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An Examination of Napping and Psychosocial Functioning in Preschool Children

Brian Kenneth Crosby
University of Southern Mississippi

The University of Southern Mississippi

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Abstract of a Dissertation
Submitted to the Graduate Studies Office
of The University of Southern Mississippi
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Philosophy

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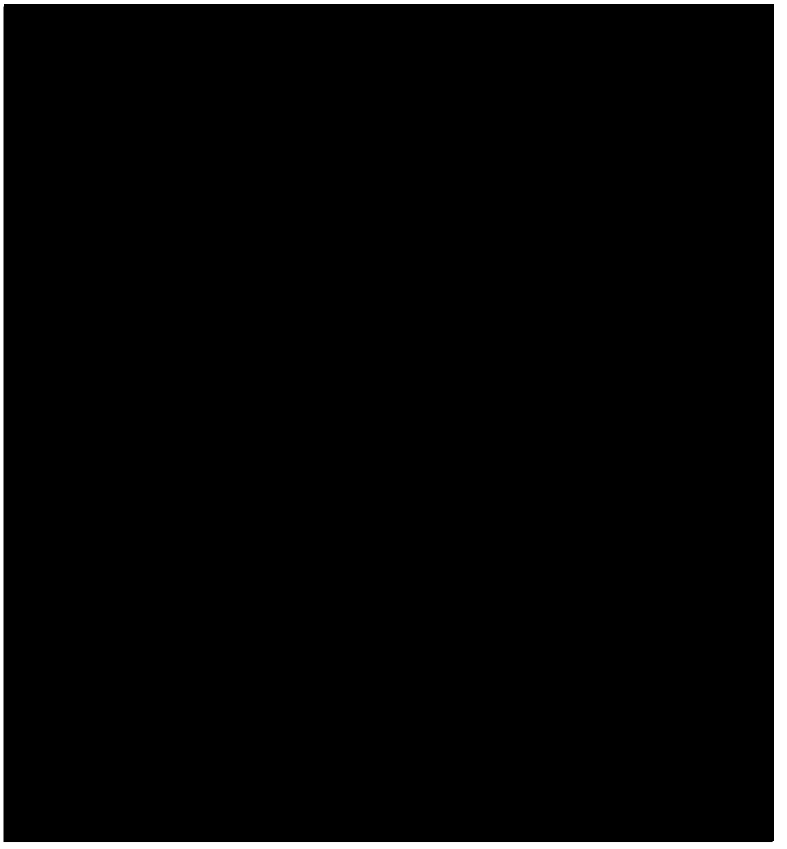

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ABSTRACT

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The objectives of this study were to examine racial differences in the sleep distribution of 4- to 5-year-old children, to assess the relationship between napping and psychosocial functioning, and to determine if there are racial differences in the relationship between napping and psychosocial functioning. The sleep behavior of 67 children (52.2% non-Hispanic White; 55.2% male) 4 to 5 years old from a community sample was assessed through caregiver-report and actigraphy. Psychosocial functioning was examined through caregiver-report and laboratory tasks designed to assess aspects of behavioral and emotional functioning. Results indicate that, compared to White children, Black children nap significantly more on weekdays, had significantly shorter nocturnal sleep durations on weekdays and weekends, and obtained significantly less sleep across the week. Caregivers of non-napping children reported significantly more symptoms of hyperactivity, depression, and anxiety. Additionally, in the laboratory, non-napping children exhibited significantly less sadness than napping children on a distressful task. There were no significant interactions between race and napping on any measures of psychosocial functioning.

ACKNOWLEDGMENTS

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CHAPTER I

INTRODUCTION

Sleep in Early Childhood

Sleep in young children is marked by several changes that occur during the first few years of life, including changes in sleep amount, distribution, and structure. On average, a newborn infant sleeps between 15 and 17 hours each day (Sheldon, Spire, & Levy, 1992). This daily sleep amount declines steadily to approximately 11 hours by the age of 5 years (Wolfson, 1996). The infant sleep/wake pattern is characterized by several periods of both sleep and wake throughout the 24-hour period. During the next few years, sleep begins to be distributed into a primary nocturnal period and two daytime naps, one in the morning (which typically disappears around the age of 2 years) and one in the afternoon (Iglowstein, Jenni, Molinari, & Largo, 2003; Weissbluth, 1995). It is generally acknowledged that between the ages of 2 and 5 years, afternoon naps are given up and an adult-like pattern of sleep emerges with a consolidated period of sleep occurring only at night (Sheldon, Spire, & Levy, 1992). Another prominent change in sleep between birth and the age of 5 years occurs in sleep architecture. Although infants cycle through periods of wake, active sleep (REM), and quiet sleep (nREM) like adults, these states are not organized into an adult-like pattern across the 24-hour period until about the age of 5 years (Anders, Sadeh, & Appareddy, 1995).

It is believed that the maturation of the circadian and homeostatic systems, known to regulate sleep/wake in adults, is responsible for the changes observed in sleep during early childhood (Jenni, Borbely, & Achermann, 2004). In adults, the circadian system, or "internal clock," influences alertness and sleep tendency independent of prior sleep or

waking (Borbely, 1982). Sleep propensity across the 24-hour period reaches its height in the early morning and its low in the early evening. In comparison, the homeostatic system in adults is influenced by prior sleep/wake history. This system builds "pressure" to sleep with extended wakefulness and releases this pressure during periods of sleep (Borbely, 1982). When functioning optimally, these two systems work in tandem to maintain alertness during the day and facilitate sleep at night.

