THE QUALITY OF NAPS IN YOUNG CHILDREN WITH SLEEPING DIFFICULTIES: THE ROLE OF PARENTS AND PRESCHOOLS

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ABSTRACT

Minimal research exists in regards to day-time naps in children, and to date no research has examined the architecture of naps in children. The present study examined the quality of naps in the preschool environment compared to the home environment in children with sleeping difficulties. The participants were three children aged 1 year, 8 months to 2 years, 2 months. The naps were digitally recorded in the children's homes and their preschool. The digital recordings were coded using a sleep coding system, which established the sleep states and patterns of the naps. The results indicated that the naps were individually distinctive and varied across the children and across the environments. The majority of sleep times were spent in quiet sleep compared to active sleep. The most consistent finding was that the mean length of sleep (where sleep occurred during nap time) for each child was longer in the home environment than the preschool environment. Caregiver behaviour across the environments shared similarities. Children with sleeping difficulties were chosen for this study as they represent a more challenging population for parents and teachers. It is possible that the sleeping difficulties may have overridden the differences in sleeping environments. This is an interesting and important area of future research.

CHAPTER 1

LITERATURE REVIEW

Sleep is vital to our health, well-being and survival. It is an essential part of life and has wide-ranging benefits. Sleep is especially important for infants and children in that it plays a significant role in growth and development, especially in infancy (Mindell & Owens, 2003).

Sleep itself is multifaceted, contributed to by the child's biological development and also influenced markedly by environmental factors (Blampied & France, 1993). There have been marked changes in children's sleep environments over the past decade with attendance at New Zealand preschools steadily rising (Statistics New Zealand, 2009). The majority of children nap during their time at preschool, with some children receiving two naps per day. This means that children's naps are occurring in more varied environments and handled by a larger number of caregivers. This raises a number of questions, especially with regard to the quality of sleep children receive in the preschool environment (compared with home) and with regard to the conditions preschool centers need to provide in order to facilitate this aspect of children's development.

Yet minimal research has been conducted with regard to the role early childhood education centres have in the development of children's sleep. In fact minimal research has been conducted with regard to children's naps per se.

This literature review will examine closely each of the factors touched on above. It will consider the importance of sleep, sleep architecture and the development of sleep. It will then focus on reviewing research related to naps, as well the role parents and early childhood education centres play in children's sleep. Finally the literature review will briefly consider sleep in children with sleep problems who are the most likely to face difficulties with the regulation of sleep in different environments. These children are the participants in this study.

The importance of sleep

Optimal sleep is essential for normal development, growth, emotional health and immune function (Davis, Parker, & Montgomery, 2004). Research has shown that without enough sleep, a person is not capable of sustaining normal levels of efficiency (Fox, 1999; Mindell & Owens, 2003). Both insufficient quantity and poor quality sleep can result in sleep deprivation, which impairs an individual's ability to carry out even simple everyday tasks (Mindell & Owens, 2003). Sleep deprivation and daytime sleepiness has been associated with car accidents, workplace accidents as well as other safety concerns (Gregory & O'Connor, 2002). Sleep deprivation also impacts on an individual's physical health and well-being, cognitive functioning, and emotional health (Gregory & O'Connor, 2002).

In all these regards sleep is especially important for infants and children. Sleep is the primary activity of the brain during early development (Mindell & Owens, 2003). By the age of three years, the typical child has spent more time sleeping than awake, suggesting that sleep is essential for the mind and body to develop (Mindell & Owens, 2003). Sleep in infants and children is essential for brain maturation, synaptic plasticity, the development of the visual system as well as the consolidation of early emotional and cognitive development (Dang-Vu, Desseilles, Peigneux, & Maquet, 2006). Numerous studies have illustrated the effect of sleep on memory and learning (Blissitt, 2001; Dang-Vu, et al., 2006). Sleeping after new information has been learned has been shown to help process and consolidate the information into memory (Blissitt, 2001). In a 2006 study looking at the role of sleep in learning, 15-month old infants who received a nap following the learning of new information demonstrated better recall than infants who did not receive a nap (Gomez, Bootzin, & Nadel, 2006).

Sleep deprivation and sleepiness has many negative effects on children. Insufficient or poor quality sleep can lead to day-time sleepiness in children (Fallone, Owens, & Deane, 2002). Sleepiness has been associated with impaired performance and learning (Fallone, et al., 2002; Mindell & Owens, 2003). Higher-level cognitive functions, especially cognitive flexibility and abstract thinking and reasoning appear to be sensitive to poor quality and insufficient sleep (Mindell & Owens, 2003). Other cognitive areas such as learning and memory are also significantly impaired by sleep deprivation, although studies have shown that these areas require longer periods of sleep restriction to be affected (Blissitt, 2001). Studies looking at the academic performance of children and adolescents have demonstrated that children who do not get enough sleep, have irregular bed-time routines or have sleep problems have lower academic achievements than children without sleep difficulties (Fallone, et al., 2002).

A number of studies have focused on the relationship between sleep and behaviour. The effects of sleepiness on children may not always be obvious, as often children do not show recognisable signs such as yawning and drowsiness but instead sleepiness may present itself as problem behaviours (Lavigne, et al., 1999). Correlation studies show a clear relationship between the quantity of sleep children obtain and day-time behaviour problems (Lavigne, et al., 1999; Minde, Faucon, & Falkner, 1994; Mindell & Owens, 2003). Day-time behaviour problems related to less sleep include over-activity, non-compliance, oppositional behaviour, poor impulse control and inattention (Mindell & Owens, 2003; Weissbluth, 1984). A study focusing on the sleeping habits of 510 children between the ages of 2 and 5 years found that those children with sleeping difficulties were rated by their parents and teachers as having significantly more behavioural issues on standardised measures than children without sleeping difficulties (Lavigne, et al., 1999). Other studies have also illustrated that sleep

difficulties and day-time sleepiness in children impacts on family functioning as it can lead to added stress for the family (Mindell & Owens, 2003). Due to the correlational nature of these studies, cause and effect cannot be determined. However, a few studies have demonstrated that treatment of sleep problems in children has lead to improvements in behaviour ratings (Minde, et al., 1994). It is also possible that sleeping difficulties and behaviour problems in children are highly correlated because they are both influenced by parenting style. Parenting style, such as authoritative or permissive, has been shown to influence behaviour as well as sleep in children (Johnson & McMahon, 2008). Therefore treating sleep problems may also improve behaviour problems, as sleep interventions usually require parents to alter their habits.

Several studies have examined the impact of sleepiness on mood and emotional health. A study examining healthy children aged 8-15 years old showed that following sleep restriction, the children had decreases in positive mood (Fallone, et al., 2002). Chronic sleep difficulties have shown to decrease positive mood and increase negative mood in children (Mindell & Owens, 2003). In adults, there is a strong relationship between mood problems such as depression and sleep difficulties however these studies are correlational, so cause and effect cannot be determined (Fallone, et al., 2002; Fredriksen, Rhodes, Reddy, & Way, 2004; Lavigne, et al., 1999). It is also possible that a third factor, such as financial hardship, is causing the sleep problems as well as the depressive mood.

Chronic sleep difficulties have been linked to a number of long-term outcomes including health problems, obesity, impaired functioning and psychiatric disorders. A 2007 study examined the relationship between sleep duration and weight in 785 children between 9 to 12 years (Lumeng, et al., 2007). The study found that shorter sleep duration in 3rd grade (9

years old) was associated with an increased likelihood of being overweight in 6th grade (12 years old), independent of the child's weight in 3rd grade (Lumeng, et al., 2007). The study also found that for every additional one hour of sleep (to 9 hours of sleep) in 3rd grade, the child was 40% less likely to be overweight in 6th grade (Lumeng, et al., 2007). Another 2007 study focused on a representative sample of 2,281 children aged between 3 to 12 years of age at baseline and examined the relationship between sleeping habits and future Body Mass Index (Snell, Adam, & Duncan, 2007). The study found that those children who slept less, went to bed later or got up earlier at the time of the first assessment were more likely to have a higher Body Mass Index and be overweight five years later (Snell, et al., 2007). According to Lumeng et al., 2007, there is a direct biological link between sleep duration and a risk of being overweight, as sleep duration has been shown to alter metabolism and impact on glucose tolerance.

What is sleep?

Sleep can be defined as a state of natural unconsciousness and decreased responsiveness and interaction with the environment (Davis, et al., 2004). It is a physical and mental resting state in which the body and the mind can recuperate. Normal sleep is characterised by a decrease in body temperature, blood pressure, breathing rate, and most other bodily functions (Fox, 1999). In contrast, the brain remains active, and at times can be more active during sleep than in wakefulness (Fox, 1999). Sleep is often considered as simply a periodic resting condition for the body, however research has illustrated that sleep is complex and represents a period of significant neurologic and physiologic activity (Fox, 1999).

Research has illustrated that sleep is not simply a biological state, but rather is best viewed as a biobehavioural process (Blampied & France, 1993). Studies have suggested that sleep is a behaviour that can be influenced by a number of factors such as the environment, parental practises and bed-time routines (Blampied & France, 1993; France & Blampied, 1999). These factors can influence the development of sleep as well the quality of sleep. Bootzin (1977) suggested that falling asleep is an operant behaviour emitted to produce sleep. Sleep acts as a reinforcer for falling asleep and the act of falling asleep is influenced by both biological and environmental factors (cited in Blampied & France, 1993). Environmental factors, such as bed-time routines, reduced activity at bed-time and sleep-preparatory cues can all influence the act of falling asleep. Blampied and France (1993) also cite Bootzin as stating that although sleep is a strong reinforcer for falling asleep, other competing environmental factors such as parental attention may lead to sleep initiation difficulties.

Sleep architecture

The architecture of sleep is composed of two distinct sleep states, namely rapid eye movement sleep (REM sleep), and non-rapid eye movement sleep (non-REM sleep). Both of these sleep states have been found to have restorative functions, and it is important for individuals to complete full sleep cycles in order to receive quality sleep (Siren-Tiusanen & Robinson, 2001). Non-Rapid Eye Movement sleep has been found to help maintain the immune system and nurture physical growth, and REM sleep has been associated with restorative functions in regards to focused attention, positive mood, energy and emotional adaptation and regulation (Siren-Tiusanen & Robinson, 2001).

Sleepers usually pass through five stages of sleep, including REM sleep (stage 5) and non-REM sleep, which in turn is broken up into Stage 1, Stage 2, Stage 3 and Stage 4

(Mindell & Owens, 2003). These sleep stages progress cyclically from 1 through to REM then begin again with stage 1. A full sleep cycle takes an average of 90 to 110 minutes to complete in adults (Mindell & Owens, 2003). The first sleep cycles each night have relatively short REM sleeps and long periods of deep sleep but later in the night, REM periods lengthen and deep sleep time decreases (Mindell & Owens, 2003).

Non-REM sleep is characterised by relatively low brain activity and body movements and is divided into four stages (Mindell & Owens, 2003). Stage 1 sleep is light sleep that occurs at the sleep-wake transition (Mindell & Owens, 2003). During Stage 1 sleep, individuals can easily drift in and out of sleep and can be awakened easily (Mindell & Owens, 2003). In this stage, the eyes move slowly and muscle activity slows (Mindell & Owens, 2003). Individuals often experience sudden muscle movements, or body jerks as they are falling asleep (Mindell & Owens, 2003).

Stage 2 sleep is considered the beginning of 'true' sleep (Mindell & Owens, 2003). In this stage eye movement stops and brain waves become slower, with occasional bursts of rhythmic rapid EEG activity (Mindell & Owens, 2003). In this first cycle, Stage 2 usually lasts between 5 to 25 minutes (Mindell & Owens, 2003).

Stage 3 and Stage 4 sleep is referred to as 'deep sleep'. During deep sleep, there is an absence of eye movement and muscle movement, and individuals are difficult to awaken from these stages (Mindell & Owens, 2003). During Stage 3 sleep, extremely slow brain waves called delta waves are interspersed with smaller, faster waves (Mindell & Owens, 2003). In Stage 4, the brain produces delta waves almost exclusively (Mindell & Owens,

2003). Nightmares, night-terrors and bedwetting usually occur during Stages 3 and 4 (Mindell & Owens, 2003).

During REM sleep, breathing becomes more rapid and irregular, and muscle tone is temporarily paralyzed (Mindell & Owens, 2003). Rapid Eye Movement sleep is also characterised by episodic bursts of eye movements (rapid eye movements) (Mindell & Owens, 2003). Brain waves during this stage increase to levels experienced when a person is awake (Mindell & Owens, 2003). Also, heart rate increases, blood pressure rises, and the body loses some of its ability to regulate temperature (Mindell & Owens, 2003). Rapid Eye Movement sleep is associated with dreaming and often people can remember their dreams if awoken from this stage (Mindell & Owens, 2003). Most people experience three to five intervals of REM sleep each night, and the first REM sleep period occurs about 70 to 100 minutes after sleep onset (Mindell & Owens, 2003).

Adults spend nearly half of sleep time in stage 2, about 20% in REM and the other 30% is divided between the other three stages (Mindell & Owens, 2003). Older adults spend progressively less time in REM sleep (Mindell & Owens, 2003).

