The Effects of An Educational Intervention for Caregivers on Their Knowledge of Child Sleep and Child Sleep Behavior

Rachel Cohen

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THE EFFECTS OF AN EDUCATIONAL INTERVENTION FOR CAREGIVERS ON THEIR KNOWLEDGE OF CHILD SLEEP AND CHILD SLEEP BEHAVIOR

by

RACHEL COHEN

A dissertation submitted to the Graduate Faculty in Educational Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York

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Child Sleep Behavior

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Rachel Cohen

This manuscript has been read and accepted for the Graduate Faculty in
Educational Psychology in satisfaction of the dissertation requirement for the
degree of Doctor of Philosophy.

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ABSTRACT

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by

Rachel Cohen

Advisor: Joan Lucariello

Sleep is crucial for optimal development, health, and growth in children. However, current research indicates that children are not receiving adequate sleep and lack of sleep can lead to physical, cognitive, and behavioral problems (i.e., Mindell & Owens. 2003). In addition, improper sleep can have a negative impact on learning (Dewald et al., 2010). One route for children to achieve better sleep is to enhance caregiver knowledge about child sleep (Jan et al., 2008). Prior research on this topic has shown that, although caregiver knowledge can be increased through an intervention, often this knowledge increase is not maintained, nor does it seem to have an effect on actual sleep behavior of children (McDowell et al., 2017). Prior research, however, has not been conducted with a sample of middle-income, typically developing, preschool children. The current study implemented an intervention with such a sample to compare the effects of two different forms of caregiver education programs (“brochure only” and “brochure and email follow-up”) on caregiver sleep knowledge and beliefs and child sleep. A control group was used to compare effects of the intervention. Sixty-two participants comprised the three groups. Participants’ knowledge and beliefs on child sleep were assessed through a pretest and an immediate (given one-week post pretest) and a delayed posttest (given one-month post intervention). Child sleep duration was measured through a sleep diary before and after the intervention. Results indicated no significant increase in caregiver knowledge on
the immediate posttest, in the intervention groups when compared to the control group. However, there was a significant gain in knowledge on the delayed posttest for the “brochure only” intervention group when compared to the control group. No significant changes were seen in caregiver beliefs. Additionally, there was no significant change in child sleep duration. The study’s implications and limitations are discussed.
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Chapter 1: Introduction

Lack of quality and sufficient sleep has become a major health concern for children in America. According to Mindell and Owens (2003), 25-30% of children and adolescents experience some type of sleep problems, including insufficient sleep, poor quality, or non-restful sleep. During early childhood multiple and prolonged night wakings (Sadeh, 2004) are common. Night wakings and related sleep problems have been linked to behavior issues and difficult temperaments in children (Sadeh, Gruber, & Raviv, 2002). Improper sleep can have a negative impact on learning and can lead to significant physical, mental, and behavioral problems (Lemola, Ledermann, & Friedman, 2013). As will be documented in the literature review, amount of sleep affects a whole range of childhood behaviors, including learning, socio-emotional behavior, and physical behavior.

Caregivers have a vital role in helping form healthy sleep habits in children (Mindell, & Owens, 2003). To ensure preschool aged children receive the optimal amount and quality of sleep, caregiver knowledge is essential, as sleep at this stage is critical to ensure proper learning and functioning in school (Dewald et al., 2010). One way to help children to achieve better sleep is to enhance parental-caregiver knowledge about child sleep.

Research has been conducted both on parental knowledge about child sleep and interventions aimed at enhancing parental knowledge (McDowell et al., 2017). This research has shown that parental knowledge can be increased, but that these increases are generally not long lasting and do not have an impact on child sleep behavior itself.

A pilot study (Levine-Cohen, 2015) examined whether a parent training program can increase awareness and knowledge of best sleep practices and related sleep issues in parents of preschool aged children (ages three to five). The study examined the effectiveness of a parent
training in the form of a presentation. Overall, the presentation was helpful in increasing parental knowledge on best sleep practices. However, no follow-up was conducted to determine whether the sleep knowledge had been maintained.

It is also the case, as the literature review will demonstrate, that the questions of whether caretaker interventions lead to knowledge gains, whether any gains are maintained, and whether any such change in caretaker knowledge and beliefs affects child sleep remain largely unaddressed by other prior research. Given the importance of proper sleep for preschool aged children, it is important that the dissertation research examine these questions of caretaker training, maintenance of any training effects, and effects, if any, of caretaker training on child sleep.

The proposed study builds on the pilot study, and the gaps in prior research, to address these very issues. It included a more typically developing sample of children, comparison groups varying in terms of the degree of the intervention experienced to enhance caretaker knowledge, a delayed follow-up to assess maintenance of any intervention effects, and a measure of child sleep duration. The targeted population was primary caregivers with typically developed preschool-aged children (ages 2-5) from a middle-income family, as there is no research on this population. The goal of the study was similar in examining whether a caregiver intervention (in the form of an online brochure) could increase caregiver sleep knowledge, affect caregiver beliefs about their own child’s sleep behavior, and affect child sleep duration. Caretaker sleep knowledge and belief surveys, respectively, were completed prior to the intervention and at two time points post the intervention: one week and one month after the posttest. Based on the literature, many studies found that at the one-month follow-up, little knowledge had been retained. Child sleep duration was also measured pre- and post-intervention. The effect of the intervention was assessed across
two experimental groups that experienced training and a control group that did not. The two experimental groups were comprised of two different forms of caregiver training, respectively - “brochure only” and “brochure and email follow-up pointing to the brochure” - on caregiver sleep knowledge and child sleep. An additional variable measured was whether a caregiver training program had an effect on sleep duration in children.

Research questions:

1a) Does a caregiver training-education program improve caregiver knowledge of sleep as assessed immediately after the training when compared to a control group?

1b) Does a caregiver training-education program improve caregiver knowledge of sleep as assessed one-month post training when compared to a control group?

2) Will caregivers who receive additional specific, targeted information on sleep on a weekly basis, for a month, post the original training, show greater levels of retention of sleep knowledge compared to caregivers who only saw the brochure once, at the one-month assessment?

3) Does a caregiver training-education program change caregiver beliefs about their child’s sleep habits assessed immediately after the training when compared to a control group?

4) Does a caregiver training-education program change caregiver beliefs about their child’s sleep habits assessed one-month post training when compared to a control group?

5) Will any increase in caregiver knowledge of child sleep affect child sleep behavior when compared to a control group?
Chapter 2: Literature Review

The following chapter discusses the importance of sleep as it pertains to children, including the development of sleep patterns and implications for insufficient sleep. Additionally, caregiver knowledge of sleep and educational intervention studies are examined. The chapter concludes with a discussion of the rationale, research questions and hypotheses for the current study.

Importance of Sleep

Sleep is essential to life. According to the National Sleep Foundation (2013), sleep is critical in a person’s health and wellbeing. Sleep affects cognitive, physical, and emotional functioning, and the appropriate amount is needed to improve functioning in these domains (Gruber, 2013). During development, sleep is the primary activity that occurs to help a child grow. However, despite the importance of sleep, it was found that 25-30% of children and adolescents experience sleep problems (Mindell & Owens, 2003). Sleep problems can include insufficient sleep, poor quality, or non-restful sleep. The most common sleep problems during early childhood are multiple and prolonged night wakings (Sadeh, 2004). If not treated, night wakings issues can persist and can last into adulthood (Zuckerman, Stevenson, & Bailey, 1987). Night wakings and related sleep problems have been linked to behavior issues and difficult temperaments in children, which in turn can lead to issues in neurobehavioral functioning with older children (Sadeh, Gruber, & Raviv, 2002). Improper sleep can have a negative impact on learning and can lead to significant physical, mental, and behavioral problems (Lemola, Ledermann, & Friedman, 2013).
Sleep and Learning

Sleep is critical for learning and school performance (Dewald et al., 2010). Learning processes are regulated, in part, by the amount of sleep one receives. The body needs the proper amount of sleep in order to go through the necessary sleep cycles. All of the sleep stages, NREM and REM sleep, are linked to different aspects of memory (Curcio, Ferrara, & DeGennaro, 2006). Without proper sleep, short-term recall and working memory performances are weakened (Durmer & Dinges, 2005). Sleep consolidates cognitive performance, which is needed for executive functioning skills, such as abstract reasoning, goal-directed behavior, and creative processing (Dewald et al., 2010). Sleep issues during early childhood have been linked to an increased risk of learning issues (Stein et al., 2001). In addition, long-lasting sleep issues can have a negative effect on brain development with effects persisting into adulthood (Nelson & Bonuck, 2015).

Midday naps have been found beneficial for learning in preschool aged children. A study by Kurdzeil, Duclos and Spencer (2013) measured change in performance on a visual-spatial task after a nap or an equivalent interval of wake in preschool aged children. It was found that children who napped were able to remember 10% more than the children who were awake. The results were maintained after a full-night’s sleep, indicating the importance of napping and its effects on learning.

Sleep and Behavioral Functioning

For some, lack of sleep can cause hyperactivity and lack of focus (Thakkar, 2013). Children who display inattentive and hyperactive behavior are often associated with having attention-deficit/hyperactivity disorder (ADHD). However, the cause of these behaviors can sometimes be attributed to sleep problems (Chervin et al., 2002). Children, who have a form of
obstructive sleep-disordered breathing (SDB), such as sleep apnea or upper airway resistance syndrome, often display inattentive and hyperactive behaviors (Chervin et al., 2002). Treating the SDB has been shown to improve behavior and decrease the need for stimulant medication for ADHD (Chervin et al., 2002).

In a study by Kelly, Kelly, and Sacker (2013), over 10,000 parents were surveyed when their child was 9 months old, three years old, five years old and again at seven years old to examine the behavior of children who had either regular or non-regular bedtimes. It was found that parents who did not have regular bedtimes for their children had children with more behavioral issues when compared to children who had regular bedtimes. Introducing regular bedtimes at an early age, and giving parents tools to help, are critical for a child’s development and their behavior as they grow.

The sleep disorder, called periodic leg movements during sleep (PLMS), in which involuntary leg movements affects one’s ability to go to sleep or stay asleep, is rare in children but not those who fit the criteria for ADHD (Chervin, Archbold, Panahi, & Pituch, 2001). Parents often bring their children to the pediatricians for PLMS. This finding has significant implications in the diagnosis and treatment of ADHD. By helping cure the sleep disorder, or problem breathing during sleep, one can reduce the symptoms of ADHD and improve the child’s health, both mental and physical. It should be noted that in the Diagnostic and Statistical Manual of Mental Disorders (5th ed.; DSM–5; American Psychiatric Association, 2013) under the category of ADHD, sleep is not one of the criteria needed for a diagnosis. Since it is not needed for a diagnosis, practitioners might not ask about the child’s sleeping behaviors and patterns.

In addition to sleep problems being one possible cause of inattentive and hyperactive behavior, not receiving proper, restful sleep can negatively affect mood, behavior, and health.
Sleep and Physical Health

Many bodily systems are negatively impacted by lack of sleep (Brody, 2013), including the heart, lungs, and kidneys. All of these systems play a critical role in one’s appetite, metabolism, weight control, immune function, and disease resistance (Brody, 2013). Sleep has also been shown to affect sensitivity to pain, reaction time, mood, and brain function. In addition, there is a strong correlation between obesity and sleep duration (Taheri, Lin, Austin, Young, & Mignot, 2004). On a practical level, the more hours one is up, the more likely they are to eat. Metaphysically, metabolism is affected by a lack of sleep. It has been found that the level of the hormone, leptin, which notifies the brain that enough food has been consumed, is lowered when a person does not receive enough sleep (Brody, 2013). Because of the lower level of the hormone leptin, the hormone ghrelin, which increases appetite, becomes higher and the person feels like they need to eat, when in fact they do not, resulting in weight gain (Taheri, et al., 2004). Since the person is eating more than they should, their levels of glucose (sugar) increase, putting them at risk to develop Type-2 diabetes (Brody, 2013).

There is a strong link between poor sleep, specifically short sleep duration, and obesity. Anderson, Andridge, and Whitaker (2016) examined data from 977 children whose weekday bedtimes were recorded during preschool (mean age 4.7 years). Height and weight data were then collected when the children were adolescents (mean age 15 years). It was found that 10% of children who went to bed by 8 p.m. were obese in adolescents, compared to 23% of the children who went to bed after 9 p.m. The researchers adjusted for factors including socioeconomic status, maternal obesity and parenting style and found the same results; children who had early weekday bedtimes were at less risk of developing obesity in adolescence (almost
50% less). This study highlights the importance of early weekday bedtimes for preschool aged children and suggests that it can help to prevent obesity.

**Sleep and Emotional Health**

Insufficient sleep is a risk factor for many mental issues, especially depression and substance abuse (Brody, 2013). Sleep problems during childhood predicts an increase in anxiety/depression, inattention/over activity and aggression in adolescence (Gregory & O’Connor, 2002). Research has shown that sleep problems are associated with mood disorders and anxiety; however, it is hard to say if the sleep problem causes the mood disorder or vice versa (Smaldone et al., 2006). People with depression often describe somatic symptoms such as sleep problems and persistent sleepiness (Sharp & Lipsky, 2002). However, a study by Taylor, Lichstein, Durrence, Reidel, and Bush (2005) found that people who had insomnia (a condition in which one cannot sleep) had much higher levels of anxiety and depression when compared to people who did not suffer from insomnia.

**Development of Sleep Patterns**

**Newborns and infants (0 to 12 months)**

Sleep patterns and duration of sleep change over time. Circadian rhythms, or the sleep-wake cycle, are controlled by light and dark within a 24-hour day. Since these rhythms and patterns take time to develop, newborns have an irregular sleep schedule. In addition, sleep is the primary brain activity during early development (National Sleep Foundation, 2013). According to the American Academy of Sleep Medicine, for optimal health, infants four months to 12 months should sleep 12 to 16 hours per day, including naps (Paruthi et al., 2016). Newborns wake for one to three hours at a time before falling asleep again (National Sleep Foundation, 2013). Newborns sleep during the daytime and nighttime hours, sleeping for a variable amount
of time (Gruber, 2013). They are still developing their homeostatic timing systems, learning to
differentiate that light/daytime means wakefulness and darkness/nighttime indicates sleep. As
their circadian system develops between one month and twelve months, the amount of time spent
sleeping and waking increases (Gruber, 2013). By six to nine months old, an infant can sleep for
at least eight hours a night; however, napping still occurs during the infant stage and lasts
through age three to five (Gruber, 2013). Sleeping through the night (also referred to as
consolidation of sleep) typically emerges during a child’s first year of life (Sadeh, 2004).
However, several surveys have shown that sleeping through the night, does not occur for 20-30%
of all infants and toddlers (Sadeh, 2004). It has been found that frequent night waking and related
sleep problems are associated with difficult temperaments and behavior problems among
children (Zuckerman, Stevenson, & Bailey, 1987). Environmental and behavioral changes, such
as timing of light exposure, bedtime routines, and environmental cues associated with sleep and
wakefulness, and family habits can impact the child’s ability to fall asleep at the appropriate time
and to sleep through the night. Sleep that is consistently disjointed and causes several night
wakings are considered one of the predominant sleep problems in early childhood (Sadeh, 2004).