Interplay of Biology and Culture in Sleep

One of the most basic questions about child development is how nature and nurture interact to influence the developing child. Several theorists have proposed transactional models to describe the interplay between culture and biology in human behavior (e.g., Chess & Thomas, 1984). Applying this approach to human behavior requires that "behavioral attributes must always be considered in their reciprocal relationship with other characteristics of the organism and in their interaction with environmental demands, opportunities, and stresses" (Chess & Thomas, 1984, p. 20). Chess and Thomas integrate the transactional model into their concept of "goodness of fit":

> Goodness of fit results when the organism's capacities, motivations and style of behaving and the demands and the expectations of the environment are in accord. Such consonance between organism and environment potentiates optimal positive development. Should there be a dissonance between capacities and characteristics of the organism on the one hand and the environmental opportunities and demands on the other, there is poorness of fit, which leads to maladaptive functioning and distorted development. (p. 21)

In relation to sleep, goodness of fit refers to the match between bioregulatory sleep-wake capabilities (e.g., circadian system) and expectations, opportunities, and demands imposed by the social/family structures to which the individual belongs. Among adolescents and adults, social demands (e.g., school start times, shift work) limit the ability of individuals to obtain sufficient amounts of sleep (e.g., Carskadon, 2004). This "poor fit" results in a variety of consequences, including decreased work productivity and increased motor vehicle accidents (Pack et al., 1995; Wolfson & Carskadon, 1998). It is likely that children's sleep opportunities are likewise influenced by social demands (e.g., parental sleep attitudes/behaviors, school schedules). Estimates of the incidence of sleep problems in children ranges from 11% to 54% (Beltramini & Hertzig, 1983; Jenni, Zinggeler, Iglowstein, Molinari, & Largo, 2005; Lozoff, Wolf, & Davis, 1984) and these problems can affect psychosocial functioning (see review below). It is unknown; however, to what extent these problems may be related to environmental demands resulting in insufficient sleep (i.e., poor fit).

Racial Differences in Sleep

Research on racial differences in sleep and sleep related variables may provide insight into the transactional influence of biology and culture on sleep. Recent years have seen an increase in the study and awareness of ethnic/racial differences across a wide variety of domains ranging from the use of safety belts in automobiles (Vivoda, Eby, & Kostyniuk, 2004) to the onset of puberty among children and adolescents (Wu, Mendola, & Buck, 2002). Some of these differences appear to be strongly influenced by biological factors and others seem to have a stronger cultural influence. In other areas, it is unclear as to what factors are driving these racial differences. Within the literature on sleep and

associated factors, racial differences have been highlighted in relation to several sleep problems in both children and adults.

Sleep-disordered breathing (SDB) refers to episodes of complete or partial obstruction of the upper airway during sleep (Redline et al., 1999). This obstruction is usually associated with snoring and daytime sleepiness. Research examining the relationship between race and sleep-disordered breathing in children, using a home sleep study, physical exam, and questionnaires, found that African American children between 2-18 years of age were 3.5 times more likely to have sleep-disordered breathing than were Caucasian children (Redline et al., 1999). Similarly, a study of more than 500 adults found that African Americans were significantly more likely to exhibit symptoms of obstructive sleep apnea (OSA) than Caucasians based on information from questionnaires and a physical exam (Friedman, Bliznikas, Klein, Duggal, Somenek, & Joseph, 2006). Additionally, the partners of African American participants, compared to those of Caucasian participants, were more likely to tolerate the irregular breathing and snoring that accompany OSA, resulting in fewer African Americans seeking treatment for the disorder. The results of these studies are consistent with the conclusion that sleep-related breathing disorders occur more frequently in African Americans.

Similar racial differences have been found in Sudden Infant Death Syndrome (SIDS). SIDS is among the leading causes of death in the post-neonatal period and a significant concern to child welfare workers (Centers for Disease Control, 2008; Hauck et al., 2002). Research indicates that SIDS occurs twice as often in African American infants as it does in Caucasian infants (Murphy, 2000). Efforts have been made in recent years to educate the public regarding sleeping positions that can reduce the risk of SIDS,

but research indicates that sleep position is just one of several factors, possibly including biological factors, that may contribute to SIDS (Hauck et al., 2002).

Asthma is another disorder affecting sleep that has been found to occur more frequently in African American children. Roberts (2002) found that African American children aged 1 to 5 years are twice as likely to have both an asthma diagnosis and hospitalization related to asthma than Mexican American and Caucasian children. Asthma is of concern to sleep researchers because night wheezing can interrupt nightly sleep patterns resulting in lower sleep quality.

Racial differences in the severity of narcolepsy symptoms, Periodic Leg Movement Disorder (PLMD), and daytime sleepiness have also been identified. Narcolepsy is a central nervous system disorder characterized by excessive daytime sleepiness and abnormal REM sleep. Harsh, Peszka, Hartwig, and Mitler (2000) studied the effects of narcolepsy across racial groups and found that narcolepsy may have more serious consequences for African American patients. Compared to Caucasians, African Americans had significantly poorer sleep and significantly greater daytime sleepiness. PLMD is characterized by "periodic episodes of repetitive and stereotyped limb movements during sleep, often associated with a partial arousal or an awakening" (Mindell & Owens, 2003, p. 124). Drake et al. (2003) found that African Americans had more than a twofold lower prevalence of PLMD in comparison to non-African Americans. Studies of daytime sleepiness have also identified racial differences. Among a variety of possible triggers, daytime sleepiness can be produced by sleep of insufficient length or poor quality, inconsistent sleep/wake schedules, or sleep disorders. Based on

data from the Epworth Sleepiness Scale, Myers and colleagues (2003) found that African Americans reported significantly greater daytime sleepiness than Caucasians.