Sleep in infants (0-2 years old) has been characterised by Active Sleep (AS) and Quiet Sleep (QS), as their sleep has not yet organised into the distinct stages found in mature adults (Middlemiss, 2004). Active Sleep is similar to that of REM sleep, and QS is similar to that of non-REM sleep (Middlemiss, 2004). Active Sleep is a light sleep characterised by eye, muscle and head movements (Middlemiss, 2004). Quiet Sleep is a deeper sleep with minimal body movements, from which infants are typically difficult to arouse (Middlemiss, 2004). Newborns spend approximately 50% of their sleep time in AS sleep and the other 50% in QS

sleep, but this develops over childhood to more closely resemble the sleep architecture of adults (Middlemiss, 2004). Active Sleep and Quite Sleep periods alternate with each other in 50-60 minute ultradian cycles, in contrast to adults' 90-110 minutes cycles (Middlemiss, 2004).

Sleep regulation

Sleep is regulated by two processes operating simultaneously, namely the homeostatic process and circadian rhythms. Sleep is determined by circadian rhythms, also referred to as the biological clock, which are cyclical and last approximately 24 hours (Davis, Heller, & Frank, 1999). Small structures in the brain called suprachiasmatic nuclei (SCN) coordinate circadian rhythms, by generating neuronal and hormonal activities that regulate several different body functions over a 24-hour period (Davis, et al., 1999). The circadian rhythm functions as an internal clock, which utilises environmental cues to regulate the timing of sleep and wakefulness (Davis, et al., 1999). Wakefulness and sleep alternate between night and day, as the SCN is sensitive to light and darkness (Davis, et al., 1999). Sleep is also regulated by the homeostatic process, where the need for sleep increases the longer a person stays awake, and is relieved by sleep (Davis, et al., 2004).

The development of sleep

The development of the sleep-wake system takes place over the first few years of an individual's life. At birth, infants typically spend 16 to 18 hours of the 24 hour period asleep (Mindell & Owens, 2003). Newborns' sleep is described as polyphasic, as they sleep multiple times throughout a 24-hour period (Anders & Taylor, 1994). In newborns, sleep-wake states alternate throughout the day, with 3 to 4-hour sleep periods followed by 1 to 2 hours of wakefulness (Mindell & Owens, 2003). By 6-weeks of age the sleep-wake system in infants

begins to organise itself in accordance to the light-dark cycle and other social cues (Anders & Taylor, 1994; Scher, Epstein, & Tirosh, 2004). Infants' sleep begins to consolidate with more time asleep in the night time and more time awake during the daytime (Anders & Taylor, 1994; Scher, et al., 2004). By 6-months of age, the longest sleep period has lengthened to six hours, with two of these 6-hour sleeps being during the night, broken up by an awake period for feeding (Middlemiss, 2004; Roquefeuil, Djakovic, & Montagner, 1993). During the day, these infants have 2 naps per day, lasting between 2 to 4 hours (Mindell & Owens, 2003). By 9-months of age, most children sleep through the night (Mindell & Owens, 2003; Scher, et al., 2004). Between the ages of 1-3years, toddlers typically sleep a total of 12-hours, with the majority of this sleep being acquired in the night-time (Mindell & Owens, 2003). At 18-months of age, the majority of children have shifted to having only one nap per day, lasting approximately 1-2.5 hours (Mindell & Owens, 2003). Between the ages of 3-6 years, children typically still sleep a total of 11-12 hours, however the daytime nap gradually disappears, with the majority of children having eliminated their nap by 4 years of age (Anders & Taylor, 1994).

The sleep architecture of 3-year old children begins to be more similar to that of adults, as their REM sleep declines and sleep cycles increase to 90 minutes (Anders & Taylor, 1994). Between the ages of 6 to 12 years, sleep organisation continues to develop, with delayed sleeping times, and a reduction in total sleep duration (Mindell & Owens, 2003). The sleep of children aged 12 years resembles that of adult sleep, with total sleep time being reduced to approximately 8 hours, and REM sleep being reduced to adult levels (25-30%) (Mindell & Owens, 2003).

Naps

The majority of research on naps has been carried out on adults and this is in relation to the recuperative effects of naps, rather than the architecture of naps. Numerous studies of adults have examined the effects short naps have on various factors, including learning, performance, alertness, energy levels, memory, and day-time sleepiness. These studies have consistently found that short naps, between 15 to 30 minutes, have the ability to restore wakefulness and improve performance in adults (Hayashi, Watanabe, & Hori, 1999; Rajiv & Harjyot, 2006; Tietzel & Lack, 2002; Waterhouse, Atkinson, Edwards, & Reilly, 2007). Several studies in adults have also found that longer naps are associated with loss of productivity and sleep inertia (Rajiv & Harjyot, 2006) .

Adult research in relation to the architecture of naps is also limited. A 2006 study examined the role of day-time naps in adults on memory (Tucker, et al., 2006). The subjects in this study were 29 university students aged 18-48 years. The mean total sleep time across subjects was 47 minutes. The study found that of the 47 minutes approximately 11% was spent in stage 1, 41% in stage 2, 21% in stage 3 and 27% in stage 4, and REM sleep did not appear at all. A 1984 study examining the effects of naps on recall of information looked at 40 university students (Schoen & Badia, 1984). The participants were divided into morning and afternoon napping groups, and the average length of a nap across participants was approximately 2 hours. The study found that in the morning sleep, 22.6% of the nap was spent in REM sleep and the rest in non-REM. In the afternoon nap, only 1.89% was spent in REM, and the rest in non-REM. The results of the above two studies indicate that during naps, the majority of the sleep is spent in the non-REM stage, especially later in the day.

Of course this research in adults may have little bearing on naps in infants and toddlers. For these groups naps are ubiquitous and likely have an important role to play. But only a few studies exist in relation to naps in children. The most relevant ones are reviewed in this section. These studies have confined themselves to a description of napping patterns. None has addressed the architecture of naps. A longitudinal study followed a cohort of 172 children from 6 months to 7 years of age to gather information in regards to nap patterns (Weissbluth, 1995). The results of the study showed that at 6 months, the majority of infants (83.7%) napped 2 times per day, and the remaining infants (16.3%) napped 3 times per day. Between 15 and 24 months of age the morning nap disappears, with the majority of children (76.7%) having only 1 nap by 18 months of age. Between 36 and 48 months of age, the majority of children stopped napping altogether, however the study showed that at 7 years of age, 12% of children were still napping. The modal duration of a nap across all ages was 2 hours, however the range was wide. In this study, some parents stopped their children from napping because the nap conflicted with school activities or because the children were not falling asleep at night-time.

A 2007 study examined the sleep and napping patterns in 3-5 year old children who attended full-day childcare (Ward, Gay, Anders, Alkon, & Lee, 2007). This study collected sleep and nap data on 52 children across 3 days and nights. The results of the study found that the majority of children acquired a total of 10 hours of sleep within a 24 hour period. Out of the 52 children, 78.8% were nappers and the average length of a nap was 75.8 minutes. The study also found that the children who napped had less nocturnal sleep than non-napping children and had more night-wakings.

What is quality sleep?

According to Daws (1993), in order to receive quality sleep, individuals need to be asleep long enough to complete each ultradian REM and non-REM sleep cycle (Siren-Tiusanen & Robinson, 2001). For children, receiving quality sleep is dependent on the total sleep schedule, total sleep duration and appropriately timed naps (Siren-Tiusanen & Robinson, 2001). According to Ferber and Kryger (1995), quality naps are determined by appropriate timing, consistency, length, environment and whether the child wakes up naturally or is woken up by someone (Siren-Tiusanen & Robinson, 2001). According to Weissbluth (1989), nap deprivation and poor quality naps are a significant contributor to ruining healthy sleep patterns in children (Siren-Tiusanen & Robinson, 2001). However, more research is required in the area of naps, and their contribution to children's sleep schedules and patterns.

There are numerous factors that can impact on the quality of sleep in children including feeding schedules, activity levels, psychological disorders, physical/health problems, temperament, attachment, delays in development, as well as parental characteristics (Mindell & Owens, 2003). Environmental factors that can influence sleep include space, sleeping arrangements, family composition, lifestyle issues and cultural/family values (Mindell & Owens, 2003). The role of the parents and early childhood centres in promoting quality sleep will be discussed in the following section.

The role of parents in promoting quality sleep

Parents have a significant role to play in promoting quality sleep in their infants and children. Evidence, as will be illustrated below, suggests that one of the first key tasks parents

are required to promote is the development of self regulation, which in turn assists infants' capacity for self-soothing during sleep.

Self-regulation and self-soothing behaviour

Self-regulation can be defined as the child's ability to modulate behaviour according to the demands of a particular situation (Calkins & Howse, 2004). Self-regulation relies on multiple processes working together, including physiological, attentional, emotional, behavioural and cognitive processes (Calkins & Howse, 2004). Regulatory processes begin to develop prenatally and evolve into more sophisticated processes over the course of infancy and later childhood (Calkins & Howse, 2004). In regards to sleep, an infant must learn to be able to regulate their physiological arousal and emotions in order to be able to soothe themselves back to sleep (Calkins & Howse, 2004). Parents who encourage autonomy and independence in their infants over the course of the first twelve months in regards to falling asleep, are more likely to have infants who are able to regulate themselves and fall asleep on their own (Anders & Taylor, 1994). By one year of age, approximately 60-70% of children are able to self-soothe, and fall asleep on their own (Anders & Taylor, 1994).

Infants who have not developed the ability to self-regulate and self-soothe themselves to sleep will require parental intervention to be able to fall asleep (Johnson & McMahon, 2008). This means that parental presence will be required at bed-time as well as during night-wakings (Johnson & McMahon, 2008). Parental attention in this case becomes a competing behaviour to the behaviour of falling asleep, one that is likely to be a stronger reinforcer than sleep (Blampied & France, 1993). Parents who consistently attend to their infant when they wake up during the night are reinforcing signalling during their infant's night-wakings (France & Blampied, 1999). These infants are being positively reinforced as they have

learned that signalling to their parent through crying will result in them getting attention as well as being able to fall sleep (Johnson & McMahon, 2008).These infants are also being negatively reinforced as parental attention allows them to escape from the aversiveness of the new experience of falling asleep alone (Blampied & France 1993). Parents are negatively reinforced for attending to their children during night-wakings as that results in children falling back to sleep, and the parents gaining quietude (France & Blampied, 1999). Parents become conditioned to escape aversive behaviours such as their infant's crying by anticipating their crying and learning to attend to it earlier to avoid it (Blampied & France, 1993). These parent and child behaviours may lead to a behaviour trap or a 'coercion' trap, in which the parents and infants continually reinforce each other (Blampied & France, 1993). This coercion trap maintains the parent and child behaviours, which in turn maintain the night-wakings (Blampied & France, 1993). There are a number of parental practises that contribute to infants' inability to self-regulate during sleep. These include placing the child to bed asleep; staying with the child by their bed until they fall asleep, attending to their child and giving them attention after night-wakings; allowing the child to sleep in parents bed after night-wakings; and having prolonged bed-time rituals and routines (France & Blampied, 1999; Johnson & McMahon, 2008; Middlemiss, 2004). Sleep is a learned behaviour as well as a biological process and therefore it is crucial for parents to promote healthy sleeping habits from infancy (Mindell & Owens, 2003).

Parental characteristics

There are a number of well-established parental characteristics and factors that contribute to the development and quality of sleep. Research has illustrated that an authoritative parenting style characterised by high levels of warmth and affection and behavioural control provides an optimal environment for the development of self-regulation

(Johnson & McMahon, 2008). Parents with an authoritative parenting style are also more likely to be able to set limits around bed time and to promote autonomy in their children (Johnson & McMahon, 2008).

The role of attachment has been established as an important factor in infants' sleep behaviour (Middlemiss, 2004). The attachment style of parents, primarily mothers, has been associated with sleep disorders (Middlemiss, 2004). A 1992 study reported that mothers of infants with sleep disorders were significantly more likely to have insecure attachment (Benoit, Zeanah, Boucher, & Minde, 1992). Insecure attachment in caregivers is associated with an increased risk of insecure attachment in their infants and children (Papalia, Olds, & Feldman, 2004). Infants and children with secure attachment are more likely to develop optimal sleeping habits, and be able to better deal with separations and reunions from their parents during sleep time than children with insecure attachments (Middlemiss, 2004). Studies have shown that children with secure attachment are able to use transitional objects, such as a blanket or toy as a way of dealing with these separations, because they are able to transfer their need for attention to an object (Anders, 1994). The ability to use a transitional object is associated with fewer night-wakings, as infants use the object to help them fall back to sleep (Anders, 1994).

Parental cognitions regarding sleep have been associated with infant sleep development and sleep difficulties (Sadeh, Flint-Ofir, Tirosh, & Tikotzky, 2007). Parental cognitions, such as expectations of a child and attributions and interpretations of child behaviour play a crucial role in parent-child relationships (Sadeh, et al., 2007). Research conducted by Morrell et al. (1999), indicated that infant sleep problems were significantly correlated with parental cognitions, such as doubts about parenting competence, unrealistic expectations of an infant

regarding sleep and anger towards the infant during night-wakings. Morrell suggested that these cognitions may lead to either over-intrusive or rejecting parental interactions which in turn contribute to sleep problems (Morrell, 1999).