**Early childhood (12 months- 5 years of age)**

According to the American Academy of Sleep Medicine, for optimal health, children one
to two years of age should sleep 11 to 14 hours per day (including naps) on a regular basis
(Paruthi et al., 2016). Children three to five years of age should sleep 10 to 13 hours per day
(including naps) for optimal health (Paruthi et al., 2016). Receiving the appropriate amount of
sleep during early childhood promotes optimal development (Nelson & Bonuck, 2015). Daytime
napping declines and sleep becomes more consolidated during the nighttime (Gruber, 2013).
However, it has been shown that 20% of children wake up at least once every night and 50%
wake up during the night once a week (Acebo et al., 2005.). While waking up during the night is common, if a child cannot easily fall back asleep without the help of a caregiver, a sleep problem may become evident (Gruber, 2013). Developing the ability to self-soothe and fall back asleep independently occurs during early childhood and is an important milestone for each child to achieve (Gruber, 2013). As the child develops and their imagination broadens, children may experience nighttime fears and separation anxiety from caregivers (Gruber, 2013). Although nightmares are common among young children, children can recover quickly from a nightmare and go back to sleep (Thiedke, 2001).

**Caregiver Knowledge of Sleep**

Caregivers have a vital role in helping form healthy sleep habits (Mindell & Owens, 2003), as children are dependent on their parents throughout early childhood. In addition, if a child is having a problem with sleep, they will need their parents’ assistance to receive proper help. To ensure preschool aged children receive the optimal amount and quality of sleep, parent knowledge about sleep is a key factor.

According to health practitioner research, parent knowledge of sleep issues is one the foremost determinants of whether the child’s sleep issues will be addressed and treated. If parents do not know about healthy sleep patterns, they will be unable to recognize sleep issues in their children (Shreck & Richdale, 2011). McDowall et al., (2017) conducted a thorough literature review pertaining to parent knowledge or attitudes about sleep. The review examined studies that measured how much parents know about typical sleep in children, the symptoms associated with sleep problems, and how this knowledge was assessed. They also explored if there was a relationship between parental knowledge of sleep, parent education, child sleep problems, sleep duration, and sleep hygiene.
Using five electronic databases, McDowall et al. (2017) searched for articles up until July 2015 with key words related to parent knowledge and sleep. An initial search found 1,034 articles. The authors excluded any non-English articles and articles that assessed parental knowledge of sleep as related to early infancy and the prevention of sudden unexpected death. If any duplicate articles were found, the authors only included the study that had more detailed information. There were eight inclusion criteria that each article had to meet in order to be included in the study, such as published in a peer-reviewed journal, use of a measure of parent knowledge on sleep, and the studies had to have participants who were caregivers of children aged 1 month to 18 years. After a thorough search of literature and application of the inclusion and exclusion criteria, McDowall et al. (2017) identified only eight articles: seven published papers and one PhD dissertation.

After analyzing the eight articles, the authors found that overall parents have a poor knowledge of sleep in children. Parents that were more knowledgeable reported healthier sleep habits of their children. However, this knowledge did not necessarily result in longer sleep duration of their children. Parents appeared to have more knowledge of proper sleep hygiene and best practices during the day then sleep problems at night. Interventions to increase parental knowledge were effective but not long lasting (McDowall et al., 2017). Although all of the studies had measures, no study reported the technical properties of the scales. Four of the studies were descriptive studies and four studies included an educational intervention.

**Descriptive Studies**

Schreck and Richdale (2011) conducted a study to evaluate parental knowledge on sleep, examining whether parents know about the characteristics of sleep related to the age of child, developmentally appropriate sleep, and sleep problems. Parents of 170 children ages 2-17
participated in the study. The sample consisted of children with and without developmental
disabilities. Parents were recruited from various organizations, including early intervention
services, schools, and parent and child support groups via letter, email, or web in both Australia
and the United States. The researchers created their own 62-item questionnaire, called the
Parent’s Sleep Knowledge Inventory (PKSI), which was based on current literature on sleep and
covers all areas of sleep. The researchers used the B.E.A.R.S sleep domain, a sleep screening
algorithm, to form the questionnaire. It is a common screening tool for pediatric sleep problems
(Mindell & Owens, 2003). B.E.A.R.S stands for bedtime problems, excessive daytime
sleepiness, and awakenings during the night, regularity and duration of sleep and snoring
(Mindell & Owens, 2003). Parents in Australia filled out the questionnaire and mailed it back to
the researchers; in the United States, parents filled out the questionnaire online. Overall, the
study found that parent knowledge on pediatric sleep is poor. Parents with children across all
ages have poor knowledge on pediatric sleep patterns and sleep problems. However, knowledge
of sleep patterns in infancy was greater when compared to answers about sleep in early or middle
childhood. Results from this study reinforce the need for parent education on pediatric sleep.

In a study by Strocker and Shapiro (2007), the authors examined parental awareness and
knowledge of two specific issues related to sleep in children: pediatric obstructive sleep apnea
(OSA) and adenotonsillectomy. OSA is a common problem in children and can negatively affect
a child’s development and behavior (Strocker & Shapiro, 2007). Children who have OSA do not
typically display the same level of fatigue as adults who have OSA, thus making it difficult for
parents and/or doctors to recognize an issue. An adenotonsillectomy can help cure OSA and
involves the removal of the adenoids and tonsils. The authors analyzed data from the Harris
Interactive group, which conducted an independent online survey in April 2005 with 584 parents
in the United States (Strocker & Shapiro, 2007). Parents of children both over 18 and under 18 were divided into two groups; one group for parents whose children had received a tonsillectomy and one of whose children had not. The survey contained questions about pediatric knowledge of OSA, treatment with adenotonsillectomy, symptoms, and consequences of OSA.

The results of the survey found 95% of the parents recognized that OSA is a “serious condition” but only 15% believed they were knowledgeable about it. Very few parents knew of the effects of OSA or that it could be treated with an adenotonsillectomy. However, once parents found out that adenotonsillectomy can cure OSA, 82% reported that they would want their child to have the procedure (Strocker & Shapiro, 2007). These results indicate that there is a clear gap in parental knowledge about OSA and its treatment. Parental training and education is crucial in order to help identify OSA and treat it.

Owens and Jones (2011) investigated the associations between parental knowledge and beliefs on healthy sleep with sleep duration and practices in at-risk population. Children of color and children living in poverty are at a higher risk of receiving insufficient and poor-quality sleep (Owens & Jones, 2011). This risk could be contributed to cultural differences in attitudes and beliefs regarding the importance of sleep and sleep schedules. It was found that it is more likely that children of color and poor children have unhealthy sleep practices, such as late bedtimes and electronics in the bedroom (Owens & Jones, 2011). The authors used a convenience sample of parents of patients at a hospital-based pediatric primary care clinic located in an academic center. The center serves primarily serves children of color and children living in poverty. The participants were parents who all had at least one child aged 3 months to 12 years who attended the clinic for routine or sick visits. The parents were asked to fill out survey by research assistants in the waiting room of the clinic. The survey was created by the authors and asked
questions regarding child sleep habits, basic sleep knowledge and beliefs and attitudes regarding
sleep as a health behavior. A group of 141 parents in New York City participated in the
preliminary validation of the measure. Based on item analysis and feedback from participants,
the measure was revised for use in the primary care clinic (Owens, Jones, & Nash, 2011; Jones,
Owens, & Pham, 2012; Owens & Jones, 2011). One hundred and eighty-four surveys were
analyzed. The majority of the participants were Hispanic or Latino; 25%, were African American
and 20% were Caucasian. Although half of the participants had completed more than a high
school education, 43% less than high school education. The authors found no significant
difference between sleep habits, beliefs, and knowledge regarding children who were at the
clinic for well or sick visits.

The results of the study found many of the children did not have healthy sleep practices;
42% of the children did not have a regular bedtime, 43% had a bedtime that was later than 9
p.m., 76% of children had a television in their bedroom and 18% regularly drank caffeine. The
majority (76%) of the parents underestimated how much sleep their child needs and only 8% of
the parents believed that their child was not getting enough sleep. Most parents acknowledged
that there were negative effects from lack of sleep but were unable to correctly identify them; for
example, parents thought that being underweight was an effect of insufficient sleep, when in fact
it is the opposite. Parents also believed that snoring is a sign of healthy sleep, which in many
instances is not the case. It was found that children of parents who were more knowledgeable
about sleep knowledge displayed healthy sleep practices. The results from this study indicate a
need for parent education on healthy sleep practices, effects of insufficient sleep and sleep
problems in children, particularly targeted to the high-risk population. In addition to this
population being at-risk for unhealthy sleep practices, obesity is also a big issue and can be directly related to sleep.

Owens, Jones, and Nash (2011) conducted a study that examined caregivers’ knowledge, behavior, and attitudes regarding healthy sleep in young children. The researchers used the survey from the Owens and Jones (2011) study, as cited before. The study was conducted at the Children’s Museum of New York (CMOM) over two weekend days and caregivers of children aged 3 months to 12 years were asked to fill out a survey. It was convenient sample, with over 300 caregivers participating. Almost all had attended college and the majority were in the middle class. The results indicated that those caregivers who had better knowledge about child sleep were more likely to promote healthy sleep practices for their child, including proper bedtimes and removing electronic devices before bed. Caregivers who lacked sleep knowledge was correlated with unhealthy sleep practices and insufficient sleep in their children. These caregivers did not seem to know appropriate amounts of sleep required for children of different ages. The results from this study reinforce the need for caregiver education to promote healthy sleep practices, which will be beneficial for not only the child, but also the entire family. Owens, Jones and Nash (2011) noted that the research shows a strong connection between inadequate sleep and obesity. The authors propose that targeting the preschool-age population and their parents can have the potential to not only improve sleep habits but also help prevent obesity.

The findings from the descriptive studies showed that there is a lack of caregiver knowledge in healthy sleep habits and sleep issues. However, it was found that children whose caregivers did had child sleep knowledge had healthier sleep habits than those caregivers that did not. These findings indicate a need for caregiver intervention programs to help educate about healthy sleep practices.
Educational Intervention Studies

The four educational intervention studies cited in McDowell et al.’s paper (2017) examined different ways to improve parental sleep knowledge and whether that had an effect on child sleep behavior. A study by Jones, Owens and Pham (2012) found that parents who read a brochure on sleep in a doctor’s office increased their knowledge about children sleep. Jones, Owens and Pham (2012) recruited the participants of the study from an earlier study. In 2011, Owens and Jones used a convenience sample of parents of patients at a hospital-based pediatric primary care clinic located in an academic center, which serves a large minority population. The participants were parents with at least one child aged 3 months to 12 years who attended the clinic for routine or sick visits. Owens, Jones and Pham (2012) study consisted of 95 parents who went to the hospital based pediatric clinic. Parents were asked to complete two surveys, one before reading the brochure and one right after reading it. The survey evaluated sleep habits (before the intervention) and parental knowledge and beliefs about sleep (pre- and post-intervention). The results showed that not only did the parents increase in knowledge, but also the parents indicated that they were going to change their child’s sleep habits. This shows that by just reading about sleep, can increase parental knowledge on sleep and potentially improve sleep habits. However, it is unclear whether this increase in knowledge was long-lasting or if it had a positive impact on child sleep behavior.

Wilson et al. (2014) conducted a sleep education program for low-income preschool children and their families. According to Wilson et al. (2014) prior to their study, there had been no published study exploring the effects of a sleep education program on the sleep of preschool-aged children. The study took place in Head Start programs in two different cities in Michigan (one predominately Caucasian rural city and a predominantly African American urban city).
Participants consisted of students who attended Head Start programs and their parents. The only requirement for parents was that they had to be proficient in English. The one exclusion criterion was that a child could not be in foster care. There were 152 parent participants, which were divided into two groups: the active treatment group and the delayed treatment group (which functioned as the control group). Both groups were given surveys pre-and post-treatment (immediately after and then again at one month) that assessed parent knowledge, attitudes, self-efficacy, and beliefs on sleep. The 26-item survey was created by the authors and was piloted with 104 families in a comparable Head Start sample. In addition, parents were asked to keep a seven-day diary on their child’s sleep habits before the parent meeting and then again at one month. Sleep and wake times were recorded and then averaged. The authors only focused on bedtime and sleep duration during the week, as it tends to be more consistent and the impact of weekday sleep has a greater effect on classroom performance.

In the active treatment group, parents and teachers were given a 45-minute presentation that covered many different aspects of sleep, including best practices for sleep, the importance of sleep and consequences of poor sleep. Teachers then taught, over the course of two weeks, about sleep to their preschool students (ages 2.9-5.2). Materials were sent home with the children to promote a healthy bedtime routine. Materials included a bedtime chart, book, blanket, toothbrush, and toothpaste. In the delayed intervention group, parents were given a choice of attending a program on nutrition or a regularly scheduled parent meeting. The children did not receive the classroom intervention during the study. At the conclusion of the study, families were invited to attend the parent program on sleep and have their children participate in the two-week curriculum. At one-month post-intervention, parents were again asked to complete a seven-day diary on their children’s sleep habits and complete a survey. Results from the study showed that
both the delayed and active treatment groups increased their knowledge, with the active group showing a slightly larger increase. However, these results were not maintained at the one-month post-intervention follow-up. The children in the active intervention group did show an increase of sleep duration by 30 minutes, but this increase was not maintained after one month, nor was it connected with changes in parental knowledge on sleep.

The Wilson et al. (2014) study shows that educational interventions conducted in early childhood can have a positive effect on parental knowledge, attitudes, and self-efficacy on sleep and sleep behavior, however, parents and children might need more exposure to the information in order for it to have a long-lasting effect (Wilson et al. 2014). In addition, Wilson et al.’s (2014) study highlights the need for more studies to be done with preschool aged children regarding sleep. Research has demonstrated the importance of establishing healthy sleep practices in early childhood (Nelson & Bonuck, 2015) and training programs such as Wilson et al.’s (2014) can help facilitate good sleep habits.