A final area within the sleep literature that has highlighted racial differences is co-sleeping. Co-sleeping involves children sharing a bed with another child or with an adult. Research has clearly demonstrated that co-sleeping occurs more frequently in African American families compared to Caucasian families (Landrine & Klonoff, 1996; Lozoff, Wolf, & Davis, 1984; Ward, 1971). Landrine and Klonoff (1996) concluded that the practice of co-sleeping is a function of culture, rather than social class. The racial differences in co-sleeping are of concern because it can negatively impact the quality of nocturnal sleep (Mindell & Owens, 2003).

Racial differences in sleep problems and practices have been established clearly within a growing body of research. Although the sources of these differences are not fully understood, the consequences (i.e., psychosocial/cognitive functioning) can be serious. Further investigation into racial differences, as well as the causes and implications of these differences is needed.

Sleep and Daytime Functioning

Although the function of sleep remains largely unknown, its importance to early development is suggested by the fact that up to early school age, children spend more time sleeping than in any other activity (Mindell & Owens, 2003). Studies of sleep-wake patterns have found that more than half of the first 24 months of life are spent sleeping, and that during the following 3 years sleep and wakefulness occur in equal proportions (Anders, Sadeh, & Appareddy, 1995). The first 5 years of life are also a critical time for physical growth, including brain development. Although growth and functional

development of specific parts of the brain continue into adulthood, a child's brain has nearly reached its adult size by the time a child reaches his or her sixth birthday (Papalia, Olds, & Feldman, 2004). In addition to physical changes, the infancy and preschool periods are times of significant cognitive, social, and emotional development. Among a variety of tasks, children are learning to regulate their mood, solve problems, and establish relationships with peers. During the period in which these complex and rapid maturational advances occur, the brain is in a state of sleep a large percentage of the time (Dahl, 1996).

Psychosocial development is influenced both by genetic factors and the quality of the environment in which the child lives (Siegler, DeLoache, & Eisenberg, 2003). In order to effectively navigate their environment, children must be alert, responsive, and emotionally balanced. These factors are known to be related to the quantity and quality of sleep (Dahl, 1996). Several retrospective studies of children's sleep and their daytime functioning have shown that sleep is related to behavioral, social, emotional, and cognitive functioning (e.g., Minde, Faucon, & Falkner, 1994; Stein, Mendelsohn, Obermeyer, Amromin, & Benca, 2001).

Behavioral Functioning. The relationship between disturbed sleep and behavioral problems has been studied by a number of research groups. Bates, Viken, Alexander, Beyers, and Stockton (2002) examined the relationship between sleep variability (bedtimes and total nocturnal sleep duration) and teacher ratings of adjustment and problem behaviors among preschool children. Greater variability in sleep was significantly associated with increased behavior problems and poorer adjustment, suggesting that children on a more regular sleep schedule are better adjusted in preschool

than those who do not have consistent sleep schedules. In a second study of sleep and behavior problems, Bruni, Lo Reto, Miano, and Ottaviano (2000) found that scores on externalizing domains of the Child Behavior Checklist (CBCL) were associated with parent-reported sleep problems among Italian nursery school children. Specifically, night wakings and daytime sleepiness were associated with higher total scores on the externalizing symptoms index, and respiratory disorders in sleep were associated with increased aggressive behavior.

Other investigations of sleep and behavioral functioning have found similar relationships. Lavigne et al. (1999) reported that for 2- to 5-year-old children, less night sleep and less sleep across the 24-hour period were associated with increased total behavior problems on the CBCL. In the same sample, 2- to 3-year-old children obtaining less than 10 hours of sleep each day were significantly more likely to have externalizing behavior problems. In a final study, researchers investigated the effects of an intervention program for 1- to 3-year-old children with severe behavioral sleep problems and found that children with sleep problems had significant deficits across a variety of psychosocial domains, including behavior problem ratings on the CBCL (and a modified version of the CBCL used with younger children; Minde et al., 1994). Following a parent training program targeting sleep behaviors, a significant reduction in behavior problems was reported for the experimental group, but not for the control group, indicating that some of the behavioral issues subsided after treatment of the sleep problems. Collectively, these studies indicate that children's sleep problems negatively impact their behavioral functioning during the day.

Social Functioning. Researchers have also examined the relationship between sleep and social functioning in children. In the intervention study described above (Minde et al., 1994), children with sleep problems also had significantly poorer parent rated social skills than controls. Similar to behavior problems, ratings of social skills improved after parent training for sleep problems. Stein et al. (2001) examined the relationship between parent ratings on the CBCL and a parent report of children's sleep problems (Sleep Behavior Questionnaire [SBQ]) in 4- to 12-year old children. Results indicated that poor social competence predicted a significant portion of the variance in both the Parasomnias and Tiredness factors of the SBQ. A final study (Bates et al., 2002) found a significant relationship between variability of sleep (described in Behavioral Functioning section above) and family stress. These studies suggest that sleep disturbances are related not only to the social functioning of the child, but also to the functioning of the social structures to which the child belongs.