There are numerous other parental characteristics that have been associated with infant sleep, including parental psychopathology, personality, temperament and stress (Benoit, et al., 1992).

Environment

The environment contributes to the development of infants' and children's sleep. This includes the physical environment in which the infants sleep, bed-time routines, sleep schedules and family functioning. Limited research exists in regards to the impact the physical environment has on children's sleep (Muzet, 2007). According to Muzet (2007), quiet and dark sleep environments promote quality sleep, as it is less likely that an individual will wake from their sleep due to environmental conditions. However, no evidence exists to date in regards to infants and children to support this statement.

It is important for parents to establish consistent bed-time and nap-time routines which allow a child to start settling down and getting ready for sleep (Mindell & Owens, 2003). Inconsistent or absent bed-time routines have been implicated in sleeping difficulties as children do not learn to anticipate their naps and night-time sleeps and find it difficult to settle down (Mindell & Owens, 2003). Research conducted by Adam, Snell & Pendry (2007) indicated that family functioning is a key variable in children receiving quality sleep. A family environment that was warm and affectionate was correlated with healthy sleeping habits (Adam, Snell, & Pendry, 2007).

The significant role parents play in promoting quality sleep in their children is well established in the literature. Research has illustrated that parental characteristics, cognitions and behaviour all contribute towards the development of sleeping habits and patterns (France & Blampied, 1999; Sadeh, et al., 2007).

The role of early childhood care centres in promoting quality sleep

In contrast to the research on the role parents play in the development of sleep, there is limited research in regards to the role of early childhood care centres. This is despite the increase in time young children spend in these environments. In New Zealand, early childhood education centres, such as preschools and kindergartens, are required to provide infants and children an opportunity to receive naps or 'rest-time' during their time at the centre (Ministry of Education, 1996). The New Zealand Early Childhood Curriculum, 'Te Whariki', states that all early childhood centres must provide an environment that promotes healthy sleeping habits (Ministry of Education, 1996). For infants in particular, the curriculum states that teachers must provide individualised sleeping programmes that can adjust to the infant's own rhythms (Ministry of Education, 1996).

The literature in regards to this curriculum guideline is inconsistent as some researchers promote individualised sleeping schedules and others promote group schedules, where all the children share their nap time. Field (1994) suggests that individualised sleeping programs are disorganising for preschools, as it leads to a chaotic environment in which the caregivers become exhausted trying to accommodate each child's unique schedule. According to Field (1994) group schedules support sleep-wake rhythms and avoid overstimulation. In a book aimed at providing practical guidance to day-care centres, the authors suggest a group nap

time in the middle of the day, where all children are required to sleep or rest (O'Brien, Porterfield, Herbert-Jackson, & Risley, 1979). The authors state that group nap times create clear routines within busy environments (O'Brien, et al., 1979).

In a large ethnographic study carried out in Finnish day care centres, nap schedules and their contribution to the overall quality of children's sleep were examined (Siren-Tiusanen & Robinson, 2001). Napping schedules in this study included a simultaneous and rigid group schedule in one centre to an individualised napping schedule in another centre. The researchers noted that the simultaneous napping schedule seemed to lead to a fragmentation of children's circadian and ultradian sleep rhythms. They also noted that some children were woken up before they were ready, leading them to be tired and over-stimulated in the afternoon. For some children the period of wakefulness in the mornings was too long, leading to sleepiness. The researchers noted that individualised sleeping schedules promoted quality sleep, as they helped avoid over-tiredness and over-stimulation in the children. The authors believe that group schedules benefit the caregivers but not the children in preschools. These findings are consistent with the sleep literature which has illustrated that infants have unique sleep schedules and patterns (Mindell & Owens, 2003).

Environment

There is also limited and mixed research in regards to the optimal sleep environment in day-care centres. The New Zealand Early Childhood Curriculum does not specify guidelines in regards to the physical aspects of a sleep environment, other than there must be a consistent sleep area (Ministry of Education, 1996). In a 1974 study examining open day-care environments, the effect of a light and noisy environment on children's sleep was studied (Twardosz, Cataldo, & Risley, 1974). Thirteen infants were placed under a light and noisy

sleep environment for the first 19 days, and then into a dark and quiet sleep environment for the next 14 days. The dark and quiet sleep environment was created by closing the door and covering the large window to the sleep room. Children's sleep was assessed by an observer entering the sleep room every 15 minutes and recording whether each child was sleeping, awake or crying. The study showed that the two conditions made no difference to the children's sleep. It is important to note however, that the quality of children's sleep cannot be determined by simply observing the state of a child every 15 minutes. It is possible that when the infants slept in the light and noisy conditions their sleep was more fragmented and they spent less time in quiet (non-REM) sleep. In contrast, the Finnish day-care study mentioned above stated that a separate sleep environment was a protective factor for the children's sleeps (Siren-Tiusanen & Robinson, 2001). This would be an interesting and important area of future research, as many preschools in New Zealand do not have separate, closed-off sleep rooms.

According to Siren-Tiusanen & Robinson (2001) it is also important for early childhood education teachers to be knowledgeable about sleep, and to acknowledge and understand the importance of naps in day-care. They authors also note that consistent communication between the teachers and parents in regards to length and quality of children's sleeps at home, and other factors such as stressors, can allow teachers to accommodate nap times to children's requirements.

Limited research exists in regards to the role early childhood education centres play in the development of children's sleep. However, from the research discussed above, it seems likely that preschools have a key role to play in the development of sleep, especially for those children that attend day-care full-time and from an early age.

Common sleeping problems in childhood

Sleeping difficulties and problems are relatively common in childhood, and are often associated with particular transient periods in development (Mindell, 1999). Several studies have estimated that between 20 to 30% of preschool aged children have sleeping difficulties (Mindell, 1999; Sadeh, Raviv, & Gruber, 2000) . Research has shown that many sleeping difficulties continue into middle childhood and sometimes adulthood, illustrating the importance of establishing healthy sleeping practices from birth (Sadeh, et al., 2000).

The most common sleeping problems reported by caregivers include bedtime problems (difficulty falling asleep, resistance to going to bed), and night-time waking (Sadeh, et al., 2000). Difficulty falling asleep can be described as repeatedly taking longer than 20 minutes to fall asleep (Sadeh, et al., 2000). Studies have shown that a difficulty to fall asleep in preschool children is often a result of wrongly timed naps and evening bed-times, as well as being over-tired from a lack of quality sleep (Mindell, 1999). Having difficulty falling asleep during naps could also be a result of a child no longer requiring a nap during the day (Mindell, 1999).

Bedtime resistance includes behaviours such as children refusing to get ready for bed, attempting to delay bedtime through various behaviours or refusing to stay in bed (Mindell, 1999). Bedtime resistance is a behaviourally-based sleep problem that can often become chronic, and continue throughout the school years (Sadeh, et al., 2000). A number of factors can contribute to bedtime resistance behaviour, including age, temperament and environmental settings, however studies have suggested that the most influential factor in bedtime resistance is parental limit-setting (Mindell & Owens, 2003).

Night-wakings are a common sleep problem and can occur for many reasons, however chronic night-wakings are usually the result of inappropriate sleep onset associations (Scher & Blumberg, 1998). Sleep onset associations refers to conditions which a child learns to associate with falling asleep, and requires these same conditions each time they are falling asleep (Adair, Bauchner, Phillip, Levenson, & Zuckerman, 1991; Mindell & Owens, 2003). Therefore if children are used to their caregivers holding or rocking them until they fall asleep, these children will require caregiver presence to fall back asleep each time they wake through the night (Adair, et al., 1991; Mindell & Owens, 2003). Typically, children briefly wake around four to six times a night, however these night-wakings will not be noted by caregivers of children who are able to soothe themselves back to sleep (Mindell & Owens, 2003). Children who are unable to soothe themselves back to sleep are often referred to as 'signallers' because they signal to their parents that they need their presence in order to fall back to sleep (France & Blampied, 1999).

Summary

It is well established in the literature that sleep is essential for survival, and has many wide-ranging benefits for adults and children. Numerous research studies have examined the role parents play in the development of children's sleep, and the findings show that parent characteristics and behaviour have a significant impact on children's sleep. From the literature reviewed, it is clear that minimal research exists in relation to naps in children, as well as the role early childhood education centres have in regards to children's sleep.

Aims of the current research

The aim of the current research was to examine naps in young children with sleeping difficulties across settings, namely the home environment and the preschool environment.

Children with sleeping difficulties, such as those described in the above section, represent a more challenging group for both parents and preschools. It was decided therefore to concentrate on children with sleeping difficulties. The data gathered in this study will provide information in regards to the architecture of naps. Information gathered in regards to the architecture of naps will be used to determine the children's quality of sleep. The aims of this study include examining nap data and comparing the quality of naps children receive at home compared to day-care. This study will also examine the role parents and teachers may have in relation to children's naps, in terms of care-giving practices.

CHAPTER 2

METHOD

Design

The design was a case study of three children across two environments, namely the home environment and the preschool environment.

Participants

The group targeted for inclusion in the study were children aged between six months and 2 ½ years who attended early childhood day-care and whose parents reported that their child had sleeping difficulties. Participants were recruited through an urban early childhood preschool centre. Information letters explaining the study were sent out to various preschools across Christchurch, and the researcher then directly approached those preschools that responded positively. Following a discussion with the preschools' directors, the remaining two preschools that showed an interest were asked to sign the consent forms. The directors of each preschool then approached the parents, and informed the researcher of the parents that showed an interest in participating. The researcher made contact with these parents and further explained the study to them. Those who continued to express an interest and were deemed appropriate in terms of their child having sleeping difficulties were handed out a detailed information sheet, and were given a chance to ask the researcher any questions they had. Informed consent was finally gained from three parents, all from the same preschool.

The child participants in this study were three children aged 1 year, 8 months; 1 year, 9 months; and 2 years, 2 months at the beginning of data collection. Information about each child and his/her family is summarised in Table 1A to Table 1C. The information contained

in the tables below was reported by parents and teachers during initial contact. All names are pseudonyms.

Table 1 A. *Participant Information (Aleisha)*

Name:	Aleisha
Age:	1 year, 9 months
Gender:	Female
Family Composition:	Aleisha lives with her father and his partner. She has regular contact with her mother.
Sleep History:	For the first year, Aleisha slept in her parents' room. Often she would fall asleep only if held or rocked. Aleisha has not had specific sleep routines, and would be placed down for sleeps when tired.
Naps at Home:	Aleisha does not have a set nap time; she is placed down for a nap when she is tired. She usually sleeps between one to three hours, and falls asleep within 10 minutes. Often she will not sleep, simply rest.
Night-time Sleep:	Aleisha is placed down for her sleep between 8 and 9pm, and wakes up between 7.30 and 9.30am. She takes between 10-60 minutes to fall asleep.
Sleeping Difficulties:	According to her father, Aleisha can get upset around bed-times and will not want to go to bed. At night-time she can take a long time to fall asleep, and often wakes during the night. Recently she has experienced 'nightmares', as she wakes up frightened or screams while in bed. It can take between 45-60 minutes to settle her back down.
Preschool Attendance:	Mondays: 10am to 2pm Tuesdays: 8.30am to 5pm Wednesdays: 9am to 12.30pm
Naps at Preschool:	Aleisha has naps on Tuesdays only. She is placed down for a nap between 12.30 and 1pm, depending on when she starts showing signs of tiredness. She usually takes 15-20 minutes to fall asleep, and sleeps between 30-90 minutes. Often she does not sleep. She is sometimes rocked or patted by a staff member at the beginning of sleep.
Behaviour:	According to her father, Aleisha's behaviour is not problematic, apart from her stubborn nature. Preschool staff did not have any concerns with her behaviour.

Table 1 B. *Participant Information (Charlotte)*

Name:	Charlotte
Age:	1 year, 8 months
Gender:	Female
Family Composition:	Charlotte lives with her father and her mother.
Sleep History:	As a newborn, Charlotte had severe reflux and as a result she had difficulty sleeping for the first 3 months and often slept on her parents while they soothed her. From 3 to 10 months her sleeping improved and Charlotte sucked her thumb to soothe herself to sleep. At 10 months her sleep worsened again. Charlotte had had consistent sleep routines since birth (described below).
Naps at Home:	Charlotte sleeps at home only on the weekends. She is placed down for a nap around 12.30-1pm and will sleep between 60-90 minutes. She takes between 10-60 minutes to fall asleep. Her parents reported they sometimes pat her to sleep.
Night-time Sleep:	Charlotte is placed down for her sleep at 7.30pm and wakes up between 5.30-7am. Her night-time routine includes dinner, a bath, bottle and bed-time stories.
Sleeping Difficulties:	According to her parents, Charlotte often tantrums before bed-time, for approximately 10 minutes. She requires parental presence to fall asleep and will become upset if her parents leave. She often takes a long time to fall asleep, and can wake up to 3 times a night, each time taking 10-30 minutes to fall back to sleep.
Preschool Attendance:	Monday to Friday: 8.30 to 5.00pm
Naps at Preschool:	Charlotte has a nap every-day, and is placed down for a nap between 10.30 to 11am. She will sleep between 1 to 1.5 hours. She is often rocked or patted by a teacher until asleep. She usually takes between 10-15 minutes to fall asleep.
Behaviour:	According to her parents Charlotte's behaviour is not problematic apart from her sleeping difficulties. The preschool staff did not have any concerns about her behaviour.

