAD as a Mediator of the Association between Trait Anxiety and Infant Sleep Outcome

Table O Summary of Multiple Regression Analyses for Maternal Cognitions about Infant Sleep-SAD as a Mediator of the Association between Trait Anxiety and Infant Sleep Outcome

| IV for each condition | DV | B | SE _B | β | T | R ² / ΔR ² | df1 | df2 | F Change |
|--|--|-----|-----------------|--------|------|----------------------------------|-----|-----|----------|
| Condition 1 | Maternal cognitions about about infant sleep-SAD | | | | | | | | |
| Trait anxiety | | .43 | .11 | .37*** | 3.85 | .14 | 1 | 93 | 14.83*** |
| Condition 2 | Infant sleep outcome | | | | | | | | |
| Maternal cognitions about infant sleep-SAD | | .29 | .06 | .43*** | 4.57 | .18 | 1 | 93 | 20.85*** |
| Condition 3 | Infant sleep outcome | | | | | | | | |
| Trait anxiety | | .22 | .08 | .28** | 2.81 | .08 | 1 | 93 | 7.87** |
| Condition 4 | Infant sleep outcome | | | | | | | | |
| Maternal cognitions about infant sleep-SAD | | .25 | .07 | .38*** | 3.75 | .18 | 1 | 93 | 20.85*** |
| Trait anxiety | | .11 | .08 | .14 | 1.39 | .02 | 1 | 92 | 1.94 |

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

7.16 Appendix P:

Summary of Multiple Regression Analyses for Active Physical Comforting as a Mediator of the Association between Maternal Cognitions about Infant Sleep-SAD and Infant Sleep Outcome

Table P *Summary of Multiple Regression Analyses for Active Physical Comforting as a Mediator of the Association between Maternal Cognitions about Infant Sleep-SAD and Infant Sleep Outcome*

| IV for each condition | DV | B | SE _B | β | T | R ² / ΔR ² | df1 | df2 | F Change |
|--|----------------------------|-----|-----------------|--------|------|----------------------------------|-----|-----|----------|
| Condition 1 | Active physical comforting | | | | | | | | |
| Maternal cognitions about infant sleep-SAD | | .19 | .05 | .36*** | 3.76 | .13 | 1 | 93 | 14.14*** |
| Condition 2 | Infant sleep outcome | | | | | | | | |
| Active physical comforting | | .59 | .11 | .47*** | 5.17 | .22 | 1 | 93 | 26.73*** |
| Condition 3 | Infant sleep outcome | | | | | | | | |
| Maternal cognitions about infant sleep-SAD | | .28 | .06 | .43*** | 4.57 | .22 | 1 | 93 | 20.85*** |
| Condition 4 | Infant sleep outcome | | | | | | | | |
| Active physical comforting | | .45 | .12 | .37*** | 3.90 | .22 | 1 | 93 | 26.73*** |
| Maternal cognitions about infant sleep-SAD | | .20 | .06 | .30** | 3.15 | .08 | 1 | 92 | 9.93** |

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

**7.17 Appendix Q:
Summary of Multiple Regression Analyses for Maternal
Cognitions about Infant Sleep-SAD as a Mediator of the
Association between Perceived Past Maternal Overprotection
and
Infant Sleep Outcome**

Table Q *Summary of Multiple Regression Analyses for Maternal Cognitions about Infant Sleep-SAD as a Mediator of the Association between Perceived Past Maternal Overprotection and Infant Sleep Outcome*

| IV for each condition | DV | B | SE _B | β | t | R ² / ΔR ² | df1 | df2 | F Change |
|--|--|-----|-----------------|--------|------|----------------------------------|-----|-----|----------|
| Condition 1 | Maternal cognitions about infant sleep-SAD | | | | | | | | |
| Perceived past maternal overprotection | | .35 | .13 | .26** | 2.63 | .07 | 1 | 93 | 6.93** |
| Condition 2 | Infant sleep outcome | | | | | | | | |
| Maternal cognitions about infant sleep-SAD | | .28 | .06 | .43*** | 4.57 | .18 | 1 | 93 | 20.85*** |
| Condition 3 | Infant sleep outcome | | | | | | | | |
| Perceived past maternal overprotection | | .24 | .09 | .27** | 2.74 | .08 | 1 | 93 | 7.49** |
| Condition 4 | Infant sleep outcome | | | | | | | | |
| Maternal cognitions about infant sleep-SAD | | .29 | .06 | .43*** | 4.57 | .18 | 1 | 93 | 20.85*** |
| Perceived past maternal overprotection | | .05 | .10 | .05 | 0.50 | .01 | 1 | 92 | .25 |

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