Emotional Functioning. Three of the studies described above also examined the emotional functioning of children in relation to sleep problems. Along with the behavioral and social skills problems mentioned above, Minde et al. (1994) found that children with behavioral sleep problems were more irritable and dysregulated in terms of their mood than children without sleep problems. Parent training targeting sleep problems improved not only the sleep difficulties, but also children's emotional functioning. Bruni et al. (2000) reported significant relationships between internalizing (e.g., depression) symptoms on the CBCL and both bedtime problems (e.g., resistance) and daytime sleepiness in nursery school children. Lastly, Stein et al. (2001) found that anxiety and depression explained a significant portion of the variance in the Parasomnias and

Insomnia factors of the SBQ. In addition, somatic complaints explained a significant portion of the variance in the Tiredness and Insomnia factors. The ability of children to regulate their mood and emotions has clear implications for social interaction and behavioral functioning. It is therefore not surprising that sleep is importantly related to variables within each of these domains.

Cognitive Functioning. A final area of functioning found to be related to sleep is cognitive functioning. Several different aspects of cognitive functioning have been studied in relation to sleep. Following a three day period of sleep stabilization, Sadeh, Gruber, and Raviv (2003) studied the effects of sleep-extension (extension of nocturnal sleep period by at least 30 minutes for three consecutive nights) and sleep-restriction (restriction of nocturnal sleep period by at least 30 minutes for three consecutive nights) in a group of 9- to 12-year-old children. Children were given a battery of neurobehavioral tasks prior to and following the sleep manipulation. At follow-up (six days following the initial testing session), the sleep-extension group showed improved performance on a memory task and a reaction time task whereas the sleep-restriction group did not improve. These results suggest that obtaining more sleep extends some cognitive benefits to children. The tasks included in this study have been found to be significantly correlated with classroom behaviors and achievement tests in other studies (Sadeh et al., 2003). Cognitive functioning can also be assessed in terms of the ability to sustain attention. Minde et al. (1994) found a significant relationship between sleep problems and attention problems in children. When academic achievement is used as a measure of cognitive functioning, two studies have demonstrated a relationship with poor sleep (Bruni, Antignani, Innocenzi, Ottaviano, & Ottaviano, 1995; Giannotti, Cortesi, &

Ottaviano, 1997). Bruni et al. (1995) found academic achievement to be related to sleep duration and sleep difficulties in a sample of 8- to 11-year-old children. More specifically, shorter sleep duration and increased sleep difficulties were related to poorer academic achievement. Giannotti et al. (1997) found that among primary and middle school children in Italy, failing children slept fewer hours and had later average bedtimes than children who were performing well in school.

It is clear from the literature that sleep is related to a child's behavioral, social, emotional, and cognitive functioning. Two points are worth noting in relation to the research described above. First, the correlational nature of these studies does not allow for causal conclusions regarding the impact of sleep on daytime functioning. Disturbed sleep could lead to disturbed daytime functioning or conversely, disturbed daytime functioning could lead to disturbed sleep. Alternatively, both could be related to some third variable, such as parenting practices, that influences the relationships reported. Second, all studies to date have focused on the relationship between nocturnal sleep and daytime functioning. No known research to date has looked specifically at the relationship between the distribution of sleep, specifically napping behavior, and daytime functioning in children. Given recent reports of racial/cultural differences in napping behavior (see below), such an examination seems warranted.

Napping Differences in Children

Reports of napping behavior in young children have indicated that the proportion of children napping declines steadily from close to 100% at the age of 2 years to less than 10% at the age of 6 years (Anders, 1982; Iglowstein et al., 2003; Thorleifsdottir, Bjornsson, Benediktsdottir, Gislason, & Kristbjarnarson, 2002; Weissbluth, 1995).

Unfortunately, these reports are limited by two factors. First, current research describing the napping behavior of children is based solely on caretaker report (Iglowstein et al., 2003; Thorleifsdottir et al., 2002; Weissbluth, 1995). Second, most of these reports are based on samples of White children (Thorleifsdottir et al., 2002; Weissbluth, 1995), failing to account for the influence of race/culture on the regulation of napping behavior (Webb & Dinges, 1989; Worthman, 2002).

Two additional studies have suggested that traditional beliefs about children's napping may not be applicable to children of all races/cultures. In an analysis of sleep and behavior problems among preschoolers seen in pediatrician's offices, significant differences were found in the sleep of "Minority" children as compared to White children (Lavigne et al., 1999). Based on parental report, minority children, compared to White children, took significantly more (Minority: 4.13 naps/week; White: 2.67 naps/week) and longer (Minority: 1.26 hrs.; White: 1.05 hrs.) daytime naps. Despite these differences in napping, the total amount of sleep across the 24-hour period (nocturnal and diurnal sleep) was not significantly different between the races as White children obtained significantly more nocturnal sleep. In a more recent investigation of children's napping, Crosby, LeBourgeois, and Harsh (2005) found significant differences in the napping behavior of Black and White children. Whereas a majority of White children gave up their naps between 5 and 6 years of age, close to 90% of Black children continued to nap one or more days each week at the age of 5 years. Further, close to 40% of Black children continued to nap one or more days per week at the age of 8 years. Similar to Lavigne et al., White children in this study obtained significantly more nocturnal sleep than Black children resulting in no racial differences in total sleep each day. Given the increasingly

complex racial makeup of the United States, these studies suggest that normative data on children's sleep may need to be organized by racial group. There is a need to replicate these data with objective measures of sleep, such as actigraphy, rather than relying solely on caretaker report.