Stores and Stores (2004) conducted a behavioral intervention on sleep for parents who have children diagnosed with Down syndrome. The study included only children younger than five but over 6 months of age, as these children would be in the early stages of a sleep problem (if applicable) and could benefit greatly from an intervention. Both parental reports and objective measures on sleep were used before and after the intervention to assess sleep patterns. Parents were randomized to be in either a control group or instruction group, in which advice was given to mothers on sleep. Mothers in the instruction group were given an instruction package, based on behavioral principles on sleep. An instruction session was given that presented on sleep hygiene and sleep problems. Behavioral techniques were provided to help promote good sleeping habits. In addition, the instruction session included a discussion period in which mothers could
converse on experiences and any problems. Knowledge on sleep was assessed before and after the intervention (at 1- and 6-month follow-ups), using the Knowledge of the Sleep of Young Children Questionnaire (Quine, 1997), as well as the Knowledge of Behavioral Principles as Applied to Children Questionnaire (Furtkamp et al., 1982). In addition, actigraphy, an objective measure of sleep, was used to determine if the intervention had an effect on sleep duration. This involved attaching a small wristwatch type device to the children to measure movement during sleep.

Results indicated an increase of knowledge after the educational intervention; however, no significant differences were found for sleep of the children. At a six-month follow up, the increased knowledge was maintained, and it led to an improvement in behavioral sleep problem ratings. However, sleep-related problems did not seem to improve. This study shows that while interventions can improve knowledge and awareness of sleep issues, this does not necessarily translate to improved sleep in children.

In her dissertation, Turner (2013) conducted a follow-up study to determine how well parents were able to maintain knowledge and behavior principles and procedures in sleep routines 6-12 months after a randomized controlled trial. The trial compared the efficacy of two different types of educational sleep programs geared towards parents of children with autism. The first program was focused on behavior principles related to sleep (called BPT). The second one was a psycho-education program that consisted of five workshops related to parenting children with autism (referred to as PE). Turner (2013) recruited 20 parents from the trial: 10 were in the BPT group and the other 10 were in the PE group. All of the parents had a child between the ages of two and seven who had a diagnosis of Autism Spectrum Disorder (ASD) and a history of sleep disturbances (which was defined as having experienced any of the following
over the course of four consecutive weeks: bedtime resistance; delayed sleep onset; sleep association problems; nighttime wakings; and morning wakings). Turner used four different assessments and conducted interviews to assess how well the parents were able to maintain knowledge and behavioral principles on sleep routines. The first assessment was created by Turner and assessed knowledge of sleep problems and behavioral principles. Turner (2013) used the Modified Simonds and Parraga Sleep Questionnaire (MSPSQ) to assess sleep behavior (Simonds & Parraga, 1982). The other two measures were parent-rating scales on stress.

Results from the study found that both the knowledge scores in the BPT and PE group increased, with the BPT group demonstrating a slightly higher score. However, the difference between groups was not significant. These scores were not maintained 6-12 months after the trial had ended. In addition, there was no relation found between parental knowledge and child sleep behavior, indicating that the behavioral strategies taught to the parents were not effective in creating a change in their child’s sleep.

**Post-intervention follow-up**

Three out of the four intervention studies conducted follow-up studies to determine whether the intervention had any lasting effects on sleep knowledge and/or duration. Stores and Stores (2004) conducted follow-ups at one-month post intervention and then again at six months. Wilson et al. (2014) follow-up with their participants one-month post intervention. Turner’s (2013) study conducted follow-ups six- and 12-months post-intervention. It should be noted that no explanation was given as to how researchers picked the time frame. All of the studies used a version of the pre-intervention survey given to the participants.

These three studies (i.e., Stores & Stores, 2004; Wilson et. al., 2014; and Turner, 2013) all involved interventions that required a lot of time and for the parents to attend the intervention
in person. While there is value in this, given the technology available today, it is worthwhile to pursue an intervention program online, to see if any of the results can be improved upon. Wilson et. al (2014) commented that more exposure to the information might be needed in order for the intervention to have a long-lasting effect. Conducting a study including repeated exposure to sleep information could help increase and maintain sleep knowledge, as well as impact child sleep behavior.

Measures

**Measures of Parental Sleep Knowledge**

All of the studies in McDowall et al.’s (2017) review used a measure to assess sleep knowledge. Only three of the studies used measures that assessed changes in sleep duration in children.

Table 1 is adapted from McDowall et al.’s (2017) article and outlines each sleep knowledge measure and how they were developed.
Table 1

**Sleep knowledge measures**

<table>
<thead>
<tr>
<th>Authors</th>
<th>Measure Title</th>
<th>Measure Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>Owens, Jones, and Nash (2011)</td>
<td><em>Parental Knowledge of Healthy Sleep in Children</em> (adapted from Owens &amp; Jones, 2011)</td>
<td>Created by authors; piloted with 141 parents visiting a community museum.</td>
</tr>
<tr>
<td>Owens and Jones (2011)</td>
<td><em>Parental Knowledge of Healthy Sleep in Children</em> (adapted from Owens &amp; Jones, 2011)</td>
<td>Created by authors; piloted with 141 parents visiting a community museum.</td>
</tr>
<tr>
<td>Schreck and Richdale (2011)</td>
<td><em>Parents’ Sleep Knowledge Inventory (PSKI)</em></td>
<td>Created by authors, consulted current literature on sleep.</td>
</tr>
<tr>
<td>Strocker and Shapiro (2007)</td>
<td><em>Harris Interactive Group Survey</em></td>
<td>Not described</td>
</tr>
<tr>
<td>Wilson et al. (2014)</td>
<td><em>Parent Knowledge, Attitudes, Self-Efficacy, and Beliefs about Sleep (KSAB)</em></td>
<td>Created by authors, piloted with 104 families with similar backgrounds to sample.</td>
</tr>
<tr>
<td>Turner (2013)</td>
<td><em>Knowledge of Behavioral Principles</em></td>
<td>Created for the current study</td>
</tr>
<tr>
<td>Jones, Owens and Pham (2012)</td>
<td><em>Parental Knowledge of Healthy Sleep in Children</em> (adapted from Owens &amp; Jones, 2011)</td>
<td>Created by authors; piloted with 141 parents visiting a community museum.</td>
</tr>
</tbody>
</table>

Most of the measures were created by the authors of the study and no psychometric properties were listed. The *Parental Knowledge of Healthy Sleep in Children* survey has been used in three different studies (Owens, Jones, & Nash, 2011; Jones, Owens, & Pham, 2012; Owens & Jones, 2011). The survey is based on healthy sleep habits and includes three sections that ask about child sleep habits, beliefs, and knowledge regarding sleep as a health behavior. The sleep beliefs section asks parents if their child gets enough sleep, has healthy sleep habits and if they plan on making any changes in relation to their child’s sleep such as reducing caffeine, removing electronics from the bedroom and/or changing bedtimes.
The content of the items was the same across the three Owen et. al studies; the only difference was the number of items in each section of the survey. In addition, parents are asked if their child gets enough sleep, how much sleep their child needs, and whether their children have healthy sleep habits.

**Measures of Child Sleep Duration**

The use of either an objective or subjective measure of sleep duration can be helpful in determining treatment effects following an intervention. In the majority of the literature on sleep, sleep duration is measured in two different ways: either by actigraphy, which is an objective measure of sleep, and/or a sleep diary, which is a subjective measure of sleep. Actigraphy involves attaching a small wristwatch type device to a child, which automatically measures movement during sleep (Stores & Stores, 2004). Sleep diaries involves recording of wake and sleep times, typically for at least one week. In the Wilson et al. (2014) study, parents were asked to record the time their child “fell asleep” and “woke up” for seven days prior to the intervention and then again one-month post. Turner (2013) and Stores and Stores (2004) used a questionnaire developed by Simonds and Parraga (1982). The questionnaire asks about different parts of sleep in children.

**Pilot Study**

As research has shown, preschool age is a critical time to establish best sleeping practices. Receiving the appropriate amount sleep during early childhood promotes optimal development (Nelson & Bonuck, 2015). Parental sleep knowledge is one way to ensure children are receiving proper sleep however there appears to be gap in the literature about parent trainings geared towards parents of preschool aged children (Wilson et al., 2014).
A pilot study (Levine-Cohen, 2015) was conducted to examine whether a parent training can increase awareness and knowledge of best sleep practices and related sleep issues to parents of preschool aged children (ages three to five). The study examined the effectiveness of a parent training in the form of a presentation. The training was targeted to teach parents of preschool aged children (age three to five) about sleep hygiene and issues related to sleep. The study focused on two important aspects of sleep: sleep hygiene and issues that are related to sleep. It was hypothesized that the presentation would increase knowledge and awareness in sleep and related issues.

The study consisted of nineteen parents who all sent their children to an early childhood center in New York City. All participants received a background survey that sought demographic information prior to the intervention (see Appendix A, Part III). The survey revealed that all parents had at least one child around age three to five years old. The majority of the participants identified as either African American (27.7%) or Hispanic (27.8%) and reported earning a low-income (average less than $29,000/per year). The mean age of the participants was 27.12 years, ranging from 20 to 39 years.

The study took place during the early childhood center’s orientation for preschool in August 2015. Parents were asked to come to the presentation as part of the orientation. The design of the study was a pretest-intervention-posttest. The format of the study was based on a dissertation by Danielle Guttman (2014) that investigated different forms of professional development seminars targeted to increase teachers’ awareness of internalizing disorders in early childhood.

The measures for the pilot study consisted of a pretest (see Appendix A) and an identical posttest (see Appendix B), that were in the form of a questionnaire with two parts.
Part 1 consisted of ten multiple choice questions about best practices for sleep. The content of these questions was based on a handout from Seattle Children’s’ Hospital (2011) that listed best practices for sleep. There was one correct answer for each question and the number of correct answers was totaled for both the pre- and posttest respectively.

The second part of the questionnaire was used to determine how much parents know about the effects that poor sleep can have on children. This part of the questionnaire was in the form of vignettes, which described children with different emotional and physical issues. These vignettes were adapted for preschool aged children from the Infant Sleep Vignettes Interpretation Scale (ISVIS), which asked parents to rate his or her agreement about approaches for addressing sleep problems with infants (Sadeh, et al., 2007). Each vignette entailed three competing response descriptions to which parents had to rate their agreement. Participants’ answers were compared from pre- to post test to determine if their attitude changed. The pre-presentation questionnaire formed the pretest data to establish a baseline of the parents’ knowledge and awareness of sleep and its effects.

The intervention consisted of a thirty-minute presentation about sleep based on information from the National Sleep Foundation and literature on sleep. The presentation discussed the importance of sleep and how sleep impacts a child’s mental, physical, and emotional health. The presentation also included best practices for sleep; tips to help parents during bedtime and ways to ensure the child receives the appropriate amount of sleep.

Following the parent training, the participants filled out post-presentation questionnaire, which formed the posttest data. Each parent received a copy of the presentation and a handout from a local library listing different sleep resources.
Overall, the presentation was effective in teaching parents of preschool aged children about sleep hygiene. A paired t-test was performed on part one of the questionnaire to compare participants’ mean test scores before and after the presentation to determine if parents’ scores increased. The results indicated that the means did increase from before the presentation ($M=5.47, SD=2.87$) to after the presentation ($M=6.84, SD=2.12$). The t-test indicated that this difference was significant $t (19) =2.895, p=.01$. This implies that a parent training, consisting of a short presentation and a handout of different resources, could be an effective way to teach parents about different topics related to children. In addition, during the presentation, parents asked the presenter about different sleep situations that arose in their own home and how best to deal with them. Allowing parents to ask questions and interact with the presenter during the presentation could be another reason the parents were able to learn, and retain information, about sleep hygiene.

Data were not analyzed for part two of the questionnaire, the vignettes, because only a few participants circled answers for all three statements in each question. Furthermore, among those that did respond to all three statements per question, they often circled the same answers for each statement. Therefore, it appeared they did not understand the directions. Hence inferential statistics were not run.

Overall, the presentation was helpful in increasing parental knowledge on best sleep practices. During the presentation, parents were engaged and seemed eager to learn about sleep and how to help their child with sleep. These results demonstrate the value of a parent training regarding sleep, particularly for children in early childhood. The lessons learned during a parent training can help ensure optimal development for preschool aged children. However, research has demonstrated that the knowledge gained during a parent training is not maintained after the
intervention. Teaching caregivers about children’s sleep is only useful if the knowledge is retained and put into practice. The pilot study (Levine-Cohen, 2015) did not conduct any post-intervention follow-up. It is not known whether the caregivers retained any of the knowledge gained from the presentation. The current dissertation conducted a long-term follow-up post-intervention to assess whether any sleep knowledge gained was retained. It also introduced an additional form of caregiver training to see if such enhanced training would lead to greater gains in caretaker knowledge.

**Rationale and Research Questions**

Establishing healthy sleep practices in early childhood is shown to aid in healthy development (Nelson & Bonuck, 2015). Poor sleep can cause problems in all areas of functioning: behaviorally, academically, physically, and emotionally (Gruber, 2013). As pediatricians may not always be adequately trained to screen for sleep problems, it is important that parents have knowledge about child sleep and are reliable observers and reporters of their child’s sleep habits (McDowell et al., 2017).

The prior literature leaves certain questions still very much unaddressed and these will be addressed in the dissertation research. While some prior research has shown parent trainings to have some impact on enhancing their knowledge about child sleep (McDowell et al., 2017), to the little extent that there has been any study of maintenance of knowledge, lack of maintenance has been found. Nor has any increase in parental knowledge been shown to affect child sleep behavior. Moreover, most of the prior research is unilluminating as to these issues with typically developing, middle-income preschoolers who might be considered a baseline population, as prior studied samples include special child populations. To date, the few studies that have been
conducted have been with either low-income (Wilson et al., 2014) or atypically developing populations (Stores & Stores, 2004; Turner, 2013).

Hence it seems important to revisit these issues of caregiver training, maintenance of any training effects, and effects, if any, of parental training on child sleep with a population of middle-income, typically developing preschoolers, to see if results will vary.

As noted in the Introduction, the proposed study addressed gaps in the literature in a variety of ways. It included a more typically developing sample of children, comparison groups varying in terms of the degree of the intervention experienced to enhance caretaker knowledge, a long-term follow-up to assess maintenance of any intervention effects, and a measure of child sleep duration.

The current study also builds on prior research in being able to utilize, as a primary measure, a survey already developed. This measure is the Parental Knowledge of Healthy Sleep in Children survey used by Owens et al. (2011) and Jones et al (2012). This measure not only assesses parental knowledge about child sleep, but also assesses parental beliefs about their own child’s sleep behavior and potential changes in caretaker practices around their child sleep. It also includes a survey to gather demographic and sleep habit information. The advantages of using this measure is that it is easy to administer, is not time consuming and can be completed by parents with a wide range of educational backgrounds (McDowall et al., 2017). The measure is as comprehensive as any other prior measure. In addition, this measure responded to change after educational interventions.