Table 1 C. *Participant Information (James)*

Name:	James
Age:	2 years, 2 months
Gender:	Male
Family Composition:	James lives with his mother, father and baby brother.
Sleep History:	For the first year of his life James slept in his parents' bedroom, after which he was placed into his own room. During the second year he would often wake up and cry at night-time and his parents would allow him to sleep in their bed. James has had a sleep routine in place since birth (described below).
Naps at Home:	James is placed down for a nap between 1 to 2pm. He often takes up to 30 minutes to fall asleep, after which he sleeps between 60-90 minutes. His mother often sits next to him until he settles to sleep.
Night-time Sleep:	James is placed down for his sleep between 7-7.30pm and wakes up between 6-7am. He often takes 30 minutes to fall asleep. His night-time routine includes dinner, a bath, and stories.
Sleeping Difficulties:	According to his mother, James often refuses to take naps and has tantrums around nap time. James will often not stay in bed, therefore his mother has to sit next to him until he falls asleep. After his nap, James occasionally tantrums for up to 30 minutes. At night-time James typically wakes up around 1am and will go to sleep in his parents' bed.
Preschool Attendance:	Mondays: 9.00am to 3.00pm Tuesdays: 11.30am to 3.00pm
Naps at Preschool:	James has a nap on Mondays and Tuesdays. He is placed down for a sleep between 12-12.30pm, and will sleep between 60-90 minutes. James is often patted to sleep by staff, and it takes him 10-20 minutes to fall asleep.
Behaviour:	According to his mother, James is often tired which results in him being irritated and displaying tantrums. According to preschool staff, James' behaviour is not problematic.

Settings

The settings in this study included the urban preschool that all of the participants attended, as well as each of the participant's homes. The preschool caters for infants and children aged 0 to 3 years. It is medium-sized preschool, with a separate nursery section (for children aged 0-18 months) and preschool section (for children aged 18-36 months). The preschool has approximately seven permanent, fully qualified early childhood teachers as well as casual staff. Several of the staff members have been working at the preschool for a

number of years, and it has a reputation as a well organised and well managed centre. It has a separate sleep room, which is closed off from the play area, with twelve cots and one small bed. The sleep room is reasonably dark and quiet, with 'soothing' music that is played throughout the day. There is a teacher present in the sleep room at all times.

All the participants have a similar home sleep environment. Aleisha and Charlotte sleep on their own in a separate room, and James sleeps in the same room as his baby brother. During day-time naps, the curtains are closed so the rooms are reasonably dark and quiet. Aleisha and Charlotte sleep with the door closed during their naps as well as night-time sleeps, however James sleeps with the door open during his nap times.

Materials and Measures

The materials used in this study included a small laptop with a webcam (Apple MacBook) which was used to digitally record the children sleeping. All the sleep data was then viewed on the laptop and coded by using a coding procedure developed by Anders (1979). This coding procedure has been utilised in other research studies including France (1989) and Henderson (2001). The coding system and the corresponding states are shown in Table 2 below. As each recording was being viewed a state was assigned to each minute of the nap. The numbers assigned are as close as possible to those used to denote state in infants.

Table 2. *A description of the coding system and the corresponding states*

Code (child)	State	Scoring
7	The child is out of bed or cot	Any length of the child being out of bed is scored
6	The child is crying	Any length of the child crying is scored
4	The child is awake	Any length of the child awake is scored

2	The child is in active sleep (REM)	Active sleep is characterised by sudden, involuntary body movements, such as twitching. When the child is settling, any length of REM state is scored. Once settled, a child must make 2 movements within 3 minutes for REM onset, followed by 2 movements every 5 minutes for REM to continue.
1	The child is in quiet sleep (non-REM)	Quiet sleep is characterised by an absence of body movement. A child must not make any movements for 3 minutes for non-REM to be coded.
Code (caregiver)	State	
2	The caregiver is present with interaction	Any length of the caregiver touching or talking to the child is scored
1	The caregiver is present without interaction	Any length is scored
0	The caregiver is absent	Any length is scored

The first digital recording was viewed by the researcher and her supervisor as a training tool, and any differences in the scores were reviewed by reference to the video.

Procedures

Following the recruitment of the participants, the researcher made an appointment with each of the parents in order to interview them in their home regarding their child's sleep history, sleeping difficulties and behaviour. Following the interview, the researcher set up the video equipment (laptop) in the child's room, and recorded their first nap. The researcher did not stay in the room during the nap as this would interfere with the child's nap. Two more nap times were digitally recorded for each child, at a time which suited the parents. The laptop was delivered by the researcher for each use and collected later. For each child, the three nap times were recorded over a period of one week.

Prior to recording each child's preschool sleeps, the researcher interviewed the teacher most familiar with the child, regarding the child's sleep patterns, sleep difficulties and behaviour. The laptop was used to record each child's naps on three separate occasions, over a three week period (one nap per week). After setting up the laptop the researcher left the sleep room as there was always a teacher present.

Ethics

Prior to beginning this study ethical approval was obtained for the project from the Human Ethics Committee at the University of Canterbury, New Zealand (see Human Ethics letter of approval in Appendix A). Informed consent was gained as described above. Participation was voluntary and it was made clear to all the participants that they had the right to withdraw from the study at any time (see the Information Letters and Consent Forms in Appendix B).

CHAPTER 3

RESULTS

Data coding

The data in this study was generated through the coding of the videos using the system described above in the Method section. Each video was coded while the coder watched the video running at a rate four times the normal speed, this time compression enhancing the efficiency of the coding. In addition to determining the code for the activity state, the coder noted down the times any changes in states occurred. This allowed the coder to determine the total minutes spent in each state, and the times at which state changes occurred.

Inter-rater reliability

To ensure that the time coding of the videos was reliable, four out of eighteen (~25%) videos were reviewed by a second rater. The second rater was asked to write down the time shown in the video each time they noticed the child move. The reliability index shown below was used to calculate the percentage of agreement and disagreement about the times of state changes. These percentages were then used to calculate the mean inter-rater reliability index (see Table 3).

$$\text{Percentage Reliability index} = \frac{\text{Number of agreements}}{\text{Number of agreements + disagreements}} \times 100$$

Table 3. *The percentage of inter-rater reliability across the four videos*

	% of reliability
Video 1	92%
Video 2	95%
Video 3	87%
Video 4	88%
Mean %	90.5%

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The mean inter-rater reliability across the four videos was 90.5%, which demonstrates a satisfactory level of agreement between the raters on the time coding.

Data Analysis

The data analysis included a child-by-child analysis as well as an analysis comparing nap locations. This allowed the data to be examined at an individual level, as well as a group.

Sleep Variables

The sleep variables derived from the raw data are shown in the Table 4 below, including a description of each variable.

Table 4. *Description of the sleep variables*

Sleep Variable	Description
Time Down	Time the child is placed down for nap
Time Up	Time at the end of the nap
Length of Nap	The length of the nap (awake and asleep)
Time Cry	Time spent crying during nap

Sleep-Onset Latency	Time taken to fall asleep from the time being placed to bed
Time in REM	Time spent in Active Sleep (REM)
Time in nREM	Time spent in Quiet Sleep (nREM)
Time Awake	Time spent awake during the nap
Time Out of Bed	Time spent out of bed during the nap
Sleep Efficiency	The percentage of time spent asleep during a nap
Length of Sleep	The length of time asleep during a nap
Parent/Teacher Absent	The length of time caregivers are absent (not in the room)
Parent/Teacher Present Only	The length of time caregivers are present without auditory or physical interaction
Parent/Teacher Present with Interaction	The length of time caregivers are present with interaction

Nap architecture

As illustrated in Figure 1A to F, with the exception of two nap times (Aleisha's second nap at preschool and James's third nap at home) each child spent more time in quiet sleep than active sleep. Apart from this similarity, the most consistent factor across the naps was that the pattern of sleep activity for each nap was distinctive in terms of sleep architecture, both for each child, and across the children.

Child by child analysis

Aleisha

Figure 1A and Figure 1B below illustrate Aleisha's naps at home and at preschool. As shown in the graphs, Aleisha slept only once at home during the three nap times, and slept three times at preschool. At home, her first and second nap were similar as she lay awake in bed and then got out of bed and played in her room for the rest of nap time. For her third nap at home, she was placed into bed asleep (in active sleep). Her father noted that Aleisha had fallen asleep in the car for approximately 15 minutes prior to being placed in bed. The parent

behaviour across the three naps at home was very consistent, as the parent placed Aleisha into bed, left the room and returned at the end of the nap.

Aleisha's naps at preschool were all similar in regards to her time asleep (51mins, 66mins, 56mins respectively). The sleep pattern across her three naps had similarities, as during each nap Aleisha entered into active sleep before entering quiet sleep. During her first and third nap at preschool, Aleisha spent a significantly longer time in quiet sleep than active sleep. During her second nap, Aleisha entered quiet sleep for only 11 minutes, the rest of her sleep was spent in active sleep. The teacher behaviour across the three naps was also very consistent, as the teacher placed Aleisha to bed, then left and returned to settle her to sleep by patting or rubbing her. After Aleisha has fallen asleep, the teacher again left, and returned once she had awakened.

As Table 5A shows, Aleisha was placed to sleep at the same time (1.00pm) on her first two naps at home, however on her third nap she was placed to bed 90 minutes later at 2.30pm. This is also the only nap during which Aleisha fell asleep. Aleisha's sleep efficiency for her third nap was 97%, however as she was placed to bed asleep the exact sleep efficiency cannot be determined. As Table 5B shows, Aleisha was placed to sleep at similar times at preschool (12.40pm, 12.40pm, 1.00pm). Her sleep efficiency across the three naps was 46%, 61% and 62% respectively, which illustrates that Aleisha did not fall to asleep immediately.