The napping differences found in these studies may be related to a number of unexplored factors, including (1) different rates of attendance at preschool/daycare programs that have a regularly scheduled nap period, (2) differences in awareness of afternoon sleep tendency by children and/or their caretakers, (3) cultural or family-related differences in attitudes about the acceptability of a regular afternoon nap, and (4) genetic differences in the functioning of the chronobiological and/or homeostatic mechanisms regulating sleep. Further, it is unclear what impact, if any, the racial differences in sleep distribution reported in these studies have on children's psychosocial functioning. Although an increase in externalizing behaviors was significantly related to lower amounts of 24-hour sleep in the preschoolers studied by Lavigne et al. (1999), the impact of sleep distribution on this relationship was not examined, especially as it related to race. Crosby et al. (2005) found no relationship between napping behavior and caregiver-reported psychosocial functioning among a subset of 3- to 5-year-old children in their sample. As mentioned above, inadequate and poor-quality sleep is associated with disturbances of behavior and mood in children (Lavigne et al., 1999; Minde et al., 1994; Sadeh et al., 2003); however, no known research has systematically examined the association between napping and psychosocial functioning in children.

Statement of Purpose

The first purpose of the present study was to replicate and extend previous research showing racial differences in napping among children. Parent report and an objective measure of sleep (actigraphy) were used to assess preschool aged (4- to 5-year-old) children's sleep patterns on weekdays and weekends. The second purpose of the current study was to examine the relationship between napping and daytime functioning in preschool children and to explore possible racial differences in this relationship. The following research questions were addressed in the current study:

Question 1: Are there racial differences in the distribution of 4- to 5-year-old children's sleep across the 24-hour period?

Question 2: What is the relationship between napping and indicators of psychosocial functioning in 4- to 5-year-old children?

Question 3: Are there racial differences in the relationship between napping and indicators of psychosocial functioning in 4- to 5-year-old children?

CHAPTER II

METHODOLOGY

Participants

Caretakers of 4- to 5-year-old children were recruited from various sites in the general community (e.g., churches, daycares, community events) and informed about the study through multiple strategies (e.g., flyers, face-to-face interactions, media advertisement) aimed at attaining a heterogeneous group of children. Snowball sampling (Goodman, 1961) was also employed, whereby families participating in the study referred other families for participation. A total of 73 children were enrolled into the study. Data from a total of 67 children were included in the present analyses. Five cases were excluded from the analyses because the children were identified as belonging to racial groups other than the primary study groups (i.e., Black, White). Children identified by caretakers as American Indian ($n = 1$) and multi-racial ($n = 4$) were excluded after enrollment. Another case was excluded due to invalid caretaker-report and loss of the actigraph. All study participants were children between the ages of 4 and 5 years whose caretakers were fluent in the English language and had telephone access. Children were excluded from this study prior to participation if they were attending, or had previously attended, kindergarten, or if they were regularly taking medications that might affect sleep or alertness (e.g., psychostimulants, anticonvulsants).

The sample for the present study consisted of 67 children (37 males, 30 females) aged 48 to 71 months (56.0 ± 5.7 months). Table 1 presents the characteristics of the total sample and the 35 non-Hispanic White (52.2%; hereafter referred to as "White") and 32 Black (47.8%) children in the study. The mean ages of White and Black children were

statistically equal (56.1 ± 6.5 vs. 55.9 ± 4.8 months, respectively) as were the number of Black and White children of each sex. The number of children in the family was comparable for White and Black children. Caretakers of White and Black children

Table 1: *Sample Characteristics for Study Groups.*

Characteristic	**Total Sample** ($n = 67$)	**White** ($n = 35$)	**Black** ($n = 32$)	**Significant Comparisons**[a]
Age (in months)[b]	56.0 (5.7)	56.1 (6.5)	55.9 (4.8)	*n.s.*
Sex (% male)	55.2	57.1	53.1	*n.s.*
Number of children in family[b]	2.0 (1.0)	2.2 (0.9)	1.8 (1.1)	*n.s.*
Regular medication - past month (% yes)	26.9	20.0	34.4	*n.s.*
Chronic medical or psychological condition (% yes)	17.9	17.1	18.8	*n.s.*
Attends school/day care (% yes)	65.7	65.7	65.6	*n.s.*
Hours per week in school/day care[b, c]	31.1 (14.2)	27.5 (15.3)	35.3 (12.0)	*n.s.*
Time school/day care starts[b, c]	8:08 (0:56)	8:29 (0:45)	7:45 (0:58)	$t = 2.8, p < .01$
Mother's age[b]	30.5 (5.7)	31.1 (5.3)	29.7 (6.1)	*n.s.*
Four-factor SES[b]	42.9 (13.3)	46.9 (11.9)	38.5 (13.4)	$t = 2.7, p < .01$
School/summer data collection (% summer)	62.7	51.4	78.1	$\chi^2 = 6.2$, p = .012
CSHQ Total Score	47.6 (7.8)	46.0 (7.9)	49.5 (7.4)	*n.s.*

Note: SES = socioeconomic status; CSHQ = Children's Sleep Habits Questionnaire
[a] Comparisons between White and Black children; [b] *M* (*SD*); [c] Only includes children attending school/day care

reported statistically equal rates of regular medication use and chronic medical/psychological conditions. Comparable numbers of White and Black children were reported to attend a school or daycare program, and the hours they attended these programs each week did not differ significantly. Black children were, however, reported to go to school or daycare significantly earlier than White children (White: 8:29; Black: 7:45; $t = 2.8, p < .01$). Mothers of White and Black children did not differ significantly in age. SES was higher among White families than among Black families (White: 46.9; Black 38.5; $t = 2.7, p < .01$). A significantly larger proportion of data from Black families was collected during summer months compared to White families (χ^2 [1, $N = 67$] = 6.2, p = .012). Based on data from the CSHQ, caretaker-reported sleep problems did not differ between White and Black children.