The goal of the study was to examine whether a caregiver intervention (in the form of an online brochure and repeated pointers to the brochure, respectively) can increase caregiver sleep knowledge, change caretaker beliefs about the sleep of their own children, and affect child sleep
duration. Assessments of such were completed prior to and subsequent to (at one week and one month after the pretest) the intervention. The effect of the intervention was assessed across two experimental groups, who experienced the intervention, and a control group that did not.

As noted in the Introduction, the research questions were:

1a) Does a caregiver education program improve caregiver knowledge of sleep as assessed immediately after the training when compared to a control group?

1b) Does a caregiver education program improve caregiver knowledge of sleep as assessed one-month post training when compared to a control group?

2) Will caregivers who receive additional specific, targeted information on sleep on a weekly basis, for a month, post the original intervention, show greater levels of retention of sleep knowledge compared to caregivers who only saw the brochure once, at the one-month assessment?

3) Does a caregiver education program change caregiver beliefs about their child’s sleep habits assessed immediately after the intervention when compared to a control group?

4) Does a caregiver education program change caregiver beliefs about their child’s sleep habits assessed one-month post intervention when compared to a control group?

5) Will any increase in caregiver knowledge of child sleep affect child sleep behavior when compared to a control group?

The hypotheses for the current study were:

**H1:** The caregiver education program will improve caregivers’ knowledge on sleep as assessed immediately after the intervention, in both experimental groups when compared to the control group.
**H2:** The caregiver intervention will improve caregivers’ knowledge on sleep as assessed one-month post intervention, in both experimental groups when compared to the control group.

**H3:** Caregivers who received additional specific, targeted information on sleep on a weekly basis post the original intervention (experimental group 2), will be more knowledgeable on children’s sleep 1-month post follow up compared to caregivers who saw the brochure once (experimental group 1).

**H4:** The caregiver intervention will change caregiver beliefs about their child’s sleep assessed immediately after the intervention in both experimental groups when compared to the control group.

**H5:** The caregiver intervention will change caregiver beliefs about their child’s sleep assessed one-month post intervention in both experimental groups when compared to the control group.

**H6:** Caregivers who received additional specific, targeted information on sleep on a weekly basis post the original intervention (experimental group 2), will show greater change in beliefs about their own child’s sleep at 1-month post follow up compared to caregivers who saw the brochure once (experimental group 1).

**H7:** Caregiver knowledge of child sleep will have a positive effect on child sleep behavior itself, when compared to the control group. However, the effects will be greater in experimental group two.
Chapter 3: Methods

This chapter describes the methodology of the current study which examined the effectiveness of a caregiver intervention and whether it can increase caregiver sleep knowledge, change caretaker beliefs about their own child’s sleep behavior, and improve child sleep duration.

Participants

Participants were recruited through local early childhood centers, caregiver groups, and schools via their email listservs. In addition, recruitment occurred via online parent groups on Facebook and Yahoo. The email solicitation had a link to Qualtrics, an online survey tool, that led participants to the study’s homepage (see Appendix C). The study was advertised as an opportunity to learn about sleep for preschool aged children. The stated benefits for participation were the potential knowledge gained via reading an informational online brochure on sleep.

A total of 98 participants gave consent for the study and filled out the first survey. However, 36 participants were excluded from study analysis. Of those excluded, two withdrew during the study, two submitted a consent form and survey after data collection had stopped, three were caretakers of children with a disability, and one was excluded because his/her child was above age five. An additional twenty-eight participants were excluded because they did not complete the first/immediate posttest measure (administered one week after the pretest). Participants who filled out the first/immediate posttest but did not fill out the delayed posttest and/or the sleep diaries, were included in the study. Therefore, sixty-two participants were included in the study and data analysis.
**Measures**

For the current study, two measures were used: one to detect change in parental sleep knowledge and one to assess change in child sleep duration. To assess parental sleep knowledge, the *Parental Knowledge of Healthy Sleep in Children* survey (Owens, Jones & Nash, 2011; Jones, Owens, Pham, 2012) was used. A group of 141 parents in New York City participated in the preliminary validation of the measure (Owens et al., 2011). Based on item analysis and feedback from participants, the measure was revised to the current version which has been used in several studies (Owens et al., 2011, 2011; Jones et al., 2012; Owens & Jones, 2011).

The *Parental Knowledge of Healthy Sleep in Children* survey is comprised of a pre-intervention survey (see Appendix D) and a post-intervention survey (see Appendix E). The pre-intervention survey contains four sections that query the following, respectively: background information (8 items), child sleep habits (12 items), parental sleep health beliefs (4 items), and parental sleep knowledge (10 items). For the purpose of this study, one of the knowledge questions was eliminated as it dealt with sleep habits of children age 6-12 and this study recruited caregivers with children ages two to five only. In addition, only 11 sleep habit questions were used as one of these was inadvertently omitted when the survey was being formatted for Qualtrics.

The background information section contains eight demographic questions on caretaker participants’ age, relationship to child, highest level of education, racial/ethnic background, zip code, child date of birth, child gender, and ages of other children living in the house.

The child sleep habits section asked caregivers to estimate how much sleep their child needs and to record child sleep and wake times during the week and weekend, usual daily nap duration, and frequency of certain bedtime habits. The 4-part section on sleep beliefs asked
caregivers to rate, on a three-point scale (agree, neither agree nor disagree, disagree), whether their child receives enough sleep (Q1), has healthy sleep habits (Q2), whether they plan on changing anything about their child’s current sleep habits (Q3A), and, if yes to Q3, to record a checkmark next to those items, among the list of items presented, that they planned to change (Q3B). The last section, on sleep knowledge, consists of nine statements about various facts pertaining to children’s sleep and healthy sleep habits. Caregivers were asked to select whether they think the statement is “true”, “false”, or “do not know.” The post intervention survey is identical to the pre-intervention survey but excludes the background and sleep habits sections.

The second measure was a sleep diary as used in Wilson et al.’s study (2014). This measure was to assess changes in child sleep duration. It required that caregivers fill out a form listing child wake and sleep times each day for seven days (see Appendix F). The sleep diary was administrated twice: once after the pretest and then again with the delayed posttest (which was given one-month after the intervention). Since the sleep diary took seven days to fill out, it was thought to be too burdensome to ask the participants to complete the sleep diary as part of the immediate posttest as having already done one for the pretest.

**Design**

The study was an intervention study with three conditions: two experimental groups that received an intervention to improve caregiver knowledge about child sleep, and a control group that did not. The two intervention groups included a “brochure only” and a “brochure plus email follow-up.”

All participants were randomly assigned via an excel formula to one of the three groups: intervention condition 1, intervention condition 2, control condition. There were 20 participants in the control group, 22 participants in intervention group 1, and 20 participants in intervention
group 2. Significant attrition occurred by the time of the delayed posttest (sent one month after
the pretest), leaving twenty-nine participants distributed as follows: eight in the control group, 12
in intervention group 1, and nine in intervention group 2. Fifty-seven participants filled out the
first sleep diary as part of pre-testing. However only 13 completed all seven days. Of those 57
participants who filled out the first sleep diary, 36 filled out the sleep diary one month after the
first one. Only nine of these 36 participants filled out all seven days for the second sleep diary.

Procedures

As noted, the study took place online via, Qualtrics, which is an online survey tool that
allows you to create surveys and track responses. A link was generated for each survey. When
participants clicked on the link for the study, they were asked to fill out an informed consent
form and complete the pre-test survey (Appendix D) on their computer. Once informed consent
was obtained, and if they qualified for the study based on screening responses to the pretest
survey (e.g., excluding children with disabilities and children of the wrong age range), they were
asked to fill out a sleep diary for seven days. Once the seven days had elapsed, they were
randomly sorted into one of the three experimental conditions.

Participants in the two intervention groups experienced the intervention in which they
were given a link to a WordPress website that had the Healthy Sleep Brochure, created by Judith
Owens and Brian Pham for their 2012 study (Jones, Owens, & Pham, 2012; Appendix G). The
brochure was created based on information from the National Sleep recommendations regarding
healthy children’s sleep. There are three key objectives covered in the brochure: (1) to discuss
the importance of sleep and possible consequences of poor sleep; (2) recommended sleep
amounts for preschool aged children; (3) healthy sleep habits and behaviors. The brochure is
visually appealing and accessible at a sixth-grade reading level.
The “brochure plus email group,” (i.e., Intervention Group 2) also received a weekly email with a link to the brochure.

The control group was given access to the information shared during the intervention at the study’s conclusion, so as to not exclude them from receiving potentially helpful information.

Once the intervention was complete, the Post-Intervention Measures were administered.

The Parental Knowledge of Healthy Sleep in Children survey was administered to participants in both intervention groups immediately after reading the brochure and again at one-month post intervention. The intervention groups filled out a sleep diary once after the pretest and then again with the delayed posttest (which was given one-month after the intervention).

The control group did not get access to the brochure, nor the follow-up email reminders. However, they were administered all measures. They filled-out the pretest survey in addition to the sleep diary at the time of the pretest. They received the other two measures – post-test survey and sleep diary – at the same time interval that the intervention groups received these measures.

At the conclusion of the study, the caregivers in the control group were emailed the link to the brochure.

**Confidentiality of Participants**

To ensure confidentiality, only participants’ email addresses were used to track responses. To maintain confidentiality, only the PI and the research assistant had access to the Qualtrics account. Only the PI sent out emails from her secure graduate school account. Once data collection was complete, all participants were assigned a number (1-62) to identify them for analysis purposes.
Chapter 4: Results

The purpose of the present study was to examine the effectiveness of two different forms of caregiver intervention ("brochure only" and "brochure and email follow-up") on caregiver sleep knowledge and beliefs, and on child sleep. Prior to the intervention, some demographic information on caretaker and child participants was solicited in a pre-test survey. In addition, background information on the sleep habits of the children in the study was elicited from caretakers in the pretest survey. To assess whether or not the intervention had an effect on participating caregivers, caregiver knowledge about child sleep and beliefs about their own child’s sleep was assessed at three points in time: pretest (prior to the intervention), immediate posttest (given one-week after the pretest), and delayed posttest (given one-month after the pretest). In addition, to ascertain whether any potential gains in knowledge about sleep acquired by caregivers during the intervention affected child sleep, caregivers were asked to fill out a sleep diary, pre- and post-intervention that recorded hours of child sleep. This chapter presents the findings from the present study.

Demographic Characteristics of Caregivers and Children

Based on the background survey (Part 1 of the Parental Knowledge of Healthy Sleep in Children survey), demographic information on caretaker and child participants was obtained. Table 2 describes the demographics of the caretaker participants included in the data analysis. Gender, education level, ethnicity, age and relationship to child are reported. The majority of the participants identified as mothers (92%), female (92%), White/Caucasian (98.4%), and all participants had more than a high school education (100%). Five participants identified as male (8%) and fathers (8%).
Table 2

Demographic Information for Participants: Caregivers

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Female</td>
<td>57</td>
<td>92</td>
</tr>
<tr>
<td>Education Level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than high school</td>
<td>62</td>
<td>100</td>
</tr>
<tr>
<td>High school or less</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White/Caucasian</td>
<td>61</td>
<td>98.4</td>
</tr>
<tr>
<td>Multiracial</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>Asian</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Native Hawaiian/Pacific</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-29</td>
<td>10</td>
<td>16</td>
</tr>
<tr>
<td>30-34</td>
<td>23</td>
<td>37</td>
</tr>
<tr>
<td>35-39</td>
<td>16</td>
<td>26</td>
</tr>
<tr>
<td>40 and up</td>
<td>12</td>
<td>19</td>
</tr>
<tr>
<td>Other (age 4)</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>Relationship to the child</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother</td>
<td>57</td>
<td>92</td>
</tr>
<tr>
<td>Father</td>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>

Note: N=62

Table 3 shows the characteristics of the children in the study (that is, for whom caretaker pre-test and post-test data are available and for whom caretakers reported on). As noted, there was a total of 62 children included in the data analysis. The gender of the children was evenly divided between males (50%) and females (50%). Children ranged in age between 2-5 years.
Although this was a wide age range for a study of child sleep behavior, the preponderance of the sample was between 2-4 years of age, with the great majority (71%) aged 3-4 years.

Table 3

Demographic Information for Participants: Children

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>31</td>
<td>50</td>
</tr>
<tr>
<td>Female</td>
<td>31</td>
<td>50</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 years old</td>
<td>16</td>
<td>25.8</td>
</tr>
<tr>
<td>3 years old</td>
<td>23</td>
<td>37</td>
</tr>
<tr>
<td>4 years old</td>
<td>21</td>
<td>33.8</td>
</tr>
<tr>
<td>5 years old</td>
<td>2</td>
<td>3.2</td>
</tr>
<tr>
<td>Other children living in the house</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>16</td>
<td>25.8</td>
</tr>
<tr>
<td>At least one</td>
<td>46</td>
<td>74.2</td>
</tr>
</tbody>
</table>

Note: N=62

Children’s Sleep Habits

The pretest survey asked caregivers eleven questions about their children’s sleep habits. The results of this survey are presented in Table 4. For some questions, if the proportion of responses across all three groups was less than 80%, responses were broken down by group to determine if there were any significant differences between the three groups. This applied to questions four, five and seven.

For question 1, on how much sleep preschool children need, 92% of the sample responded either 10-12 hours or 13-15 hours. According to the National Sleep Foundation (2013) and cited in the intervention brochure, between 10 and 15 hours is the appropriate range of sleep for children ages 2-5. This indicates that most of the sample answered this question correctly.

Across all three groups, almost all of the children were reported to have a regular bedtime during the week (97%) and during the weekend (90%). Most of the children also had a regular wake
time (84%). In addition, 95% reported to have a regular bedtime routine, with 87% having reading as part of this routine, and only 18% having TV included. None of the children sampled had a TV, cell phone or computer in their bedroom and almost none drank caffeine during the day. These latter findings are to be expected for the age range of the children sampled (ages 2-5 years old).

There did appear to be group differences in other sleep habit variables. For regular wake time on the weekends, 90% of the control group children were reported to have such, whereas only 50% of the children in Experimental Group 2 were reported to have such. In addition, there was a 20% difference between the two experimental groups in never having an adult present in the room, with 45% of Experimental Group 1 never having an adult in the room, with 65% of Experimental Group 2 never having an adult in the room.