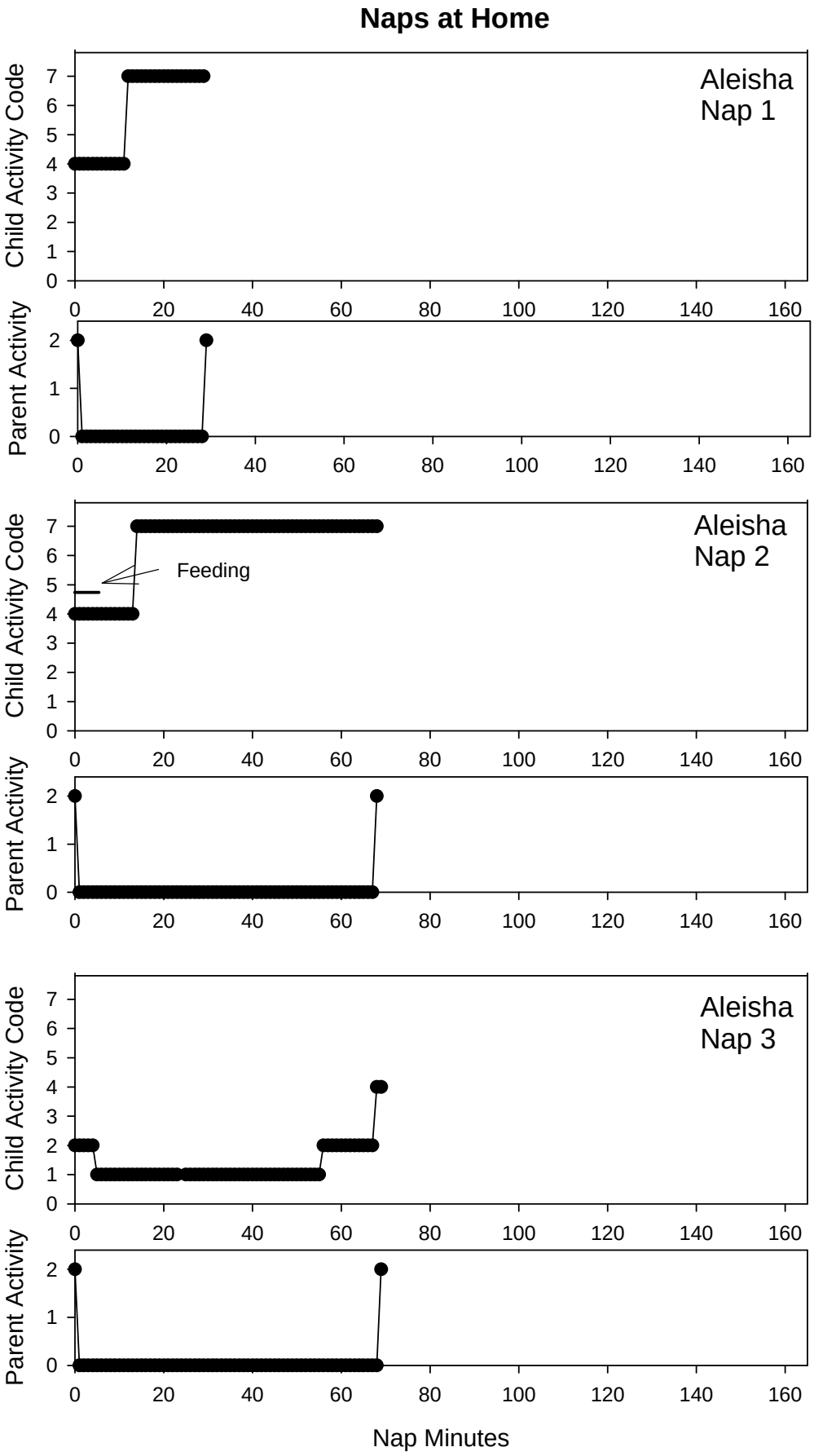

Figure 1A. *Aleisha's home naps*

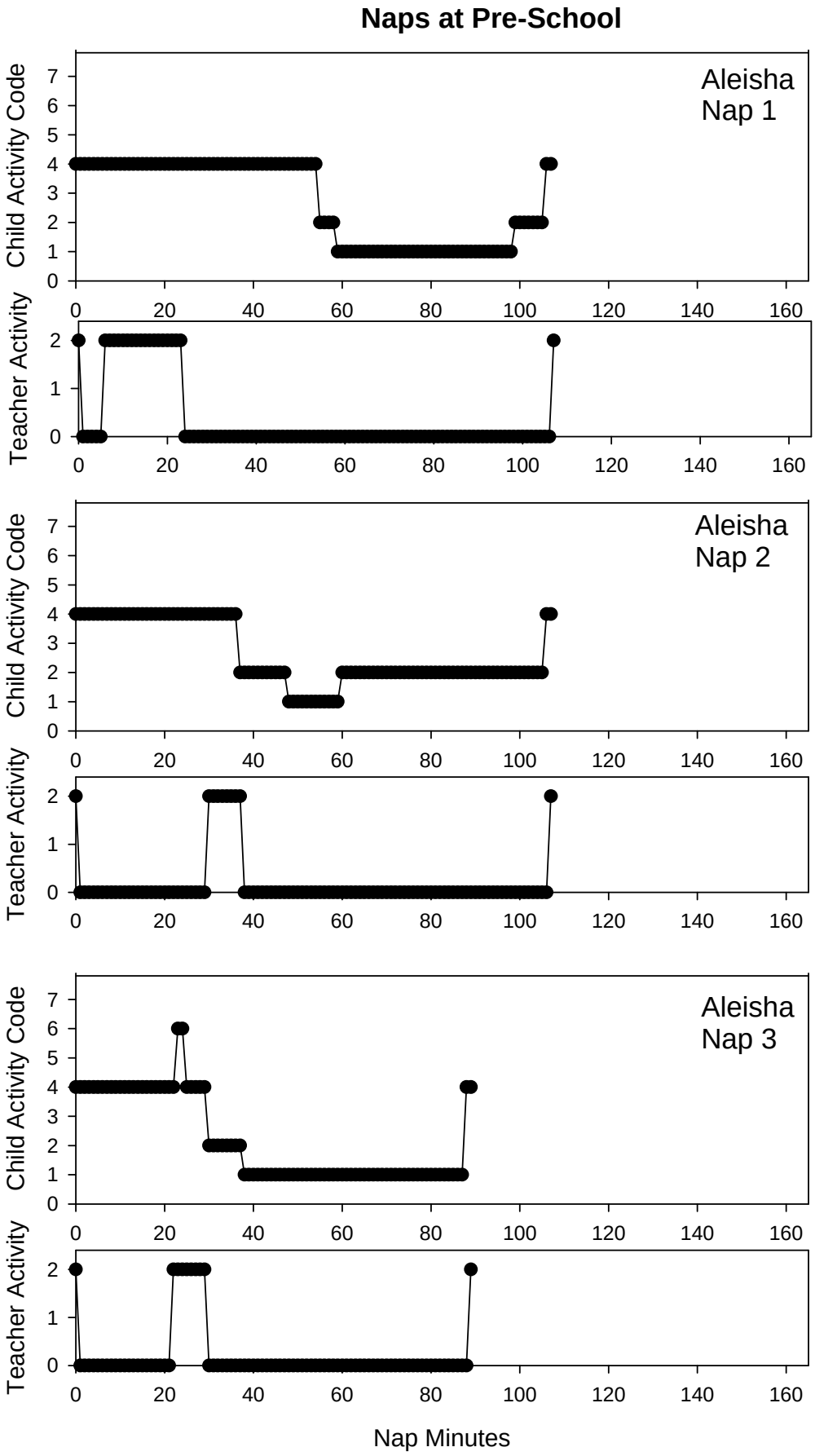

Figure 1B. *Aleisha's preschool naps*

Table 5A. *Aleisha's home naps*

	Nap 1 (Fri)	**Nap 2** (Sat)	**Nap 3** (Thu)	**Nap 1** (Fri)	**Nap 2** (Sat)	**Nap 3** (Thu)
Sleep Variables					Percentages	
Time Down	1.00pm	1.00pm	2.30pm			
Time Up	1.29pm	2.08pm	3.39pm			
Length of Nap (mins)	29	68	69			
Time Cry (mins)	0	0	0	0%	0%	0%
Sleep-Onset Latency (mins)	N/A	N/A	0			
Time in REM (mins)	N/A	N/A	17	N/A	N/A	24%
Time in nREM (mins)	N/A	N/A	50	N/A	N/A	72%
Time Awake (mins)	29	68	2	100%	100%	2%
Time Out of Bed (mins)	18	54	0	62%	79%	0%
Sleep Efficiency (%)				N/A	N/A	97%
Length of Sleep (mins)	0	0	67			
Parent Intervention						
Absent (mins)	27	66	67	93%	97%	97%
Present only (mins)	0	0	0	0%	0%	0%
Present with interaction (mins)	2	2	2	.06%	.02%	.02%

Table 5B. *Aleisha's preschool naps*

	Nap 1 (Tue)	**Nap 2** (Tue)	**Nap 3** (Tue)	**Nap 1** (Tue)	**Nap 2** (Tue)	**Nap 3** (Tue)
Sleep Variables					Percentages	
Time Down	12.40pm	12.48pm	1.00pm			
Time Up	2.27pm	2.35pm	2.29pm			
Length of Nap (mins)	107	107	89			
Time Cry (mins)	0	0	2	0%	0%	.02%
Sleep-Onset Latency (mins)	55	37	29			
Time in REM (mins)	11	54	8	10%	50%	.08%
Time in nREM (mins)	39	12	48	36%	11%	53%
Time Awake (mins)	56	38	31	52%	35%	34%
Time Out of Bed (mins)	0	0	0	0%	0%	0%
Sleep Efficiency (%)				46%	61%	62%
Length of Sleep (mins)	51	66	56			
Teacher Intervention						
Absent (mins)	89	97	79	83%	90%	88%
Present only (mins)	0	0	0	0%	0%	0%
Present with interaction (mins)	18	10	10	16%	.09%	11%

Charlotte

Figure 1C and Figure 1D below illustrate Charlotte's naps at home and at preschool. As shown in the graphs, Charlotte slept during every nap at home and at preschool. Her three naps at home were reasonably long (114mins, 165mins, 101mins respectively), with her second nap being the longest out of all the recorded naps. During her second nap at home, which was 165 minutes long, Charlotte woke out of her sleep on two occasions, but fell back to sleep without parental intervention. During her first nap at home, Charlotte took almost 20 minutes to fall asleep, and the video showed Charlotte repeatedly standing up in her cot even when placed down by her mother. Charlotte's mother was present for the first 20 minutes trying to settle her down, by talking to her and patting her. During the other two naps, Charlotte's mother placed her in bed then left the room, then checked on her twice during the nap.

Charlotte's preschool naps were reasonably consistent in terms of length of time asleep (84mins, 82mins, 73mins respectively) as Table 5D shows. During her first and second nap, Charlotte took 18 minutes to fall asleep, and on her third nap she took 8 minutes. The teacher was present for the first 20 minutes during her first nap, and as the video shows, she was patting her and trying to soothe her to sleep. During Charlotte's second and third nap, the teacher placed her in the cot and left, then checked on her to make sure she is sleeping.

As Table 5C shows, Charlotte was placed down for a nap at 11.30am for her first nap at home, and at 1.00pm for her second and third nap. Her mother had stated that she gets placed down for a sleep when she is tired rather than at a set time. Her sleep efficiency across the three naps was 79%, 88%, and 75% respectively. As Table 5D shows, Charlotte was placed down for her naps at preschool around lunchtime (11.50am, 11.25am, 12.15pm). Her

sleep efficiency across her three naps was 80%, 80%, 76% respectively, which is consistent with her sleep efficiency at home.