Materials

Child Demographics/Sleep Questionnaire (Appendix A). A questionnaire completed by caregivers that obtains basic information regarding the child's demographic status, medication use, medical/psychological conditions, and current sleep behaviors (e.g., bed time, wake time, napping).

Four Factor Index of Social Status (Hollingshead, 1975). A measure that provides an index of socioeconomic status (SES) based on the occupation and educational level of the household contributor(s). Cut-off scores provide several SES categories: levels I (55-66); II (40-54); III (30-39); IV (20-29); and V (8-19). Lower numbered categories correspond to higher SES. This information was obtained as part of the Child Demographics/Sleep Questionnaire.

Behavioral Assessment System for Children, Second Edition, Parent Rating Scale - Preschool (BASC-II; Reynolds & Kamphaus, 2004). The BASC-II is a 134-item paper-

and-pencil normative instrument that requires parents or other caregivers to rate how often specific behaviors occur on a four-point scale (Never, Sometimes, Often, Almost Always). The preschool version is used for children between 2 and 5 years of age. The BASC-II assesses adaptability, activities of daily living, aggression, anxiety, attention problems, atypicality, depression, functional communication, hyperactivity, social skills, somatization, and withdrawal. It yields composite scores for adaptive skills, externalizing problems, internalizing problems, and a behavioral symptoms index. The BASC-II provides normative data for both general and clinical samples. Within the general normative sample, the BASC-II has adequate internal consistency (α = .70 to .93) and test-retest reliability (α = .72 to .86) for research and clinical tools.

Children's Sleep Habits Questionnaire (CSHQ; Owens, Nobile, McGuinn, & Spirito, 2000). The CSHQ is a 33-item caregiver-report used as a screening measure for common childhood sleep problems (e.g., bedtime resistance, sleep onset delay, night wakings, parasomnias, sleep duration, sleep disordered breathing, daytime sleepiness). Caregivers rate how often specific sleep-related behaviors occur on a three-point scale (Rarely, Sometimes, Usually). The child's level of sleepiness in specific situations is also rated on a three-point scale (Not Sleepy, Very Sleepy, Falls Asleep). The CSHQ can be used with children between 4 and 12 years of age. The CSHQ Total Scale has adequate reliability (α = .88) and discriminates between children with and without sleep problems (Owens, Nobile, McGuinn, & Spirito, 2000).

Sleep-Wake Diary (Appendix B). The sleep-wake diary is a daily diary that documents the child's bedtime, wake time, naps, total sleep time, and any periods the activity monitor is not worn. When compared to actigraphy and PSG sleep parameters, sleep

diaries have adequate validity and reliability for use in research and clinical practice (Kushida et al., 2001). Included within the sleep diary are daily parent-ratings of the child's mood, alertness, stress, and excitement.

Actigraphy. The actigraph is a watch-size monitor that allows for the continuous recording of sleep-wake states by measurement of motor activity (Kushida et al., 2001). Model AW64 Actigraphs are accelerometers with a sensitivity of less than .01 g, and a sampling rate of 32 Hz. (Respironics, Inc., 2006). This device collects activity data at a chosen epoch length (i.e., .25 min, .5 min, 1 min, 2 min, 10 min, or 15 min). After downloading the actigraphic data, epochs are scored as sleep or wake by Actiware Software – v5.04 (Respironics, Inc., 2007). The AW64 Actigraph uses an algorithm that modifies the activity counts during a single epoch by the level of activity produced in the surrounding 2-minute time period. If this final activity count is above a specified threshold (low = 80, medium = 40, high = 20), the epoch is scored as wake. Kushida and colleagues (2001) have shown that in comparison to PSG, the sleep-wake algorithm is excellent in detecting sleep (sensitivity = .92) and adequate in identifying wake (specificity = .50) in adults. Studies have also established the reliability and validity of actigraphy, compared to polysomnography ("gold standard"), in the study of sleep in children (DiLeo, Umlaur, Makris, & Orji, 2005). Along with the study of sleep, several studies have validated the use of actigraphy in assessing daytime physical activity in children (Finn & Specker, 2000; Puyau, Adolph, Vohra, & Butte, 2002; Puyau, Adolph, Vohra, Zakeri, & Butte, 2004).

The Actiware Software (version 5.04) package computes a variety of sleep summary statistics. The sleep summary variables used in this study include: *Start Time* –

the first minute of at least 3 consecutive minutes of scored sleep within the scoring interval (researcher set parameter from sleep diary); *End Time* – the last minute of at least 5 consecutive minutes of scored sleep just prior to the end of the scoring interval (researcher set parameter from sleep diary); *Interval Duration* - the time elapsed between the Start Time and the End Time of the given interval; *Scored Total Sleep Time* – the total number of epochs between the Start Time and the End Time of the given interval scored as sleep by the Actiware software multiplied by the epoch length in minutes; *Percent Sleep* – the percentage of Scored Total Sleep Time (Scored Total Sleep Time divided by [Interval Duration minus Total Invalid Time] multiplied by 100). Inter-scorer reliability was calculated as the percent agreement between researcher set parameters (i.e., Start Time and End Time). In the current sample, 24% of cases were scored independently by two researchers trained in the scoring procedures with the average inter-scorer reliability calculated at 97% (range 89-100%).