Table 4

*Children’s Sleep Habits (from Pretest Survey)*

<table>
<thead>
<tr>
<th>Sleep Habit Question</th>
<th>Proportion of responses (%) (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. How much sleep does the average child this age need in 24 hours</td>
<td>8-9 hours 6 (4) 10-12 hours 48 (30) 13-15 hours 44 (27) Missing 2 (1)</td>
</tr>
<tr>
<td>2. Does your child have a regular bedtime?</td>
<td>Weeknights Yes 97 (60) No 3 (2) Weekend nights Yes 90 (56) No 10 (6)</td>
</tr>
<tr>
<td>3. What time does your child usually go to bed?</td>
<td>Weeknights (pm) 6:30-7:30 52 (32) 7:35-8:30 42 (26) 8:35-9:30 6 (4) Weekend nights (pm) 6:30-7:30 39 (24) 7:35-8:30 50 (31) 8:35-9:30 11 (7)</td>
</tr>
</tbody>
</table>
4. Does your child have a regular wake time

<table>
<thead>
<tr>
<th></th>
<th>Weekdays</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>84 (52)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>16 (10)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Weekend days</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Group (n=20)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>90 (18)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>10 (2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimental Group 1 (n=22)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>73 (16)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>23 (5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>9 (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimental Group 2 (n=20)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>50 (10)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>50 (10)</td>
<td></td>
</tr>
</tbody>
</table>

5. What time does your child usually wake up?

<table>
<thead>
<tr>
<th></th>
<th>Weekdays (am)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5-6</td>
<td>15 (9)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6:05-7:00</td>
<td>61 (38)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7:05-8:00</td>
<td>21 (13)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8:05-9:00</td>
<td>2 (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>2 (1)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Weekend days (am)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5-6</td>
<td>6 (4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>6:05-7:00</td>
<td>56 (35)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>7:05-8:00</td>
<td>34 (21)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>8:05-9:00</td>
<td>2 (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>2 (1)</td>
<td></td>
</tr>
</tbody>
</table>

6. On average, what is the total time that your child naps each day?

<table>
<thead>
<tr>
<th></th>
<th>Hours:</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>45 (27)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>.5</td>
<td>2 (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1-2</td>
<td>45 (27)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.1-3</td>
<td>8 (5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.1-4</td>
<td>2 (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Missing</td>
<td>2 (1)</td>
<td></td>
</tr>
</tbody>
</table>

7. How many nights per week are you or another adult present in the room when your child falls asleep?

<table>
<thead>
<tr>
<th></th>
<th>Every night or almost every night</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control Group</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimental Group 1</td>
<td>30 (6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimental Group 2</td>
<td>27 (6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A few nights a week</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control Group</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimental Group 1</td>
<td>14 (3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimental Group 2</td>
<td>5 (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>About once a week</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Control Group</td>
<td>5 (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimental Group 1</td>
<td>5 (1)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Experimental Group 2</td>
<td>5 (1)</td>
<td></td>
</tr>
</tbody>
</table>
Effects of the Intervention on Caregiver Sleep Knowledge

Scoring

Change in caregiver knowledge was assessed by examining the scores on nine true/false questions across the pre-test and immediate and delayed post-tests. The nine questions asked about various facts pertaining to sleep and healthy sleep habits for children. The Sleep Knowledge measure is in Appendix D (section IV), as noted in the Methods section.
For each of the nine questions, for each participant, on the pre-test and immediate and delayed post-tests, a score of “one” was assigned for a correct response and “zero” for an incorrect response. A total score was then calculated for each participant on each measure (pretest, immediate and delayed posttests). Participants who scored 8 or above on the 9-item pretest were eliminated from any further analysis, as they already had almost all of the information that the intervention was designed to provide and hence little opportunity for growth in their knowledge was possible. Therefore, the data presented (for both the immediate and delayed posttest) reflect only those participants who scored a seven or below (out of nine questions) on the pretest Sleep Knowledge measure.

**Knowledge Question Scores**

Means for each knowledge question, by the three groups, for the pretest and immediate posttest can be found in Table 5 and for the pretest and delayed posttest found in Table 7. Means total scores (across the nine questions) for the pretest and immediate posttest can be found in Table 6 and for the pretest and delayed posttest in Table 8.
Table 5

*Mean Number of Correct Responses to the Nine Sleep Knowledge Questions by Question and Experimental Group: Pre- and Immediate Posttest (Standard Deviations in Parentheses)*

<table>
<thead>
<tr>
<th>Question</th>
<th>Control N=14 Pretest</th>
<th>Posttest</th>
<th>Experimental Group 1 N=19 Pretest</th>
<th>Posttest</th>
<th>Pretest</th>
<th>Posttest</th>
<th>Experimental Group 2 N=11 Pretest</th>
<th>Posttest</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.64 (.49)</td>
<td>.71 (.49)</td>
<td>.26 (.45)</td>
<td>.1 (.32)</td>
<td>.27 (.46)</td>
<td>.17 (.41)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>.79 (.42)</td>
<td>.86 (.38)</td>
<td>.79 (.42)</td>
<td>.8 (.42)</td>
<td>1 (.0)</td>
<td>1 (.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>.71 (.47)</td>
<td>.57 (.53)</td>
<td>.47 (.51)</td>
<td>.4 (.52)</td>
<td>.73 (.47)</td>
<td>.83 (.41)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>1 (0)</td>
<td>1 (0)</td>
<td>.95 (.23)</td>
<td>1 (.0)</td>
<td>1 (.0)</td>
<td>1 (.0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>.79 (.43)</td>
<td>.71 (.49)</td>
<td>.63 (.5)</td>
<td>.6 (.52)</td>
<td>.46 (.52)</td>
<td>.5 (.55)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>.93 (.27)</td>
<td>.86 (.38)</td>
<td>.95 (.23)</td>
<td>1 (.0)</td>
<td>.91 (.3)</td>
<td>.83 (.41)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>.21 (.43)</td>
<td>.43 (.53)</td>
<td>.42 (.51)</td>
<td>.4 (.52)</td>
<td>.28 (.47)</td>
<td>.17 (.41)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>.43 (.51)</td>
<td>.43 (.53)</td>
<td>.58 (.5)</td>
<td>.4 (.51)</td>
<td>.27 (.47)</td>
<td>.5 (.55)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>.64 (.5)</td>
<td>.57 (.53)</td>
<td>.74 (.45)</td>
<td>.5 (.53)</td>
<td>.55 (.52)</td>
<td>.5 (.54)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6

*Mean Pre-test, Immediate Post-test, and Gain scores for the Sleep Knowledge Questions by Group*

<table>
<thead>
<tr>
<th></th>
<th>Control N=14</th>
<th>Experimental Group 1 N=19</th>
<th>Experimental Group 2 N=11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>6.1</td>
<td>5.8</td>
<td>5.5</td>
</tr>
<tr>
<td>Posttest</td>
<td>6.6</td>
<td>7.3</td>
<td>6.6</td>
</tr>
<tr>
<td>Gain</td>
<td>.5</td>
<td>1.5</td>
<td>1.2</td>
</tr>
</tbody>
</table>
Table 7
Mean Number of Correct Caretaker Responses to the Nine Sleep Knowledge Questions by Question and Group: Pre- and Delayed Posttest (Standard Deviations in Parentheses)

<table>
<thead>
<tr>
<th>Question</th>
<th>Control N=7</th>
<th>Experimental Group 1 N=9</th>
<th>Experimental Group 2 N=6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>Posttest</td>
<td>Pretest</td>
<td>Posttest</td>
</tr>
<tr>
<td>1</td>
<td>.57 (.53)</td>
<td>.56 (.53)</td>
<td>.67 (.52)</td>
</tr>
<tr>
<td>2</td>
<td>.86 (.38)</td>
<td>.78 (.44)</td>
<td>.83 (.41)</td>
</tr>
<tr>
<td>3</td>
<td>.71 (.49)</td>
<td>1 (.33)</td>
<td>1 (.0)</td>
</tr>
<tr>
<td>4</td>
<td>1 (.38)</td>
<td>1 (0)</td>
<td>.83 (.41)</td>
</tr>
<tr>
<td>5</td>
<td>1 (.38)</td>
<td>1 (0)</td>
<td>.83 (.41)</td>
</tr>
<tr>
<td>6</td>
<td>1 (.38)</td>
<td>.89 (.33)</td>
<td>1 (0)</td>
</tr>
<tr>
<td>7</td>
<td>.57 (.53)</td>
<td>.56 (.53)</td>
<td>.78 (.44)</td>
</tr>
<tr>
<td>8</td>
<td>.58 (.53)</td>
<td>.56 (.53)</td>
<td>.5 (.41)</td>
</tr>
<tr>
<td>9</td>
<td>.57 (.53)</td>
<td>.78 (.53)</td>
<td>.67 (.53)</td>
</tr>
</tbody>
</table>

Table 8
Mean Pre-test, Delayed Post-test, and Gain scores for the Sleep Knowledge Questions by Group

<table>
<thead>
<tr>
<th>Control N=7</th>
<th>Experimental Group 1 N=9</th>
<th>Experimental Group 2 N=6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>Posttest</td>
<td>Gain score</td>
</tr>
<tr>
<td>6.1</td>
<td>5.9</td>
<td>-.29</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Pretest Score Analysis

To ensure that there were no group differences between the intervention and control groups at the study’s outset, that is prior to the intervention, separate one-way ANOVAs were run on the knowledge pretest means, summed across the 9 questions, for the participants who filled out the immediate posttest (see Table 6 for these pretest means) and the participants who completed the delayed posttest (see Table 8 for these pretest means), respectively. Findings
showed no significant differences between the three experimental groups on pretest mean scores for the immediate pretest group, $F(2, 41)= 1.049, p = .360$ and for the delayed posttest group, $F(2, 19)= 1.72, p = .206$.

**Gain Score Analysis**

Next, a gain score was calculated for each participant, by subtracting his/her total pre-test score from his/her total post-test score. A total mean gain score on the immediate posttest, by group, was calculated by summing across the mean gain scores and dividing by the number of participants in each group. The total mean number of correct responses for pre- and immediate post-test, and mean gain scores, for each group are presented in Table 6. The same gain score analysis was done for the delayed posttest data with gain scores presented in Table 8.

A 3 (Group) X 2 (Time Points) repeated measures ANOVA, with group as the between-subjects factor and time as the within subjects’ factor, was conducted on gain scores to analyze the intervention effect. Caregiver sleep knowledge was not significantly different at different points in time $F(1, 22) = 3.238, p = .086$. The main effect of group showed no significant statistical difference in mean knowledge of sleep between groups, $F(2, 19) = .918, p = .416$. Additionally, there was no statistically significant interaction between intervention group and time on sleep knowledge, $F(2, 19) = .729, p = .495$.

Additional analyses on these data were run. Due to the high attrition rate for the delayed posttest, it was decided to further explore each posttest (immediate and delayed) separately. A one-way ANOVA was conducted on the gain scores for the three groups across the pretest and immediate posttest (See Table 6) to further analyze any intervention effect. There was a condition effect trend for the immediate posttest, $F(2, 41) =2.58, p=.088$, with Experimental Group 1 showing greater knowledge gains as a result of the intervention than the Control group.
However, post hoc analyses using the Tukey HSD post hoc criterion for significance indicated no significant differences between the three groups in terms of knowledge gained, \( p > .05 \).

A second one-way analysis of variance was conducted on the mean gain scores for the three groups, across the pretest and delayed posttest (See Table 8). There was a significant main effect of group for gain in knowledge, \( F(2,19) = 4.04, p = .034 \). Post hoc analyses using the Tukey HSD post hoc criterion for significance indicated that the first experimental group gained significantly more sleep knowledge (\( M = 1.84, SD = .705 \)) than in the control group, \( p < .05 \). There was no difference seen between the first and second experimental group in terms of knowledge gained, \( p > .05 \).

**Effects of the Intervention on Caregiver Sleep Beliefs**

**Immediate Posttest**

Caregivers were asked to rate, on a three-point scale (“agree”, “disagree”, “neither agree nor disagree”) to three questions about their child’s sleep habits. The questions were: “I believe my child gets enough sleep” (question 1), “I believe my child has healthy sleep habits” (question 2) and “I plan to change my child’s sleep habits” (question 3). Responses were examined to see if there were any changes from pre- to posttest.

All possible change patterns were taken to be indicative of an intervention effect and participants were given a score of “1” if they manifested any of these change patterns. These consisted in six possible changes. They are movement from:

1. Agree to Disagree
2. Agree to Neither Agree or Disagree
3. Disagree to Agree
4. Disagree to Neither Agree or Disagree
5. Neither Agree or Disagree to Agree

6. Neither Agree or Disagree to Disagree

Lack of an intervention effect consisted in no change in response from pre-to-posttest on the belief questions. Participants who evidenced no change received a score of “0.”

Furthermore, for question 3 only, since this question had two parts, responses were coded as “0” for those who showed contradictory responding across the two parts. Part 1 was “I plan to change my child’s sleep habits” (agree or disagree). Participants were coded as “0” if they manifested either pattern of contradiction across these that is, “disagreed,” that they would make a change but then checked off items in part 2 that they would change. As to the other pattern (indicating agreeing to make a change, but then making no selection of what he/she might change), part 2 did not have an “other” option. Hence, participants either were contradicting themselves or the change(s) they were contemplating were not listed as an option. There were two participants who were coded as “0” based on the criteria listed above, one was in the control group and the other one was in experimental group number one.

The number of participants in each group who demonstrated changes on each belief question is presented in Table 9. The small number of participants in each group who demonstrated a change in knowledge violated the assumption for an ANOVA that the data is normally distributed. Thus, no inferential statistics were run.
Table 9

Number of participants in each group showing change in beliefs pre- to posttest (immediate)

<table>
<thead>
<tr>
<th>Question</th>
<th>Control (n =14)</th>
<th>Experimental Group 1 (n =19)</th>
<th>Experimental Group 2 (n =11)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. Child gets enough sleep</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Q2. Child has healthy sleep habits</td>
<td>3</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Q3. Plan to change child’s sleep habits</td>
<td>2</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Delayed Posttest

The same scoring and analyses done on the immediate post-test were conducted comparing pre-test scoring to the delayed post-test scoring. The number of participants in each group who demonstrated changes on each belief question is presented in Table 10. There was one participant in each group who contradicted themselves on the third question, thus were given a score of “0.” Similar to the immediate posttest, the small number of participants in each group who demonstrated a change in knowledge violated the assumption for an ANOVA that the data is normally distributed. Thus, no inferential statistics were run.

Table 10

Number of participants in each group showing change in beliefs pre- to posttest (delayed)

<table>
<thead>
<tr>
<th>Question</th>
<th>Control (n =7)</th>
<th>Experimental Group 1 (n =9)</th>
<th>Experimental Group 2 (n =6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1. Child gets enough sleep</td>
<td>2</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Q2. Child has healthy sleep habits</td>
<td>2</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Q3. Plan to change child’s sleep habits</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>
Behavior Changes

In both posttest surveys (immediate and delayed), caregivers were asked about what changes they plan on making to their child’s sleep. The posttest survey had six different options that included, increasing the amount of sleep, setting an earlier bedtime and starting to use a bedtime routine. Data was only analyzed for those participants who responded “yes” to the third belief question, indicating that they were planning on making a change to their child’s sleep habits. Participants who said they were not going to make a change or who wrote “neither agree/disagree” but still specified changes were not included as their responses were contradictory. Table 11 and 12 indicate the responses per group (for immediate and delayed posttest) and what changes they were planning on making. For both the immediate and delayed posttest, the most common changes were to set an earlier bedtime. As very few participants indicated a plan to make a behavior change, assumption of normal distribution was violated and so no inferential statistics were run on the behavior change responses.