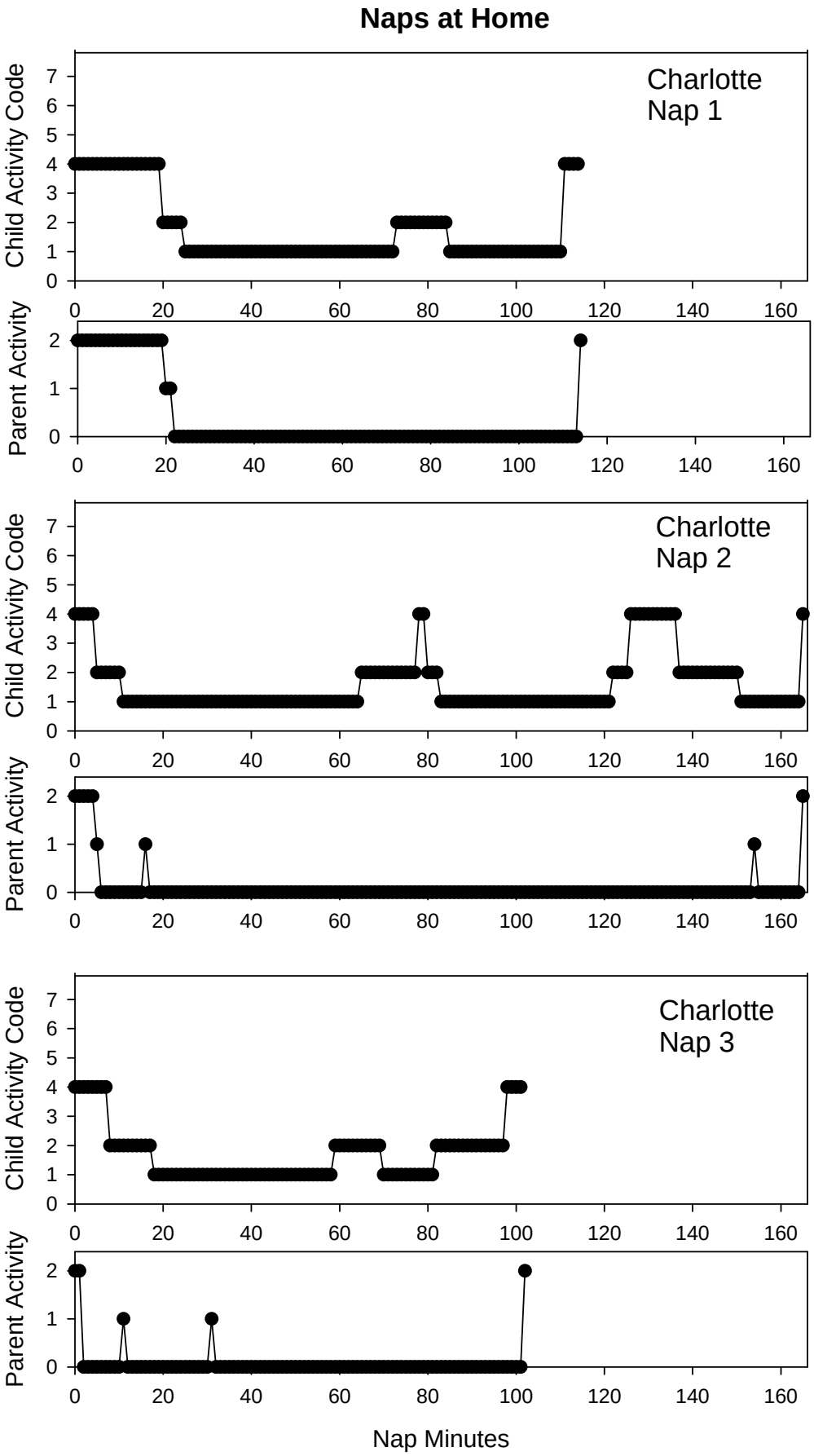

Figure 1C. *Charlotte's home naps*

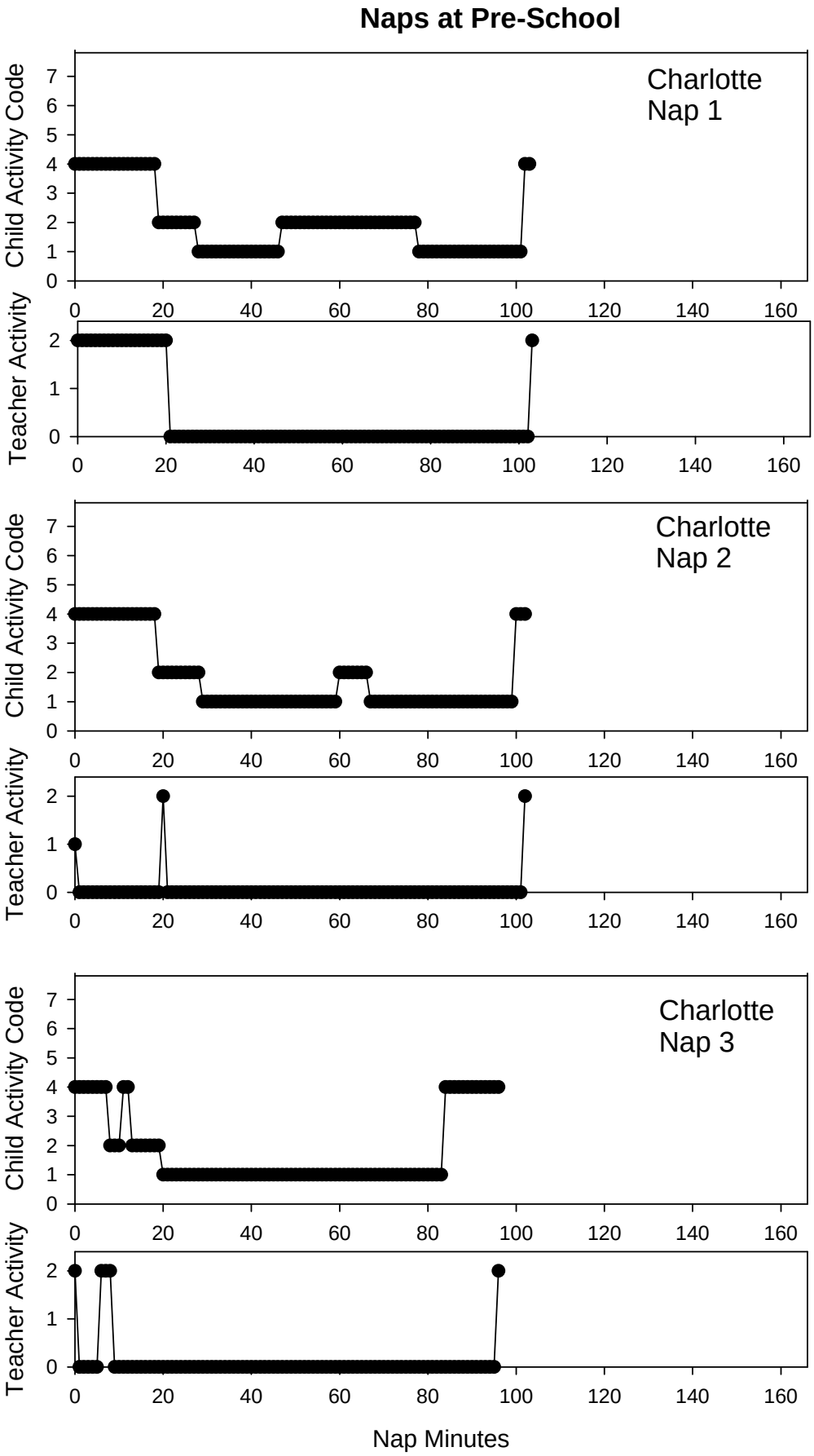

Figure 1D. *Charlotte's preschool naps*

Table 5C. *Charlotte's home naps*

	Nap 1 (Sat)	**Nap 2** (Sun)	**Nap 3** (Sat)	**Nap 1** (Sat)	**Nap 2** (Sun)	**Nap 3** (Sat)
Sleep Variables					Percentages	
Time Down	11.30pm	1.00pm	1.00pm			
Time Up	1.24pm	3.45pm	2.41pm			
Length of Nap (mins)	114	165	101			
Time Cry (mins)	0	0	0	0%	0%	0%
Sleep-Onset Latency (mins)	19	4	7			
Time in REM (mins)	17	40	37	16%	24%	36%
Time in nREM (mins)	74	106	39	64%	64%	38%
Time Awake (mins)	23	19	12	20%	11%	11%
Time Out of Bed (mins)	0	0	0	0%	0%	0%
Sleep Efficiency (%)				79%	88%	75%
Length of Sleep (mins)	91	146	76			
Parent Intervention						
Absent (mins)	93	156	64	81%	94%	63%
Present only (mins)	2	3	2	.01%.	.01%	.01%
Present with interaction (mins)	19	6	3	16%	.03%	.02%

Table 5D. *Charlotte's preschool naps*

	Nap 1 (Tue)	**Nap 2** (Tue)	**Nap 3** (Tue)	**Nap 1** (Tue)	**Nap 2** (Tue)	**Nap 3** (Tue)
Sleep Variables					Percentages	
Time Down	11.50am	11.25pm	12.15pm			
Time Up	1.34pm	1.07pm	1.51pm			
Length of Nap (mins)	104	102	96			
Time Cry (mins)	0	0	0	0%	0%	0%
Sleep-Onset Latency (mins)	18	18	6			
Time in REM (mins)	40	17	10	38%	16%	10%
Time in nREM (mins)	44	65	63	42%	63%	65%
Time Awake (mins)	20	20	23	19%	19%	23%
Time Out of Bed (mins)	0	0	0	0%	0%	0%
Sleep Efficiency (%)				80%	80%	76%
Length of Sleep (mins)	84	82	73			
Teacher Intervention						
Absent (mins)	82	99	91	78%	97%	94%
Present only (mins)	0	0	0	0%	0%	0%
Present with interaction (mins)	22	3	5	21%	.02%	.05%

James

Figure 1E and Figure 1F illustrate James's naps at home and at preschool. As illustrated in the graphs below, James slept during all his naps at home, and for two out of his three naps at preschool. His naps at home were varied and fragmented, as he switched between different states numerous times during his sleeps. During his first nap, James took almost an hour to fall asleep. During this hour, the video showed James being very energetic and constantly getting out of bed and running out of the room. As the graph shows, the parent behaviour during James's first nap was very consistent, with James's mother placing him back into bed every time he climbed out, then leaving the room. James's mother also attended to his crying and calling out. During his next two naps, James's mother placed him to bed then left, however she checked on James a couple of times during his naps.

As Figure 1F shows, James's naps at preschool were more consistent and less fragmented. James spent significantly more time in quiet sleep than active sleep during his two sleeps at preschool. James also took less time overall to fall asleep at preschool than at home. The teacher behaviour was also consistent, as the teacher sat with James, patting him, until he fell asleep during his first two naps, then left. During his third nap, the teacher patted him for the first 10 minutes then left, and after another 15 minutes James was taken out of bed.

As Table 5E shows, James was placed down for his naps at home at a similar time (1.30pm, 1.00pm, 1.00pm). His length of sleep across the three naps was varied (91mins, 122mins, 48mins respectively). James's sleep efficiency across the three naps was also varied (59%, 87%, 59% respectively). James was placed down for a nap at preschool at the same time across the three days (1.30pm). His length of sleep during his first nap was 56 minutes

and 113 minutes during his second nap. His sleep efficiency across the two naps was 73% and 84%.