The Laboratory Temperament Assessment Battery, Preschool Version (Lab-TAB; Goldsmith, Reilly, Lemery, Longley, & Prescott, 1999). The Lab-TAB is an instrument designed to assess aspects of psychosocial development in preschool children. The Lab-TAB consists of 33 *episodes*, or structured tasks, that cover five broad dimensions (fearfulness, distress, joy/pleasure, interest/persistence, and activity level). These tasks, or variations of these tasks, have been used in other research examining the emotional and behavioral functioning of preschool children (e.g., Campbell, Szumowski, Ewing, Gluck, & Breaux, 1982; Gilliom, Shaw, Beck, Schonberg, & Lukon, 2002; Kochanska, Murray, Jacques, Koenig, & Vendergeest, 1996; Wakschlag et al., 2005). The internal consistency of the Lab-TAB episodes is acceptable with average Cronbach alpha coefficients for

episodes ranging from .62 to .94 (P. Clark, personal communication, July 18, 2008). Video recordings of each episode are scored following the completion of each series of tasks by trained researchers. Inter-rater reliability was calculated as the percent agreement between raw scores for each of the variables coded. In the current sample 31% of cases were coded independently by two researchers trained in the coding procedures. Inter-rater reliability for all variables was greater than 82% (range 82.5% to 100%). For the current study, four episodes were selected that assess areas of behavioral and emotional functioning known to be related to inadequate or poor-quality sleep (see review of 'Sleep and Daytime Functioning' above). A description of each episode is included below (see Appendices C-F for a detailed description of the administration and scoring procedures for each episode):

1) *Arc of Toys*. In this episode, the child is escorted into the observation room where a pre-arranged set of stimulus toys are presented on the floor. The child is instructed that he or she can play with any of the toys in the room. The child plays in the room for the duration of the task (5 minutes). The Arc of Toys task is an activity level episode.
2) *Bead Sorting*. In this episode, the examiner presents the child with a "chore" of sorting a container filled with various colored beads (i.e., 100 each of red, white, and blue beads) into smaller individual containers. After a brief demonstration of the task by the examiner, the child is left alone for 3 minutes to work on the sorting task. The examiner returns after 3 minutes and compliments the child on his or her help. The Bead Sorting task is an interest/persistence episode.

3) *Tower of Patience*. In this episode, the examiner introduces a game to the child that they will play together. The game involves building a tower out of blocks that are placed on the table between the child and the examiner. The rules of the game require that the child and the examiner take turns placing blocks on the tower. After the child places each block, the examiner waits for a preset period of time before placing his next block. The delay varies according to a predetermined schedule. Two trials of this task are presented to comprise the episode. The Tower of Patience task is an inhibitory control episode.
4) *Impossibly Perfect Circles*. In this episode, the examiner presents the child with a sheet of paper and a green marker. The examiner explains to the child that he needs the *perfect* green circle and asks the child to draw it for him. After the completion of each circle, the examiner critiques the circle (e.g., "That one is too small") and asks the child to draw another one. The task continues for 3 ½ minutes. At that time, the examiner praises the last circle drawn by the child and thanks the child for drawing the circles. The Impossibly Perfect Circles task is a distress episode.

Procedure

Potential participants were contacted by the researcher, given an explanation of the study, and screened to assure their child did not meet any of the exclusion criteria (e.g., kindergarten attendance). Those who met criteria for the study were scheduled to meet with the researcher for the first of three appointments at the University of Southern Mississippi Sleep Research Laboratory, or other designated location (e.g., Head Start).

During the first appointment, caretakers read and signed an institutional review board approved consent form (Appendix G) and completed the Children's Demographics/Sleep Questionnaire, the BASC-II, and the CSHQ. Following the completion of these forms, the caretaker was given a demonstration on using the actigraph and trained in completing the sleep diary. If the child was present during this meeting, the actigraph was placed on the child. If the child was not present, the parent placed the actigraph on the child at the next available opportunity. During the 7- to 14-day period following the initial meeting, the child wore the actigraph on his/her non-dominant wrist 24 hours each day, with the exclusion of water contact (i.e., bathing, swimming). The caretaker was responsible for pressing the event marker on the actigraph when the child went down for naps, at bedtime ("lights out"), upon waking from naps or nighttime sleep, and any time the actigraph was removed/reapplied. The caretakers were also responsible for completing the Sleep-Wake Diary on a daily basis during this period.

At the time of the second appointment, occurring one afternoon between 3:00 p.m. and 6:00 p.m. during the period that the child was wearing the actigraph, the caretaker brought the child to complete the Lab-TAB tasks with the researcher. The episodes were presented in the same order for each child (i.e., Arc of Toys, Bead Sorting, Tower of Patience, Impossibly Perfect Circles). Administration of these tasks took approximately 25 minutes. Video recordings of each session were made and scored following the sessions. The episodes were terminated if a child became too upset during the administration ($n = 1$).

At the conclusion of the evaluation period, the researcher met with the caretaker for a third appointment to download the data from the actigraph and collect the Sleep-

Wake Diary. In order to resolve any discrepancies between the actigraphic record and the Sleep-Wake Diary, actigraphy data was downloaded, printed, and reviewed with the caretaker prior to the end of this meeting. All participants were rewarded with a $20 gift card to a local retailer and coupons for free kid's meals at a local restaurant ($10 value) after completing the study requirements.