Table 11

<table>
<thead>
<tr>
<th>Behavior Change Responses, Immediate Posttest</th>
<th>Take the TV out of his or her bedroom</th>
<th>Reduce or eliminate caffeine</th>
<th>Make bedtimes and wake times the same every day</th>
<th>Increase the amount of sleep he/she gets</th>
<th>Set an earlier bedtime</th>
<th>Start using a bedtime routine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group (n =2)</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Experimental Group 1 (n =6)</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Experimental Group 2 (n =6)</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 12

**Behavior Change Responses, Delayed Posttest**

<table>
<thead>
<tr>
<th></th>
<th>Take the TV out of his or her bedroom</th>
<th>Reduce or eliminate caffeine</th>
<th>Make bedtimes and wake times the same every day</th>
<th>Increase the amount of sleep he/she gets</th>
<th>Set an earlier bedtime</th>
<th>Start using a bedtime routine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control Group (n =1)</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Experimental Group 1 (n =3)</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Experimental Group 2 (n =4)</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

**Sleep diary**

Participants were asked to fill out a sleep diary for seven days both prior to and one month after the intervention. First, a total amount of hours of sleep per day was calculated for each child participant. It should be noted that only 25 of the 62 participants across all three groups filled out a pre- and post-sleep diary. Moreover, of the participants who did fill out the diary, many did not do so for all seven days. See Table 13 below for the average number of reporting days by group. These issues made it difficult to determine if any change in sleep duration occurred between the three groups.
Table 13

*Average number of days reported on in Sleep Diary by Group (out of 7 total days)*

<table>
<thead>
<tr>
<th></th>
<th>Control N=10</th>
<th>Experimental Group 1 N=9</th>
<th>Experimental Group 2 N=6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>5.3</td>
<td>4.9</td>
<td>5.83</td>
</tr>
<tr>
<td>Posttest</td>
<td>4.4</td>
<td>5.2</td>
<td>3.67</td>
</tr>
</tbody>
</table>

For each child, by group, a mean number of hours slept prior to the intervention and post the intervention was calculated. Then, an average number of hours slept was calculated for each child, for pre- and post-test, by dividing the total number of hours slept by the total number of days reported on. The mean number of hours slept, by group, across pre- and post-test is reported in Table 14.

Next, a gain score was computed by subtracting the average number of sleeping hours on the pretest from the average number of sleeping hours on the post-test for each child. The mean gain scores by group is presented in Table 14.

Table 14

*Mean and Gain scores for Hours Slept Pre- and Post-Intervention by Group*

<table>
<thead>
<tr>
<th></th>
<th>Control N=10</th>
<th>Experimental Group 1 N=9</th>
<th>Experimental Group 2 N=6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>11.04</td>
<td>11.7</td>
<td>10.54</td>
</tr>
<tr>
<td>Gain score</td>
<td>-.08</td>
<td>.52</td>
<td>-.43</td>
</tr>
<tr>
<td>Posttest</td>
<td>11.12</td>
<td>11.18</td>
<td>10.9</td>
</tr>
</tbody>
</table>

A one-way ANOVA on the gain scores was conducted to analyze intervention effect. There were no significant differences in sleep gains by group from pre- to posttest, $F (2, 22) = 2.655, p = .093.$
Chapter 5: Discussion

This chapter presents a summary and discussion of the results from the present study. Limitations of the study are discussed, as well as ideas for future research and implications of results.

Key Findings

The current study investigated the effectiveness of two different forms of caregiver intervention and whether they can increase caregiver sleep knowledge and beliefs and improve child sleep duration. All participants were given a pretest survey that assessed caregiver beliefs and knowledge regarding child sleep. Caregivers were also asked to fill out a sleep diary, recording their child’s wake and sleep times for seven days. The first experimental/intervention group (“brochure only”) then read a brochure on healthy sleep in children and took a posttest one week later and again at one-month post the intervention. The second experimental/intervention group (“brochure plus email group”) received a weekly email with a link to the brochure for four weeks, to create the opportunity to increase their exposure to the material and, if the opportunity is taken, to hopefully increase their retention of the information as compared to participants in the “brochure only/once” condition. Results were compared to a control group that was not given access to the brochure (until after the conclusion of the study). In addition to filling out pre- and posttest surveys on sleep knowledge and beliefs, all three groups filled out a sleep diary before and one-month after the intervention, to measure any potential changes in children’s sleep duration. A summary of the study’s hypotheses and findings are presented in Table 15. The main findings are described in more detail below.
### Summary of Findings from Hypotheses

<table>
<thead>
<tr>
<th>HO</th>
<th>Hypothesis</th>
<th>Supported/Not Supported</th>
</tr>
</thead>
<tbody>
<tr>
<td>HO1</td>
<td>The caregiver intervention will improve caregivers’ knowledge on sleep as assessed immediately after the intervention, in both experimental groups when compared to the control group.</td>
<td>Not Supported. There were no significant increases in the number of correct responses immediately after the intervention when compared with a control group</td>
</tr>
<tr>
<td>HO2</td>
<td>The caregiver intervention will improve caregivers’ knowledge of sleep as assessed one-month post intervention in both experimental groups when compared to the control group.</td>
<td>Supported. There was some significant increase in the number of correct responses one month after the intervention for experimental group 1 when compared with the control group</td>
</tr>
<tr>
<td>HO3</td>
<td>Caregivers who received additional specific, targeted information on sleep on a weekly basis post the original intervention (experimental group 2), will be more knowledgeable on children’s sleep 1-month post follow up compared to caregivers who saw the brochure once (experimental group 1).</td>
<td>Not supported. There were no significant differences seen between the two experimental groups.</td>
</tr>
<tr>
<td>HO4</td>
<td>The caregiver intervention will change caregiver beliefs about their child’s sleep assessed immediately after the intervention in both experimental groups when compared to the control group.</td>
<td>Not supported. There were no significant differences in change in beliefs immediately after the intervention in either experimental group when compared with the control group</td>
</tr>
<tr>
<td>HO5</td>
<td>The caregiver intervention will change caregiver beliefs about their child’s sleep assessed one-month post intervention in both experimental groups when compared to the control group.</td>
<td>Not supported. There were no significant differences in change in beliefs one month after the intervention when compared with a control group.</td>
</tr>
<tr>
<td>HO6</td>
<td>Caregivers who received additional specific, targeted information on sleep on a weekly basis post the original intervention (experimental group 2), will show greater change in beliefs about their own child’s sleep at 1-month post follow up compared to caregivers who saw the brochure once (experimental group 1).</td>
<td>Not supported. There were no significant differences seen between the two experimental groups.</td>
</tr>
<tr>
<td>HO7</td>
<td>Caregiver knowledge of child sleep will have a positive effect on child sleep behavior itself, when compared to the control group. However, the effects will be greater in experimental group 2.</td>
<td>Not supported. There were no significant differences in the amount of time slept by children, across groups, pre- and post-intervention.</td>
</tr>
</tbody>
</table>
Caregiver sleep knowledge

Participants were presented with a series of nine questions pertaining to children’s sleep and healthy sleep habits on the pretest and on both posttests (immediate and delayed). There were no group differences on the participants’ pretest knowledge scores.

It was hypothesized that the caregiver intervention would improve caregivers’ knowledge of sleep as assessed immediately after the intervention, in both experimental/intervention groups when compared to the control group. Findings suggested a marginal effect of condition whereby one of the intervention groups, experimental group 1, showed a greater gain in knowledge compared to the control group, but the effect was not statistically significant. This result might not have achieved statistical significance due to the small sample size.

Similarly, it was hypothesized that the caregiver intervention would improve caregivers’ knowledge about sleep as assessed one-month post intervention, in both intervention groups when compared to the control group. This finding was partially supported, as there was a significant increase in knowledge in experimental group 1 compared to the control group. This finding bolsters the trend level finding for this effect on the immediate posttest. These findings make a significant contribution to the literature. They demonstrate that an intervention consisting even in just a one-time exposure to information can increase caregiver knowledge about child sleep that is maintained a month later. This finding runs counter to much of the literature showing few immediate and no long terms effects of such interventions (see review Wilson et. al., 2014).

It was further hypothesized that caregivers who received the additional specific, targeted information on sleep on a weekly basis post the original intervention (experimental group 2), would be more knowledgeable on children’s sleep 1-month post follow up compared to
caregivers who saw the brochure once (experimental group 1). However, the findings did not suggest any significant differences between the two groups. As noted above, results indicated that the first intervention group did better than the control group in terms of gain in sleep knowledge. These findings could be due to a number of different factors. There was no way to track whether the participants in the second intervention group actually reviewed the brochure on a weekly basis; they were simply emailed a reminder each week. Hence, this group may have had no more exposure to the information on child sleep than experimental group 1, who saw the brochure only once. Additionally, due to attrition, the sample size decreased substantially for all three groups by the time of the delayed posttest and to numbers below 10 participants in each group. This sample size decreased the power of the analyses to detect any changes. Indeed, on this possibility, it is important to note that the gain scores were identical in both experimental groups for the delayed posttest (1.5 in both cases). Greater power might have shown this gain in experimental group 2 as well to differ from the control group. Also, the fact that the gain scores were the same in both experimental groups on the delayed posttest supports the suggestion that experimental group 2 did not revisit the brochure and basically had the same exposure/intervention as experimental group 1.

Caregiver Beliefs

It was hypothesized that the caregiver intervention would change caregiver beliefs about their children’s sleep when assessed immediately after the intervention and at one-month post intervention. Participants were asked three questions relating to sleep beliefs. The questions were: whether their child receives enough sleep (Q1), if their child has healthy sleep habits (Q2) and whether they were planning on changing anything about their child’s current sleep habits (Q3). Patterns of responses were analyzed to see if the intervention had any effect on their
beliefs. It was found that there were almost no changes in belief for any group on the immediate and delayed posttest. Accordingly, analyses could not be run as there was so little variation in the responses from pre- to posttest (for both the immediate and delayed). Any of several factors may account for the near non-existent changes found in caretaker beliefs. It is possible that the knowledge gained from the brochure was not enough to change caretaker beliefs regarding their child’s sleep habits. Additionally, the belief measure may not have been sensitive enough to capture a change in beliefs, as child sleep behavior is complex and hard to assess via only three questions. Moreover, one of the three belief questions, question three, may have been problematic and confusing. Some participants were eliminated for giving contradictory responses across both parts of question three. One set was eliminated for saying that they were not planning to change their child sleep habits, but then selected items they would change from the behavior change section. It is possible that these participants did not fully understand the third question. Furthermore, there were participants who said they were going to change their child’s sleep habits, but then did not select any of the options in the behavior change section. Question three was flawed in providing no option for “other” for caretakers to fill in changes that they might make but that were not listed on the question form.

**Child sleep duration**

The fifth hypothesis stated that caregiver knowledge of child sleep would have a positive effect on child sleep behavior itself, when compared to the control group, and the effects would be greater in experimental group 2, who received additional specific, targeted information. Participants were asked to record their child wake and sleep times for seven days both prior to the intervention and then one-month post intervention. This hypothesis was not supported as there were no significant differences, across groups, between pre and post in number of hours of
sleep reported for the caregivers’ children. While this finding does suggest that any caretaker knowledge gained from the brochure did not lead to any significant increases in child sleep duration, several problems with this measure can be noted and might have affected the findings. Only a very small sample of participants filled out the sleep diary pre- and post-intervention and most of the diaries were not filled out for the requested seven-day period. Furthermore, participants did not necessarily know the time that their child actually fell asleep (versus the time they put their child to bed). In addition, the sleep diary did not account for any night wakings. For these reasons, it was difficult to ascertain the true intervention effect, if any, for child sleep.

**Limitations and Future Directions**

Although a significant increase in caregiver knowledge of child sleep was found, particularly one-month post intervention, the current study had several limitations.

The study took place entirely online via Qualtrics, an online survey tool that allows one to create surveys and track responses. While this did allow the PI to advertise and distribute the study widely, it also posed several limitations. Often times someone would give consent and start filling out the first survey but fail to complete it. The experimenter was limited in ways to spur completion. If no identifying information was provided by the participant (and phone numbers were not solicited as part of the study), the PI had no way to follow up and ask the participant to complete the survey. Similarly, if someone did fill out the entire first survey, but did not provide identifying information, the PI was unable to send a sleep diary and posttest, thus preventing that participant from being included in the study.

A second limitation of the study was its high attrition rate. As already noted, 98 people gave consent to the study. Of those 98, 90 were eligible to participate in the study. However, only 62 people filled out the posttest survey one week after the pretest and only 29 participants
filled out the posttest one month after the pretest. Since emails were the only way the PI could reach the participants, it was difficult to follow up to ensure that people filled out the posttest. The PI sent several reminder emails to the participants and while they did seem to help, there were many people who did not respond. Several times, the PI saw on Qualtrics that participants opened the link but did not complete it. The participants could have forgotten about it or did not realize they did not submit their answers. Future studies should include more follow-up to ensure responses. Furthermore, it might be helpful to obtain participant phone numbers (with permission) as an alternate way to follow-up with participants and reduce the attrition rate.

Another major problem rested in collecting the sleep diary responses. One set of problems related to the design of the sleep diary itself, which had several limitations. While some data were able to be obtained regarding wake/sleep times, the sleep diary did not account for wake times during the night nor other variables that could have impacted the child’s sleep (i.e., naps, sickness, travel, etc.). Furthermore, many participants asked if they should be recording when they put their child into bed versus when they actually fall asleep (participants often reported having trouble with making this distinction, as they would put their child to bed, close the door, and would not know the precise time the child fell asleep). Future studies need to be able to account for these issues and clarification of wake/sleep time is needed.