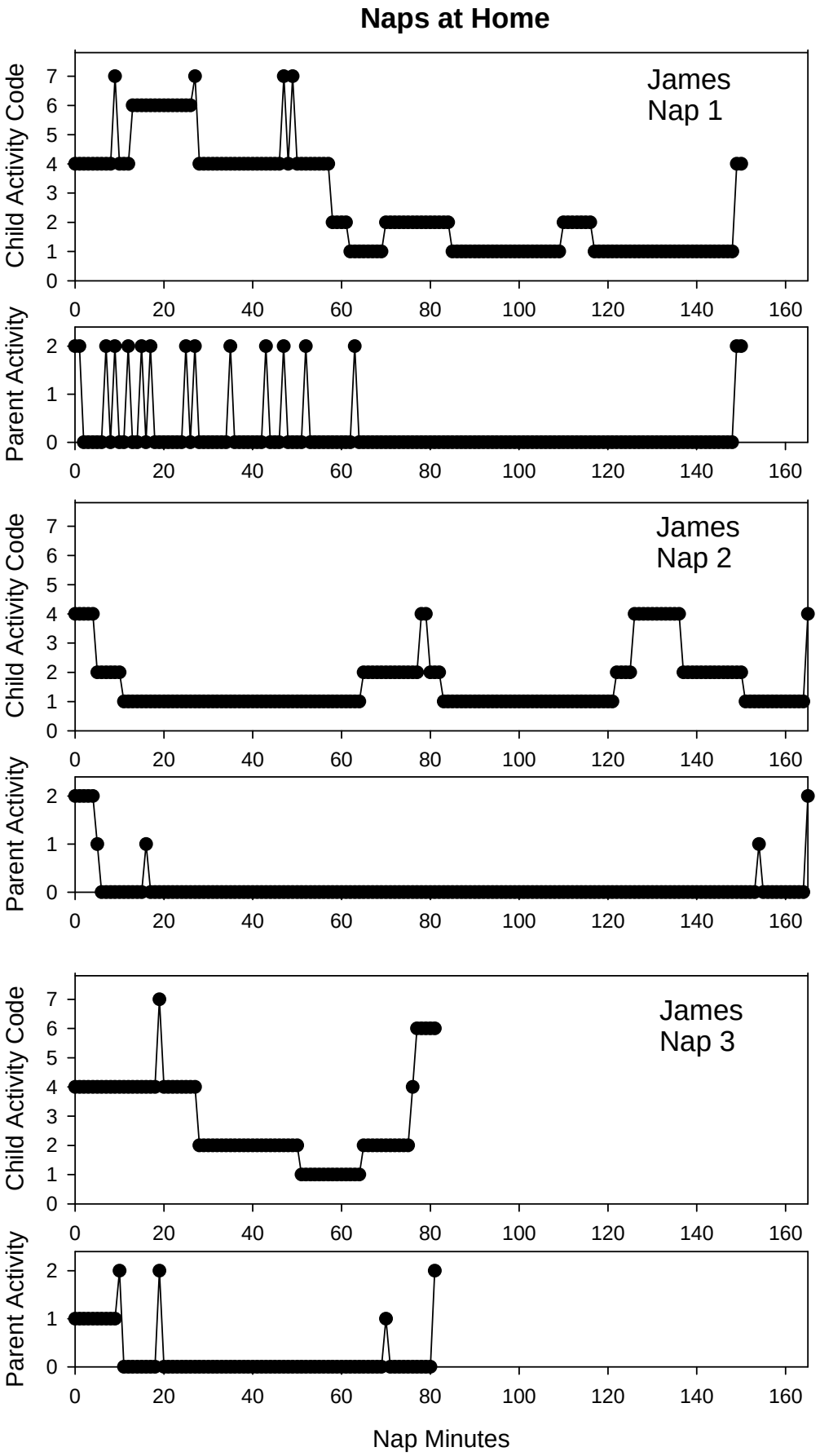

Figure 1E. *James's home naps*

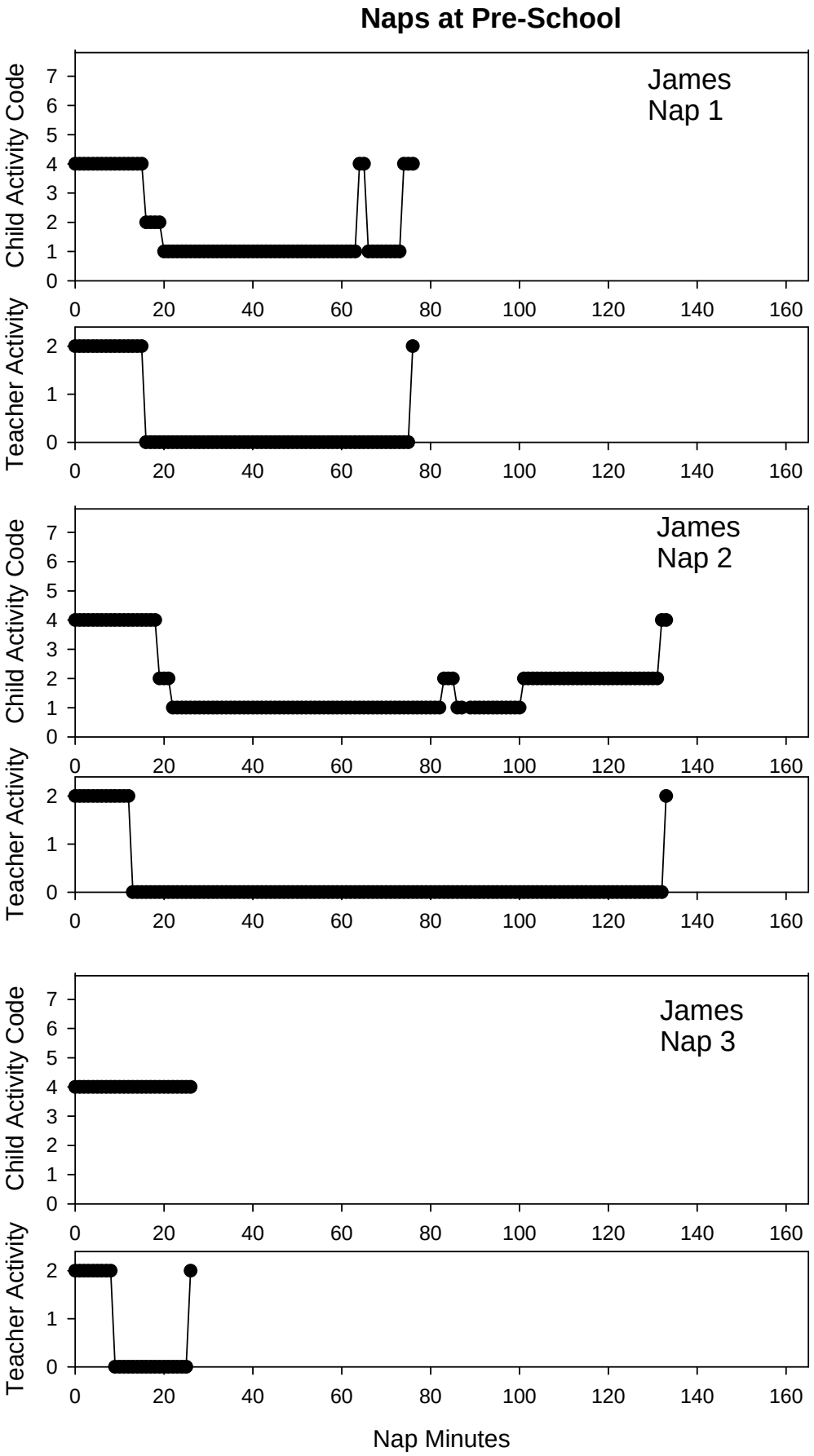

Figure 1F. *James's preschool naps*

Table 5E. *James's home naps*

	Nap 1 (Wed)	**Nap 2** (Fri)	**Nap 3** (Wed)	**Nap 1** (Wed)	**Nap 2** (Fri)	**Nap 3** (Wed)
Sleep Variables					Percentages	
Time Down	1.30pm	1.00pm	1.00pm			
Time Up	4.00pm	3.20pm	2.21pm			
Length of Nap (mins)	150	140	81			
Time Cry (mins)	14	0	5	.09%	0%	.06%
Sleep-Onset Latency (mins)	57	16	27			
Time in REM (mins)	26	38	34	17%	27%	41%
Time in nREM (mins)	65	84	14	43%	60%	17%
Time Awake (mins)	59	18	33	39%	12%	40%
Time Out of Bed (mins)	4	0	1	.02%	0%	0.01%
Sleep Efficiency (%)				59%	87%	59%
Length of Sleep (mins)	91	122	48			
Parent Intervention						
Absent (mins)	134	131	68	89%	93%	83%
Present only (mins)	0	5	10	0%	.03%	12%
Present with interaction (mins)	16	4	3	10%	.02%	.03%

Table 5F. *James's preschool naps*

	Nap 1 (Tue)	**Nap 2** (Tue)	**Nap 3** (Tue)	**Nap 1** (Tue)	**Nap 2** (Tue)	**Nap 3** (Tue)
Sleep Variables					Percentages	
Time Down	1.30pm	1.30pm	1.30pm			
Time Up	2.46pm	3.44pm	1.56pm			
Length of Nap (mins)	76	133	26			
Time Cry (mins)	0	0	0	0%	0%	0%
Sleep-Onset Latency (mins)	15	18	N/A			
Time in REM (mins)	4	37	N/A	.05%	27%	N/A
Time in nREM (mins)	52	76	N/A	68%	57%	N/A
Time Awake (mins)	20	20	26	26%	15%	N/A
Time Out of Bed (mins)	0	0	0	0%	0%	0%
Sleep Efficiency (%)				73%	84%	N/A
Length of Sleep (mins)	56	113	0			
Teacher Intervention						
Absent (mins)	60	97	16	78%	72%	61%
Present only (mins)	0	0	0	0%	0%	0%
Present with interaction (mins)	16	10	10	21%	.07%	38%

An analysis comparing nap locations

Table 6A to Table 6C below shows the means of the sleep variables across the two environments for each child. Table 7 below shows the means of the sleep variables across the children's home and preschool naps. As the tables show, the mean length of sleep (where sleep occurred during nap time) in the home environment is longer for each child than the mean length of sleep at preschool. The mean sleep efficiency was higher in the home environment than the preschool environment for Aleisha and Charlotte. James had a higher sleep efficiency at preschool than home. The mean sleep-onset latency was varied across the children and across environments. The caregiver behaviour across environments was similar, as both parents and teachers spent the majority of time being absent, followed by being present with interaction. All the caregivers spent the least time being present without interaction. As Table 7 shows, the mean sleep-onset latency was slightly longer in the preschool environment than the home environment.

Table 6A. *Table of means for Aleisha's home and preschool naps. Note number in () is number of sleeps*

	Home Naps	**Preschool Naps**
Sleep Variables	Means	Means
Length of Nap (mins)	55	101
Time Cry (mins)	0	0.6
Sleep-Onset Latency (mins)	0 (1)	40
Sleep Efficiency (%)	97% (1)	56%
Length of Sleep Episodes (mins)	67 (1)	57.6
Caregiver Intervention		
Absent (mins)	53.3	88.3
Present only (mins)	0	0
Present with interaction (mins)	2	12.6

Table 6B. *Table of means for Charlotte's home and preschool naps*

	Home Naps	**Preschool Naps**
Sleep Variables	Means	Means
Length of Nap (mins)	126.6	100.6
Time Cry (mins)	0	0
Sleep-Onset Latency (mins)	10	14
Sleep Efficiency (%)	80.6%	78.6%
Length of Sleep (mins)	104.3	79.6
Caregiver Intervention		
Absent (mins)	104.3	90.6
Present only (mins)	2.3	0
Present with interaction (mins)	9.3	10

Table 6C. *Table of means for James's home and preschool naps. Note number in () is number of sleeps*

	Home Naps	**Preschool Naps**
Sleep Variables	Means	Means
Length of Nap (mins)	123.6	78.3
Time Cry (mins)	6.3	0
Sleep-Onset Latency (mins)	33.3	16.5 (2)
Sleep Efficiency (%)	68.3%	78.5% (2)
Length of Sleep Episodes (mins)	87	84.5 (2)
Caregiver Intervention		
Absent (mins)	111	57.6
Present only (mins)	5	0
Present with interaction (mins)	7.6	12

Table 7. *Table of means across the children's home and preschool naps*

	Home Naps	**Preschool Naps**
Sleep Variables	Means	Means
Length of Nap (mins)	101.73	93.3
Time Cry (mins)	6.3	0.6
Sleep-Onset Latency (mins)	14.43	23.5
Sleep Efficiency (%)	81.9%	71.0%
Length of Sleep (mins)	86.1	73.9
Caregiver Intervention		
Absent (mins)	89.5	78.8
Present only (mins)	2.6	0
Present with interaction (mins)	6.3	11.5

CHAPTER 4

DISCUSSION

The purpose of the current study was to investigate the quality of naps in children with parent-reported sleeping difficulties in two different environments. One environment was the children's home, the other was their preschool. Because children are both tending to enter child care at earlier ages, and are spending an increasing amounts of daily time in child-care issues concerning sleep in these environments warrant investigation, but minimal research exists in regards to children's daytime sleep, and to date no studies have examined the architecture of naps in children.

Interpretation of results

General findings

The examination of the results indicates that the naps were individually distinctive and varied in terms of their patterns and architecture across the children and across the environments. The most consistent factor found across the naps was that the mean length of sleep (where sleep occurred during nap time) was longer in the home environment than the preschool environment for all the children. Another finding was that for the majority of naps, the children spent more time in quiet sleep than active sleep. Caregiver behaviours across the environments shared similarities. These findings as well as individual results will be discussed below.

Nap architecture and patterns

It is possible that the mean length of sleep at home was longer than at preschool for the children because there were fewer distractions in the home environment. Each child in

this study slept on their own in a separate room during nap time at home. This allowed for an environment that is reasonably quiet with minimal distractions. In contrast, the preschool sleep room included six cots with a number of children sleeping at the same time, and up to two teachers present during nap times. The higher number of people present in the sleep room may have led to more distractions and environmental noise, leading to the children waking up earlier.

For the majority of the sleep times, the children spent longer in quiet sleep compared to active sleep. As no other studies have previously examined nap architecture in children, this finding cannot be compared to other studies. However, children of a similar age to the children in this study spend more time in quiet sleep than active sleep during their night-time sleeps, as mentioned in the literature review. The literature reviewed in relation to adult nap architecture also indicated that the majority of nap time is spent in n-REM sleep than REM sleep.

The architecture and pattern of naps were varied and individually distinctive. For example, James's naps at home were all different in terms of length, efficiency, and time spent in quiet compared to active sleep. During his third nap at home, James spent more time in active sleep than quiet sleep. James's results are similar to that of the other two children. It is possible that these children's naps had a lack of a consistent pattern because they all had sleeping difficulties to some extent. Again, this finding cannot be compared to previous studies. All the children displayed a fragmented sleep pattern within some of their naps, as they frequently switched between sleep states. It is possible that the children's sleeping difficulties contributed to their fragmented naps. Because their sleep difficulties were not verified or specified, links between night-sleep disturbance and naps cannot be further

explored. Future research on naps also needs to also investigate the quality of night-time sleep for the participants.

Nap routines

At preschool, all the children were placed down for their nap at similar times across their three nap times. The children's nap times at home were also similar, however not as consistent as at preschool. At home, Aleisha was placed down for a nap at the same time (1.00pm) for her first two naps, however she was placed to sleep 90 minutes later on her third nap. Her third nap is the only time Aleisha slept in the home environment. It is possible that a later nap time is more appropriate for Aleisha in the home environment, however it was beyond this study to explore this finding. At preschool, Aleisha was placed down for a nap around 1.00pm each time, and she also had a sleep every time. One possible explanation is that this nap-time may be more appropriate at preschool, as an early start in the morning and a busy environment may lead her to be tired quicker.

Both Charlotte and James had a number of long naps, with one of Charlotte's naps at home being 2 hours and 40 minutes long. It is possible that these children required long naps during their day as they did not receive quality sleep at night-time. Both Charlotte and James's parents reported that they had difficulties with night-time sleep and often woke during the night. This may have contributed to them being tired during the day and requiring longer naps.

Caregiver behaviour

The results in regards to the caregiver behaviours across the settings showed that there were similarities in their behaviour. For example, each caregiver, whether parent or pre-

school staff member, spent the majority of the nap time being absent, followed by being present with interaction, and spent the least time being present without interaction. None of the caregivers stayed with the child for the whole length of the nap, and the majority left after placing the child into the bed or the cot and settling him or her in. The majority of the caregivers settled the children by patting or rubbing them.

One of the interesting differences between the caregivers (teachers and parents) were their perceptions of the children's sleeping difficulties. Each child's parent reported that they had difficulties with their sleep, especially being able to get them to take their naps. However, the teachers at the preschool did not perceive these children as having any sleeping difficulties. Although the results did not show clear differences in terms of the quality of naps between the two environments based on three nap times, it is possible that due to the differences in caregiver behaviours the preschool teachers have less difficulty getting the children to take their naps. The permanent staff at the preschool are fully qualified and experienced teachers, and understand the importance and value of naps. As the researcher observed, they are firm with the children in regards to what is expected of them at nap time. As the results showed, none of the children got out of their cots at preschool, and even if they did not sleep they were able to lie in their cot and have a rest. This is in contrast to James's and Aleisha's behaviour at home, as will be discussed below with the example of James.

James in particular took a reasonably long time to fall asleep during his home sleeps, especially during his first nap, which had a sleep-onset latency of 57 minutes. His mother reported that James often resists going to sleep especially in the day-time. During his first nap at home, the results showed that James's mother consistently placed him back into bed every-time he got out of bed, and she also attended to his crying. This caregiver behaviour may

have resulted in reinforcing James's getting out of bed, as each time he would receive his mother's attention (Blampied & France, 1993). James took a shorter time to fall asleep during his preschool naps than his home naps, and he did not get out of bed during any of the nap times. During his third nap at preschool James did not have a sleep, however he was able to lie in bed for 20 minutes and have a rest. This difference may be explained by the difference in caregiver behaviour between the environments. As the researcher observed the teachers had clear rules and consistent consequences for the children's behaviour at preschool. The teachers had clear expectations in terms of the children being quiet in the sleep room, and staying in their cots.

As the results showed, Aleisha's father had the most consistent parent behaviour out of the three parents as he placed Aleisha to bed then left, and returned at the end of her nap time. As discussed in the literature review, this type of parent behaviour promotes self soothing and self regulation in children (Anders & Taylor, 1994). As the digital recordings showed, although Aleisha only slept once out of her three naps, she was able to rest in bed on her own without parental attention as well as play in her room quietly on her own.

During Charlotte's first nap at home, Charlotte's mother stayed with her until she settled down and fell asleep. This took almost 20 minutes, and as the video showed Charlotte's mother sat next to the cot and patted Charlotte as well as laid her down each time she stood up. It is possible that this parent behaviour was reinforcing Charlotte to stay awake as this led to her receiving her mother's attention. Charlotte's mother reported that she has difficulties falling asleep on her own, and therefore she often stays with her until she falls asleep. However, as described in the literature review this is likely to be reinforcing her staying awake (Johnson & McMahon, 2008).