A second set of problems related to the incomplete reporting of the sleep diary data by the participants. It should be noted that this problem found in the dissertation research is not uncommon. Obtaining data for sleep diaries can be difficult. For example, in the Wilson et al. (2014) study, only 54% of their participants returned a sleep diary. Although 90% (n=57) of the participants did start the first sleep diary, only 13 completed all seven days. Of those 57 participants who filled out the first sleep diary, 65% (n=37) filled out the second sleep diary,
given one month after the first one. Only nine participants filled out all seven days for the second sleep diary. At the outset of the study, all eligible participants were sent a daily link to fill out the sleep diary. The PI found that participants were forgetting to fill out the sleep diary some days. To reduce the amount of emails the participants received, the links were only sent every other day, which did seem to help with recording. Due to the nature of Qualtrics, when participants were sent the link, they were unable to see their previous entries, which some participants had issues with. Participants reported that they were unsure whether they had recorded previous days and often emailed the PI for clarification. In addition, some participants reported that some of the sleep diary emails went to their spam folder, accounting for their missing the links on some days. Nine participants requested a paper version of the sleep diary, which they would fill out and send back to the PI. While only four people returned them, it should be noted that those sleep diaries were filled out completely. This suggests that future studies should include an option for participants to complete a paper version of the sleep diary; for some participants, having a piece of paper to record their child’s wake/sleep times might be easier (and also a natural reminder to do so) than having to log onto Qualtrics. After the seven days, the participants can be called and/or emailed to hand in the sleep diary.

It is also the case that methods to collect child sleep duration data superior to the diary method have been developed. When trying to ascertain changes in the sleep duration, a majority of studies use actigraphy, which is an objective measure of sleep. Actigraphy involves attaching a small wristwatch type device to a child, which automatically measures movement during sleep (Stores & Stores, 2004). This is a much more reliable way to record wake and sleep times. However, due to the nature of the current study, using actigraphy was not feasible. Future studies might want to try to find more reliable ways to record sleep/wake times to understand changes in
sleep duration, such as actigraphy. Also, using household technology could help objectively track sleep. Currently, there are several products available for caregivers to use to track their child’s sleep at home (such as the Owlet and the SNOO Baby Bassinet).

Another significant limitation of the study related to its small sample size. While significant changes were seen in caregiver knowledge, the sample size was still not as large as originally intended. The PI had planned to have 30 participants in each treatment group. However, because of time constraints to conduct the study within a reasonable time frame combined with slow response rates to the recruitment process, the PI stopped collecting data once there were 20 participants in each treatment group. The sample size was further reduced upon learning that 18 of the 62 participants were not in need of the intervention, having achieved near perfect scores of 8 or 9 (out of 9 questions) on the pretest child sleep knowledge survey. Hence, these participants needed to be eliminated from data analysis. This left an even smaller sample of 44 participants (across all three groups). This finding suggests also that a more advanced intervention may be needed that would inform on more complex, and less familiar, aspects of child sleep behavior. It is possible that with a larger sample and a more advanced intervention a greater intervention effect would have been found for caregiver knowledge and beliefs, and in turn, on the effect of these on child sleep behavior.

The sample for the current study was also limited in being quite homogenous with respect to gender, ethnicity, and relationship to child. It was primarily Caucasian and female (hence consisting in mainly mothers). Therefore, the sample was not a valid representation of the larger population of caregivers and children. Future studies should try to include participants who represent the demographic diversity of New York City, as this is where the study took place. The current study was also limited in ascertaining more refined information on the educational
background of the participants. The demographic pretest survey only asked participants if they had more or less than a high school education, making it difficult to determine the range of education among the participants. A more detailed question regarding education should be used to measure the possible mediating effects of education on caregiver knowledge and beliefs. Participants should be asked what level of education they have past high school (if applicable), such as an Associates, Bachelor’s, Master’s or Doctorate degree. The education question asked in the pilot study measure (Appendix A, Part III, Question #4), could be used as a model for future questions regarding education.

Implications and Future Research

There are several important implications of the current study. The intervention was an effective way of helping caregivers gain knowledge about sleep, particularly one-month post-intervention. Prior research on this topic has shown that, although caregiver knowledge can be increased through an intervention, often this knowledge increase was not maintained (McDowell et al., 2017). As caregiver knowledge of sleep issues is one of the foremost determinants of whether the child’s sleep issues will be addressed and treated, the findings from the current study are extremely valuable and can be used to guide future research and interventions on this topic.

The current study added to the literature in several ways. None of the articles outlined in McDowell et al.’s, (2017) literature review pertaining to parent knowledge or attitudes about sleep had any intervention that used repeated exposure to the sleep intervention. One of the suggestions for future research in Wilson et al.’s (2014) study was for the use of repeated exposure to the materials, as repeated exposure is thought important for teaching concepts well. The current study had two experimental groups, one with repeated exposure and one without, to determine if repeated exposure could increase knowledge retention. Although the results from
the current study did not find any differences between the group that had repeated exposure and
the one that did not, this could be due to the limitations of the study, where repeated exposure
was offered, but its uptake not assured (as noted earlier). Repeated exposure to information could
have the potential of increasing an intervention effect.

Another addition to the literature represented by the present study was the use of a
sample of middle-class, typically developing children. According to McDowell et al.’s (2017)
review, and a current examination of the literature, there is scant literature on parent-caregiver
education programs for neurotypical preschool children. The promising results with this sample
indicate that middle-income, typically developing preschoolers, and their caretakers, could be a
fruitful group to benefit from such interventions.

The current study represented an addition to the literature in another way as well. This
was in terms of its inclusion of a measure of child sleep duration. This measure had the potential
to show, if caretaker sleep knowledge was gained and/or retained by the caregivers, whether such
had a positive impact on children’s sleep duration. As stated before, improper sleep can have a
negative impact on learning and can lead to significant physical, mental, and behavioral
problems in children (Lemola, Ledermann, & Friedman, 2013). Hence, the ultimate goal of any
intervention, is to affect child sleep behavior in a positive direction. As noted, the current
measure of child sleep had its limitations and suggestions were made for better measures that
could be used going forward.

Another contribution to the literature of the current study was its entirely online
methodology. Although this method had its limitations, as already discussed, it also had its
strengths and could be improved upon from what was done in the present case. The online
methodology makes it easier to reach a wide potential participant pool. Additionally, it affords
greater participation as it is less time-consuming and effortful than would be a face-to-face methodology. Caregivers could participate whenever and wherever it was most convenient for them. In addition, it did not require a significant amount of time or direct contact with caregivers to deliver the key information. These factors are very important to consider for future research.

In today’s culture, caregivers are busier than ever. In a recent article, Miller (2018) reports on data indicating that parenting in America has become much more demanding than in the past. This situation has been known to lead to feelings of stress and pressure. Easily accessible information on child sleep behavior would be highly desirable and likely preferable to the time it would take to attend workshops or classes on how to help their children sleep. It should be noted, however, that the ease of an online study may not be similar across all subject groups. For low SES families, internet access might not be as available or desirable.

It is also important to note that the online methodology holds certain advantages for researchers. The current study was inexpensive to conduct. The only expense was access to an online survey platform, such as Qualtrics, which was used in the study. Enlyft, a company that studies the usefulness of companies, found that 19,755 companies, including education management, health care and higher education companies used some sort of survey research product (Enlyft, 2019). The online approach enabled the study to provide important information to caregivers without any financial burden.

**Conclusions**

The purpose of the current study was to determine if a caregiver intervention can increase caregiver sleep knowledge and beliefs and affect child sleep. It is critical that preschool aged children receive the appropriate amount of sleep to ensure proper learning and functioning in school (Dewald et al., 2010). One way to help children to achieve better sleep is to enhance
parental-caregiver knowledge about child sleep. If caregivers are aware of their child’s sleep habits, they can better monitor them to ensure children are receiving the appropriate amount of sleep. For children who attend a preschool program, caregiver knowledge of children’s sleep can be beneficial to teachers in managing child classroom behavior.

The current study found that a caregiver intervention can improve caregiver knowledge about child sleep, particularly one-month after the intervention, which suggests that some long-term learning took place. While a change in caregiver beliefs about sleep and an increase in child sleep duration were not found, potential methodological improvements were detailed that could show enhanced results of such an intervention in all three behavioral domains in future research.
Appendix A: Parental Sleep Knowledge, Pre-test, Pilot Study

Pre-Questionnaire
(Before the Parent Training)

Part I: Sleep Hygiene

Please answer the questions below. All responses will be kept confidential.

1. If your child is tossing and turning in bed for over 20 minutes, what should you do?
   a. Nothing, he/she will fall asleep eventually
   b. Take them out of bed and let them do a high stimulation activity (i.e. running around) for 20 minutes
   c. Lay down with them in bed
   d. Take them out of bed and let he/she do a low stimulation activity (i.e. reading) for 20 minutes
2. If a child does not nap during the day, should you:
   a. Give them daily quiet time anyways
   b. Put them to sleep earlier
   c. Nothing, it’s just your child’s sleep habits
   d. Force them to nap
3. Does napping affect a child’s learning?
   a. Yes
   b. No
4. When it is bed time, what are appropriate activities to do to help them fall asleep?
   a. Read for a short time
   b. Let them play on an iPad/electronic device to help them get tired
   c. Exercise
   d. Watch a television show in their bedroom
5. What time of day should your child stop having caffeine (soda, chocolate), so it won’t impact bed time?
   a. Morning
   b. Afternoon/Evening
   c. Child should never have caffeine, even having it in the mornings will affect their sleep
6. Around bed time your child never seems to be tired, should you
   a. Make them go into their bed anyways; they will fall asleep eventually
   b. Delay bedtime by 30 minutes increments until child becomes sleepy, then put them in bed
c. Let them play in the living room until they fall asleep on the couch

7. When checking on your child you should:
   a. Be brief and quiet, you just want to show your presence and reassure them
   b. Talk to them for a couple of minutes
   c. Do whatever the child wants

8. What are some items in the child’s bedroom that could be preventing them from falling asleep?
   a. An electronic clock
   b. No cool air
   c. A telephone
   d. All of the above

9. It’s finally the weekend, you can let your child:
   a. Sleep-in
   b. Go to sleep later
   c. Neither; you could keep the same bedtimes and wake times to ensure a consistent sleep schedule all week

10. What are some activities you can do to help your child sleep better?
    a. Teach them some relaxation techniques, such as deep breathing
    b. Exercise during the day
    c. Have a predictable series of events each night, such as brushing teeth and then reading a story
    d. All of the above
Part II: Vignettes

Preschool Sleep Vignettes: Problem Identification Interpretation Scale
The following descriptions are of preschool aged children who display different maladaptive behaviors. Please indicate your degree to which you agree that the child is experiencing sleep problems. All responses will be kept confidential.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly disagree</td>
<td>Disagree</td>
<td>Somewhat disagree</td>
<td>Somewhat agree</td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
</tbody>
</table>

1. **Sarah is a three-year-old girl. She is always full of energy and often has a hard time completing a task. During play time you will often see her jump between many toys at once, not playing long with any one particular toy.**
   - Sarah is showing typical signs of a three old
   - Sarah is having inattention problems, not related to sleep
   - Sarah’s inattention problems are caused by lack of sleep

2. **Mark is a two- and half-year-old boy. During daycare, his teachers describe him as being withdrawn. He does not like to play with others and is often seen starting out the window. He is often sleepy but does not always nap.**
   - Mark is showing typical signs of a two and half year old
   - Mark is displaying depressive symptoms, not related to sleep
   - Mark’s problems are caused by sleep issues

3. **Sally is a three and half year old who is underweight. She does not seem to eat during meal times and is very picky about what she eats. She is often cranky throughout the day but refuses to eat.**
   - Sally is showing typical signs of a three and half year old
   - Sally is displaying behaviors related to food refusal
   - Sally’s problems are caused by sleep issues

4. **Jack is five years old and is not performing well in school. He does not seem to retain any of the information being taught in school, such as recognizing letters and names of colors.**
   - Jack is showing typical signs of a five-year-old
   - Jack is displaying signs of a learning disability
   - Jack’s academic issues are caused by sleep issues

5. **Jill is four years old and has a hard time saying goodbye to her mother every morning at school. She seems overly anxious throughout the day and is often distracted. During the day you can see Jill sitting by herself.**
   - Jill is showing typical signs of a four-year-old
Jill is displaying behaviors related to anxiety 1 2 3 4 5 6
Jill’s problems are caused by sleep issues 1 2 3 4 5 6

6. Anna is four and half years old and frequently complains of head pains. She often has to put her head down during the day.
   Anna is showing typical signs of a four and half year old 1 2 3 4 5 6
   Anna is displaying behaviors related to having a headache 1 2 3 4 5 6
   Anna’s problems are caused by sleep issues 1 2 3 4 5 6

7. Max is three and half and always seems upset after lunch. He has a really hard time calming down and is very irritable and will cry easily. Nothing seems to make him feel better.
   Max is showing typical signs of a three and half year old 1 2 3 4 5 6
   Max is displaying behaviors related to eating 1 2 3 4 5 6
   Max’s problems are caused by sleep issues 1 2 3 4 5 6
Part III: Background Information

Please respond to the following questions. All information will be kept confidential.

1. What is your age? __________

2. What is your sex?
   a. Male
   b. Female
   c. Other

3. What is your racial/ethnic background?
   a. Asian/Asian American
   b. Black/African American
   c. Hispanic/Hispanic American
   d. Native American
   e. White/Caucasian
   f. Other: ________

4. What is your highest level of education?
   a. Some high school, no diploma
   b. High school graduate, diploma or equivalent
   c. Some College
   d. Associate’s degree
   e. Bachelor’s degree
   f. Master’s degree
   g. Doctoral degree (incl, JD, MD)

5. How many children do you have? __________
   a. What are their ages? ________________

6. What is your total household income?
   a. Less than $10,000
   b. $10,000 to $19,999
   c. $20,000 to $29,999
   d. $30,000 to $39,999
   e. $40,000 to $49,999
   f. $50,000 to $59,999
   g. $60,000 to $69,999
h. $70,000 to $79,999
i. $80,000 to $89,999
j. $90,000 to $99,999
k. $100,000 to $149,999
l. $150,000 or more
Appendix B: Parental Sleep Knowledge, Post-test, Pilot Study

Post-Questionnaire
(After the Parent Training)

Part I: Sleep Hygiene

Please answer the questions below. All responses will be kept confidential.

1. If your child is tossing and turning in bed for over 20 minutes, what should you do?
   a. Nothing, he/she will fall asleep eventually
   b. Take them out of bed and let them do a high stimulation activity (i.e. running around) for 20 minutes
   c. Lay down with them in bed
   d. Take them out of bed and let he/she do a low stimulation activity (i.e. reading) for 20 minutes
2. If a child does not nap during the day, should you:
   a. Give them daily quiet time anyways
   b. Put them to sleep earlier
   c. Nothing, it’s just your child’s sleep habits
   d. Force them to nap
3. Does napping affect a child’s learning?
   a. Yes
   b. No
4. When it is bed time, what are appropriate activities to do to help them fall asleep?
   a. Read for a short time
   b. Let them play on an iPad/electronic device to help them get tired
   c. Exercise
   d. Watch a television show in their bedroom
5. What time of day should your child stop having caffeine (soda, chocolate), so it won’t impact bed time?
   a. Morning
   b. Afternoon/Evening
   c. Child should never caffeine, even having it in the mornings will affect their sleep
6. Around bed time your child never seems to be tired, should you
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   b. Delay bedtime by 30 minutes increments until child becomes sleepy, then put them in bed
c. Let them play in the living room until they fall asleep on the couch

7. When checking on your child you should:
   a. Be brief and quiet, you just want to show your presence and reassure them
   b. Talk to them for a couple of minutes
   c. Do whatever the child wants

8. What are some items in the child’s bedroom that could be preventing them from falling asleep?
   a. An electronic clock
   b. No cool air
   c. A telephone
   d. All of the above

9. It’s finally the weekend, you can let your child:
   a. Sleep-in
   b. Go to sleep later
   c. Neither; you could keep the same bedtimes and wake times to ensure a consistent sleep schedule all week

10. What are some activities you can do to help your child sleep better?
    a. Teach them some relaxation techniques, such as deep breathing
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    c. Have a predictable series of events each night, such as brushing teeth and then reading a story
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   - Sarah is showing typical signs of a three old
   - Sarah is having inattention problems, not related to sleep
   - Sarah’s inattention problems are caused by lack of sleep

2. **Mark is a two-and-half-year-old boy. During daycare, his teachers describe him as being withdrawn. He does not like to play with others and is often seen starting out the window. He is often sleepy but does not always nap.**

   - Mark is showing typical signs of a two and half year old
   - Mark is displaying depressive symptoms, not related to sleep
   - Mark’s problems are caused by sleep issues

3. **Sally is a three and half year old who is underweight. She does not seem to eat during meal times and is very picky about what she eats. She is often cranky throughout the day but refuses to eat.**

   - Sally is showing typical signs of a three and half year old
   - Sally is displaying behaviors related to food refusal
   - Sally’s problems are caused by sleep issues

4. **Jack is five years old and is not performing well in school. He does not seem to retain any of the information being taught in school, such as recognizing letters and names of colors.**

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   - Jack’s academic issues are caused by sleep issues

5. **Jill is four years old and has a hard time saying goodbye to her mother every morning at school. She seems overly anxious throughout the day and is often distracted. During the day you can see Jill sitting by herself.**

   - Jill is showing typical signs of a four-year-old
Jill is displaying behaviors related to anxiety
Jill’s problems are caused by sleep issues

6. Anna is four and half years old and frequently complains of head pains. She often has to put her head down during the day.
Anna is showing typical signs of a four and half year old
Anna is displaying behaviors related to having a headache
Anna’s problems are caused by sleep issues

7. Max is three and half and always seems upset after lunch. He has a really hard time calming down and is very irritable and will cry easily. Nothing seems to make him feel better.
Max is showing typical signs of a three and half year old
Max is displaying behaviors related to eating
Max’s problems are caused by sleep issues

*Thank you for your participation!*
Appendix C: Recruitment Email

My name is Rachel Cohen and I am a doctoral candidate completing my dissertation research at the Graduate Center, City University of New York in the Educational Psychology program. The purpose of my study is to determine if a caregiver intervention can increase caregiver sleep knowledge and affect child sleep duration. In addition, the study aims to provide useful information to help children sleep better.

The intended participants of this study are caregivers ages 18 and 65 who have at least one child between the ages of 2 and 5 years. Your participation is important because it might lead to identification of sleep issues in children and the improvement of sleep patterns. The study involves filling out questionnaires, completing a sleep diary for your child and reading information about sleep in children. The study will take place over the course of one month. If you would like to participate in the study, please visit the following website:

https://cunyhunter.co1.qualtrics.com/jfe/form/SV_8iiaaokZVyykH53

If you choose not to participate, please disregard this email. Please contact us if you have any questions.

We appreciate your time and cooperation and look forward to receiving your responses. I would greatly appreciate it if you would forward this email to any caregivers who you think may be interested in participating.

Thank you for your time!

Sincerely,

Rachel Cohen, M.S.Ed. M. Phil
Doctoral Candidate
Graduate Center, CUNY
New York City, NY 10016
rlevine@gradcenter.cuny.edu

Joan Lucariello, Ph.D.
Faculty Advisory
Graduate Center, CUNY
New York City, NY 10016
jlucariello@gc.cuny.edu
Appendix D: Parental Knowledge of Healthy Sleep in Children, Dissertation
Pre-Test

Part I. Background information: The following questions ask for general information about you and your child. If you have more than one child with you, please choose one child for whom to answer the questions.

1) Gender Male ___ Female___ Other (specify)__________________

Relationship to child:

2) Age of person completing form (years): _____________________

3) Your highest level of education (check one):
   Less than high school___ High school___ More than high school___

4) Your racial/ethnic background (check one):
   White/Caucasian___ Black/African American___ Asian___
   American Indian/Alaska native___ Native Hawaiian/Pacific___
   Hispanic or Latino___ Multiracial___

6) Your child’s age: _______

7) Your child’s gender (check one): M___ F___

8) Is your child diagnosed with a developmental disability (i.e. autism spectrum disorder or intellectual disability)? Yes__________ No_______________

9) Please list the ages of any other children who usually live in your house (months or years):
   ____________________________________________________________________
Part II. Sleep Habits: The following questions ask about your child’s sleep habits. If you have more than one child with you, please answer for the same child as in Section I.

1) How much sleep does the average child this age need in 24 hours (including nighttime and naps)? (You may write a number (e.g., 8 hours) or a range (e.g., 8-10 hours)) ________________________ hours

2) Does your child have a regular bedtime? on week nights Yes___ No___
on weekend nights Yes___ No___

3) What time does your child usually go to bed? (Include hours and minutes, am or pm. You may write in one number (e.g., 8:30 p.m.) or a range (e.g., 7:00-9:00 p.m.))
on week nights _______________________________________
on weekend nights __________________________________________

4) Does your child have a regular wake time? on week days Yes___ No___
on weekend days Yes___ No___

5) What time does your child usually wake up? (Include hours and minutes, a.m. or p.m. You may write in one number or a range)
on week days _________________________
on weekend days _____________________________________

6) On average, what is the total time that your child naps each day? (Include hours and minutes) (If he/she does not nap, write in “0”) _________________________________ hours and minutes

7) How many nights per week are you or another adult present in the room when your child falls asleep? Every night or almost every night ____ A few nights a week ____ About once a week____ Rarely _____ Never _____

8) Which of the following does your child have in his/her bedroom? (check all that apply)
   TV___ Computer___ Cell phone___ Video games___ DVD player___

9) Does your child have a regular bedtime routine? Yes___ No___

10) As part of his/her bedtime routine, does your child Read/ get read to Yes___ No___
Watch TV Yes___ No___

11) How many cups or cans of caffeinated beverages (such as caffeinated soda/coffee/ice tea, energy drinks) does your child typically drink each day? _______ cups or cans
Part III. Sleep Health Beliefs Please respond to the following statements for the same child as in Section I by circling the one answer you think is best for each question.

1) I believe my child gets enough sleep
   Agree _____
   Neither agree nor disagree _____
   Disagree _____

2) I believe my child has healthy sleep habits
   Agree _____
   Neither agree nor disagree _____
   Disagree _____

3) I plan to change my child’s sleep habits
   Agree _____
   Neither agree nor disagree _____
   Disagree _____

IV. Healthy Sleep Knowledge Please circle whether you think the following statements are True (T), False (F) or you Don’t Know (DK).

1) Children who don’t get enough sleep are more likely to be underweight than overweight
   T    F    DK

2) Snoring in a child indicates that he or she is sleeping well
   T    F    DK

3) Being either under or over-active can both be warning signs that a child is not getting enough sleep
   T    F    DK

4) Watching TV in their bedroom makes it more difficult for children to fall asleep
   T    F    DK

5) Children should have the same bedtime and waketime on weekdays and weekends
   T    F    DK

6) Children only need a bedtime routine if they are having trouble falling asleep
   T    F    DK

7) Well-rested children don’t need an alarm clock to wake up in the morning
   T    F    DK

8) The average preschooler (3-5 years) needs about 10 hours of sleep/24hrs
   T    F    DK

9) Being overweight can increase a child’s risk of sleep problems
   T    F    DK

THANK YOU VERY MUCH FOR YOUR TIME!
Appendix E:
Parental Knowledge of Healthy Sleep in Children, Dissertation, Post-Test

I. Sleep Health Beliefs Please respond to the following statements for the same child as in the first survey by circling the one answer you think is best for each question.
1) I believe my child gets enough sleep
   Agree _____
   Neither agree nor disagree _____
   Disagree _____
2) I believe my child has healthy sleep habits
   Agree _____
   Neither agree nor disagree _____
   Disagree _____
3) I plan to change my child’s sleep habits
   Agree _____
   Neither agree nor disagree _____
   Disagree _____
Please check all of the items which you plan to change about your child’s sleep:
   Take the TV out of his/her bedroom _____
   Set an earlier bedtime _____
   Reduce or eliminate caffeine _____
   Start using a bedtime routine _____
   Make bedtimes and waketimes the same every day _____
   Increase the amount of sleep he/she gets_____

II. Healthy Sleep Knowledge Please circle whether you think the following statements are True (T), False (F) or you Don’t Know (DK).
1) Children who don’t get enough sleep are more likely to be underweight than overweight
   T F DK
2) Snoring in a child indicates that he or she is sleeping well
   T F DK
3) Being either under or over-active can both be warning signs that a child is not getting enough sleep
   T F DK
4) Watching TV in their bedroom makes it more difficult for children to fall asleep
   T F DK
5) Children should have the same bedtime and waketime on weekdays and weekends
   T F DK
6) Children only need a bedtime routine if they are having trouble falling asleep
   T F DK
7) Well-rested children don’t need an alarm clock to wake up in the morning
   T F DK
8) The average preschooler (3-5 years) needs about 10 hours of sleep/24hrs
   T F DK
9) Being overweight can increase a child’s risk of sleep problems
   T F DK

THANK YOU VERY MUCH FOR YOUR TIME!
Appendix F: Sleep Diary

Please record sleep and wake times for your child each day for 7 days

### Sleep time:

<table>
<thead>
<tr>
<th>Time p.m.</th>
<th>Sunday</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
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</tbody>
</table>

### Wake time:

<table>
<thead>
<tr>
<th>Time a.m.</th>
<th>Monday</th>
<th>Tuesday</th>
<th>Wednesday</th>
<th>Thursday</th>
<th>Friday</th>
<th>Saturday</th>
<th>Sunday</th>
</tr>
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</tbody>
</table>
Appendix G: Brochure
As seen on WordPress website

Healthy Sleep: A Caregiver’s Guide

A Pamphlet for Caregivers: Click on each panel to get a closer look!

Here is the link to Survey #2. When you're done reading the pamphlet, copy and paste the link into your browser to take the survey. Thank you!

https://runyhunter.com/latexform/04_A277rO0o3387Q0D

Sleep and Your Child’s Health

A good night's sleep is important for the health and well-being of children. Why is sleep so important? Sleep is not just a time to rest; it is an active period of body growth and repair, especially in children. Just like eating a well-balanced diet and exercise, getting a enough amount of sleep is necessary to keep kids healthy. This pamphlet will help you better understand the sleep needs of your child.

A secure sense of security, restful sleep, and a calm environment help your child to feel safe. Nighttime is the perfect time to teach your child healthy sleep habits.

Recommendations for Sleep

<table>
<thead>
<tr>
<th>Age</th>
<th>Sleep Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-11 months</td>
<td>14-15 hours</td>
</tr>
<tr>
<td>1-3 years</td>
<td>12-14 hours</td>
</tr>
<tr>
<td>3-5 years</td>
<td>11-12 hours</td>
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</tbody>
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Trouble with Sleep

Sleep problems affect almost everyone at some point. These problems range from difficulty falling or staying asleep to problems with breathing during sleep. Children who have trouble sleeping might have more difficulty functioning during the day. Poor sleep is often linked to health problems, such as poor growth, problems with the immune system, and even learning difficulties. Get your child the help that they need.

Visit the website for more information on the connection between sleep and health.

It is important to be aware of the warning signs that your child may not be getting enough sleep. Do not allow any concerns with poor sleep to remain.

Signs That Your Child May Not Be Getting Enough Sleep

A well-rested child awaken’s without difficulty in the morning, plays and eats well the day. In addition, in addition to children’s development, a child getting adequate sleep may exhibit any of the following.

1. Feels refreshed and alert.
2. Wakes up feeling refreshed.
3. Requires fewer naps or nightmares.
4. Eats and sleeps well.
5. Does not have behavioral problems.

Healthy Sleep: A Caregiver’s Guide

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https://runyhunter.com/latexform/04_A277rO0o3387Q0D

Sleep and Your Child’s Health

A good night's sleep is important for the health and well-being of children. Why is sleep so important? Sleep is not just a time to rest; it is an active period of body growth and repair, especially in children. Just like eating a well-balanced diet and exercise, getting a enough amount of sleep is necessary to keep kids healthy. This pamphlet will help you better understand the sleep needs of your child.

A secure sense of security, restful sleep, and a calm environment help your child to feel safe. Nighttime is the perfect time to teach your child healthy sleep habits.

Recommendations for Sleep

<table>
<thead>
<tr>
<th>Age</th>
<th>Sleep Need</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-11 months</td>
<td>14-15 hours</td>
</tr>
<tr>
<td>1-3 years</td>
<td>12-14 hours</td>
</tr>
<tr>
<td>3-5 years</td>
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Trouble with Sleep

Sleep problems affect almost everyone at some point. These problems range from difficulty falling or staying asleep to problems with breathing during sleep. Children who have trouble sleeping might have more difficulty functioning during the day. Poor sleep is often linked to health problems, such as poor growth, problems with the immune system, and even learning difficulties. Get your child the help that they need.

Visit the website for more information on the connection between sleep and health.

It is important to be aware of the warning signs that your child may not be getting enough sleep. Do not allow any concerns with poor sleep to remain.

Signs That Your Child May Not Be Getting Enough Sleep

A well-rested child awaken’s without difficulty in the morning, plays and eats well the day. In addition, in addition to children’s development, a child getting adequate sleep may exhibit any of the following.

1. Feels refreshed and alert.
2. Wakes up feeling refreshed.
3. Requires fewer naps or nightmares.
4. Eats and sleeps well.
5. Does not have behavioral problems.

Healthy Sleep: A Caregiver’s Guide

A Pamphlet for Caregivers: Click on each panel to get a closer look!

Here is the link to Survey #2. When you're done reading the pamphlet, copy and paste the link into your browser to take the survey. Thank you!

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DID YOU KNOW? Fight, sleep, and exercise are related.
Children who do not get enough sleep are at a much higher risk of being overweight or obese. How can we help them maintain healthy weight?

- Encourage regular physical activity
- Limit screen time before bedtime
- Create a calm bedtime routine
References

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