The teachers at preschool often sat next to the children, patting or rubbing them until they fell asleep. This may have also been reinforcing the children to stay awake. Although the sleep onset latency was variable across the children, the mean sleep onset-latency was slightly longer in the preschool environment than the home environment as the results illustrated. This would be an interesting area for future research, as it is common practice for preschool teachers to stay with children until they fall asleep.

Limitations of the current study

There are several limitations to this study. One of the limitations of this study is its small sample size. Three children were used due to time limits as well as interest displayed from parents. Due to the small number of participants, information gathered regarding nap architecture and napping patterns cannot be generalised to the wider population. However, the information gathered in this study provides useful information about nap architecture and caregiver behaviour, and has several important implications for practice and further research. The results of this study also provide initial information upon which further studies can build on and explore. The participants were all recruited from the same preschool, and were middle-class and Caucasian, therefore they are not representative of a diverse population.

Another limitation regarding the participants is the inclusion criteria. Due to the limited number of parents who were interested in participating, children who were over 6 months and under 2.5 years, and had sleeping difficulties as reported by their parents were included. This resulted in some of the children possibly having more serious sleeping difficulties than others, as well as two of the children attending preschool part-time (James and Aleisha) and one child attending full-time (Charlotte). This meant that Charlotte only napped at home on the weekends.

Although information regarding parent and teacher behaviour was directly captured, another limitation is not gathering more detailed information regarding parent and teacher behaviour surrounding the nap times and the night-time sleep. For example, asking the parents and teachers to write down what they said to the children when settling them down as the digital recordings did not record sound. Also asking them to report on the routine they followed prior to the start of the digital recording would have added further information.

It would also have been useful to also examine the architecture of the children's night-time sleeps to be able to compare these to their day-time sleeps. This would have added valuable information as it would allow the researcher to see whether these children's night-time sleeps were also varied and somewhat fragmented.

Implications of the current study for research

The results showed no clear differences between the quality of naps in the two environments. There are several possible reasons for this outcome. Firstly, children in this study had sleeping difficulties to some extent, as reported by their parents. This may have contributed to their varied and somewhat fragmented nap patterns as discussed above. Research with children without sleeping difficulties is an important consideration for future research as sleeping difficulties may have overridden differences in settings. Secondly, the preschool included in this study was a high-quality preschool with long-term and experienced teachers, as observed by the researcher. The preschool also had an excellent sleep environment, which was closed off from the play-area providing an environment that was reasonably dark and quiet. It is possible that children who attend other preschools with non-

ideal sleep environments will receive sleep of a lesser quality at preschool than at home. This would be an interesting and important area of future research.

The childcare environment is an important component of early development for children, however limited information exists in regards to naps. Further study is warranted in regards to daytime naps in children to examine the potential influence of daytime naps on night-time sleep as well the potential role they play in the development of sleeping difficulties and disorders. The results of this study suggest that caregiver behaviour and environmental factors may affect the sleep of young children, and therefore it is important to examine these potential influences on sleep. Longitudinal studies would be beneficial to further our understanding of napping patterns and their possible stability and variability.

Implications of the current study for practice

Only alert children are able to concentrate on learning and benefit from preschool activities, therefore quality physical care should be a prerequisite for quality education in the preschool setting (Siren-Tiusanen & Robinson, 2001). As mentioned above, the preschool in this setting was of a high-quality with experienced teachers. The preschool also had an ideal sleep environment. The training of early childhood educators and caregivers should outline the importance of naps, and the effects of a lack of quality sleep can have on infants and children.

The sleep environment in preschools should provide a space which enables children to receive a nap or a rest with minimal distractions and noise. This involves having a sleep room which is separate and closed off from the play area, providing a reasonably dark and quiet environment. As the results showed, more time was spent in quiet sleep than active sleep

during naps for majority of the sleep times recorded. It is likely that in order to receive quality naps children require a longer period of quiet sleep than active sleep. Therefore sleep environments should facilitate children to receive quiet sleep, by providing an environment that has minimal distractions.

As many children spend the majority of their time between home and preschool, it is important for parents and teachers to have open communication between each other. In regards to sleep, this can enable teachers to place the child down for a nap at an appropriate time depending on that child's quality of night-time sleep and wake time that morning. Although this was not directly observed during this study, the teachers and the parents involved informed the researcher that they communicated to each other information regarding the children's sleep.

Conclusion

The current analysis suggests that there were no clear differences found between the quality of sleep the children received in the home environment compared to the preschool environment during the three nap times recorded. However, differences were found in regards to the length of sleep the children received across the environments. The mean length of sleep (where sleep occurred during nap time) was longer at home than at preschool for each child. It was also found that the children spent longer in quiet sleep than active sleep for the majority of the sleep times. The results also suggested that caregiver behaviour influences day-time naps, however further research is required in this area.

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Appendix A

Approval letter from the Human Ethics Committee

Human Ethics Committee
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UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
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Ref: HEC 2008/55

9 July 2008

Ms Lucia Torok
School of Educational Studies & Human Development
COLLEGE OF EDUCATION

Dear Lucia

The Human Ethics Committee advises that your research proposal "Quality of sleep in preschools." has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 7 July 2008.

Best wishes for your project.

Yours sincerely

Dr Michael Grimshaw
Chair, Human Ethics Committee

Appendix B

Information letters and consent forms

Information letter to the preschool

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Information Sheet
Child and Family Psychology
SLEEP STUDY

Dear Preschool,

Thank-you for agreeing to participate in this sleep study. My name is Lucia Torok and I am a fifth year student in the Child and Family Psychology programme at the University of Canterbury. As part of my studies, I am required to complete a dissertation, which involves carrying out research in a specific area over a 12-month period. For my dissertation, I have decided to study sleep in the preschool setting. I will study children aged 6 months -2 years old who have been identified by their caregivers as 'sleepers who take a long time settle and/or wake frequently'. This project will include:

- A short interview with the parent/s regarding the child's sleep at home.
- A short interview with the child's preschool teacher/s regarding the child's sleep at preschool.
- Direct observation of the child sleeping (day sleep), on three separate occasions at home.
- Direct observation of the child sleeping in the preschool on three separate occasions.

The aim of this research is to study the quality of children's sleep at preschool as well as at their home. In order to do this a range of information needs to be gathered. This includes interviewing the parent/s as well as the preschool teacher/s regarding the child's sleep behaviour. The parent/s will be asked questions such as: a brief history of their child's sleep, sleep problems, usual length and number of naps per day, child behaviour, usual sleep environment. The preschool teacher/s will be asked questions such as: sleep problems, usual number and length of naps per day, behaviour before and after sleep.

In order to study the quality of children's sleep I will be using some well established methods and technology. This includes direct observation, where I will sit and watch the child sleeping and code any movements they make. This also includes videoing the child sleeping using a small web-cam to ensure high reliability of the study (this web-cam will most likely be attached to the cot, but due its small size, will not disturb the child). We may also use an ankle-actigraph (a wristwatch size microprocessor that senses motion, and provides continuous motion data). Actigraphy is a well-established method for studying the quality of sleep, and it does not disturb or harm children in any way. I will also be describing the sleep environment in detail, and taking measures of ambient light and noise.
What is expected of your centre:

-for the staff to answer some questions regarding each participating child's sleep behaviour
-for the researcher (myself) to be able to observe each participating child's sleep on three separate occasions.

The participant requirements are:

-up to 6 children
-these children must be determined by their parents as 'sleepers who take a long time to settle and/or wake frequently'
-these children only nap once per day at preschool
-these children are under the age of 2.5 years of age
-these children do not co-sleep at home

For each child, three nap times will be monitored.
All information will be kept confidential to myself and my research supervisors. The resulting report will not contain any identifying details (including the identity of the preschools). The results of the research may be published, but you may be assured of the complete confidentiality of the data gathered.

There are no known risks of these evaluations. All information that is collected will be done with great care for the children and will not cause them any upset.

Thank you for agreeing to take part in this study. If you want to know more about this study (either now or at a later date), please feel free to contact either myself or my supervisors.

We are committed to treating all case study participants in a fair and ethical manner. This project has been reviewed and approved by the University of Canterbury Human Ethics Committee.

Lucia Torok

My details: Lucia Torok, cell ph: 027 343 5527

My supervisors' details: Dr Karyn G. France,
Registered Clinical Psychologist,
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Christchurch,
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UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Consent Form

Child and Family Psychology
SLEEP STUDY

- I have read and understood the attached information sheet, and I have been given an opportunity to ask the researcher questions. I understand what is involved for the participants and the preschool.

- I understand that all information will be confidential and the written report will not contain any identifying details.

- I agree and consent to Preschool taking part in the sleep study described in the attached information sheet.

- I understand that I will not be responsible for any of the equipment, and that the researcher will take care of all the equipment.

- I note that this project has been reviewed and approved by the University of Canterbury Human Ethics Committee.

- I understand that Preschool may withdraw at any time without affecting the way the preschool is treated and without giving a reason.

- I _____ (please print name) agree for Preschool to take part in the sleep study described in the attached information sheet.

Signature _____

Date _____

Information letter to the parents

UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Information Sheet for Parents
Child and Family Psychology
SLEEP STUDY

To the Parents/Caregivers

My name is Lucia Torok and I am a fifth year student in the Child and Family Psychology programme at the University of Canterbury. As part of my studies, I am required to complete a dissertation, which involves carrying out research in a specific area over a 12-month period. For my dissertation, I have decided to study sleep in the preschool setting. I will study children aged 6 months -2 years old who have been identified by their parents as ‘sleepers who take a long time to settle and/or wake frequently'.

If this describes your child you are invited to participate in this sleep study.
The project will include:

- A short interview with you regarding your child’s sleep at home.
- A short interview with your child’s preschool teacher/s regarding their sleep at preschool.
- Direct observation of your child sleeping (day sleep), on three separate occasions at home.
- Direct observation of your child sleeping in the preschool on three separate occasions.

The aim of this research is to study the quality of children's sleep at preschool as well as at their home. In order to do this a range of information needs to be gathered. This includes interviewing you as well as the preschool teacher/s regarding your child's sleep behaviour. You will be asked questions such as: a brief history of your child's sleep, sleep problems, usual length and number of naps per day, child behaviour. The preschool teacher/s will be asked questions such as: sleep problems, usual number and length of naps per day, behaviour before and after sleep.

You will also be write down times that your child is sleeping and times they are awake.

In order to study the quality of children's sleep we will be using some well established methods and technology. These will vary between home and preschool depending on the sleeping arrangements. Methods I will choose from are:

- I might sit and watch your child sleeping and record any movements they make (we can determine sleep state from this).
- I might video your child sleeping using a small web-cam or a camera on a tripod. In this case we may need an invisible infra-red light source. The use of this light source with both adults and children is well established in sleep research.
- I may also use an ankle-actigraph (a wristwatch size microprocessor that senses motion, and provides continuous motion data). Actigraphy is a well-established method for studying the quality of sleep, and it does not disturb or harm children in any way.
- I will also be describing the sleep environment in detail.

It is envisioned that the time taken to complete this study will be approximately 3-6 hours observing your child at home depending on the length of their sleep on the three separate occasions (as well as a short time taken to talk to you).
It is also envisioned that it will take approximately the same number of hours (3-6 hours), in order to observe your child in their preschool setting, depending on the length of their naps.

All information will be kept confidential to myself and my research supervisors. The resulting report will not contain any identifying details. The results of the research may be published, but you may be assured of the complete confidentiality of the data gathered.

Should you and your child decide to participate in this study, you have the right to pass on any questions and to withdraw at any time without having to give a reason.

There are no known risks of these evaluations. All information that is collected will be done with great care for your child and will not cause them any upset.

Thank you for taking time to consider my request. If you want to know more about this study (either now or at a later date), please feel free to contact either myself or my supervisors.

We are committed to treating all case study participants in a fair and ethical manner. This project has been reviewed and approved by the University of Canterbury Human Ethics Committee.

Lucia Torok

My details: Lucia Torok, cell ph: 027 343 5527

My supervisors' details: Dr Karyn G. France,
Registered Clinical Psychologist,
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Consent Form for Parents
Child and Family Psychology
SLEEP STUDY

- I have read and understood the attached information sheet, and I have been given an opportunity to ask the researcher questions. I understand what is involved for the participants and the preschool.

- I understand that all information will be confidential and the written report will not contain any identifying details. Identifying information will only be available to the participant, the supervisors and myself.

- I agree and consent to my child taking part in the sleep study described in the attached information sheet.

- I consent to the researcher obtaining information from my child's preschool teacher/s relating to my child's sleep behaviour at preschool, as described in the attached information sheet.

- I understand that I will not be responsible for any of the equipment, and that the researcher will take care of all the equipment.

- I understand that I can withdraw from this study at any time without affecting the way I am treated and without having to give a reason.

- I note that this project has been reviewed and approved by the University of Canterbury Human Ethics Committee.

- I _____ (please print name) agree to participate in the sleep study described in the attached information sheet.

Signature _____

Date _____