Prior to data collection, all actigraphs were initialized to record data at 1-minute epochs. Each sleep period was scored according to the Sadeh sleep-scoring algorithm for the period encompassing 30 minutes before reported bedtime to 30 minutes after reported rise time (Acebo et al., 2005). All sleep periods were scored individually and were defined as usable if (a) the child was not sick or taking medications, (b) the caretaker did not report any atypical events (e.g., spending the night with grandparents), (c) the actigraph was attached to the child during the entire scoring period, (d) the actigraphic data corresponded with the caretaker's sleep diary, and (e) the diary was completed appropriately.

For the current study, a "nap" was defined as a sleep period $\geq$ 30 minutes in duration that is separate from the night time sleep period. A total of 21 naps (11% of all recorded naps) occurred while children were riding in a vehicle during the evaluation period. These naps were recorded by caretakers in the sleep diary, but could not be scored using the Actiware software due to the external motion created by the moving vehicle. To preserve these naps in the analyses, the caretaker-reported duration of the nap was multiplied by the average Percent Sleep for recorded naps that did not occur in a vehicle. For example, if the caretaker reported a nap length of 45 minutes and the child's average

Percent Sleep for other nap periods was 91%, a nap length of 41 minutes was entered (45 x .91 = 41.0).

Analyses

All analyses were performed with the aid of Statistical Package for Social Sciences (SPSS) version 15.0. Prior to analysis, all paper-and-pencil and coded data were entered twice into SPSS and checked for validity. Descriptive statistics were then computed and histograms were plotted for all variables. Outliers (i.e., scores $\geq$ two standard deviations from the mean) were identified and replaced with the next closest score. This strategy was implemented for data from the BASC-II (5% outliers), Lab-TAB (4%), caregiver-report of sleep (3%), and actigraphy data (1%).

Data from the Lab-TAB episodes were managed following the steps outlined in the manual (Goldsmith et al., 1999). Steps include: (a) compute descriptive statistics for individual variables within each episode, (b) plot histograms for all variables and determine if a transformation would help normalize the distributions, (c) convert scores for each variable into *z*-scores, (d) intercorrelate all variables (*z*-scores) within an episode, and (e) form composite variables consisting of individual variables that correlate significantly and logically fit together. The authors note that these data reduction techniques do not "always capture the temporal variability in child responses very well" (Goldsmith et al., 1999, p. 4), and that investigators might choose to carry individual scores into later analyses. The correlations between individual variables in each episode are presented in Tables 2-5. Scores for the Presence of Bodily Sadness and Presence of Bodily Anger variables within the Impossibly Perfect Green Circles episode did not

correlate significantly with the other variables within this episode and were therefore carried into the analyses separately.

This study included data analysis with multiple statistical tests. The significance level for all comparisons was set at $\alpha = .05$. Where appropriate, summary statistics are presented as means (*M*) and standard deviations (*SD*). Demographic data were analyzed using *t* tests for continuous variables and χ^2 tests for categorical variables.

The first question relates to racial differences in the distribution of sleep across the 24-hour period. Actigraphic data for at least two days ($M = 7.0$, $SD = 2.0$; range 2-13 days) were aggregated across participants prior to analysis. Only six children (9.7%) had fewer than the five days of actigraphy recording suggested for reliable measure of sleep (Acebo et al., 1999). Days per week napping for actigraphic data was computed according to the following formula: ([number of recorded naps / number of days the child wore the actigraph] x 7). Racial differences in caretaker-reported and actigraphic sleep variables were assessed with one-way analysis of covariance (ANCOVA) controlling for the child's age in months, sex, season of data collection (school-year, summer), and SES.

The second question concerns the relationship between napping and psychosocial functioning in preschool children. A series of one-way ANCOVAs, controlling for sex, were performed to assess the relationships between napping ("yes" or "no") and scores on the BASC-II and the Lab-TAB. A Mann-Whitney Rank Sum Test was used to examine differences in the Sadness and Anger variables from the Lab-TAB due to the non-normality of the distributions of these variables. Classifications based on caretaker-report and actigraphic data were analyzed separately. This same set of analyses were conducted for children classified as either habitual (i.e., naps $\geq$ 4 days per week) or non-

habitual nappers. Additionally, a series of logistic regression analyses were performed to assess the relationship between napping and risk for being in the "at-risk" *or* "clinically significant" range on the BASC-II. Prior to these analyses, BASC-II scores for each subscale and composite were dichotomized into either a typical group (scores ≤ 59) or a clinical group (scores ≥ 60).

The third question concerns interaction effects between race and napping in relation to psychosocial functioning. A 2 (race) x 2 (napping status) ANCOVA, controlling for sex, was performed to test for interactions between race and napping status ("yes" or "no") in relation to scores on the BASC-II and the Lab-TAB. A Mann-Whitney Rank Sum Test was used to separately examine differences in the Sadness and Anger variables from the Lab-TAB for Black and White children due to the non-normality of the distributions of these variables. Classifications based on caretaker-report and actigraphic data were analyzed separately. This same set of analyses were conducted for children classified as either habitual (i.e., naps ≥ 4 days per week) or non-habitual nappers.

Table 2: *Pearson Correlations Between Lab-TAB 'Arc of Toys' Variables*

Variables	Speed to Begin Play	Toys Manipulated	Vigor of Activity
Speed to Begin Play		.31*	.37**
Toys Manipulated			.74**
Vigor of Activity			

* Correlation significant at the .05 level (2-tailed);
**Correlation significant at the .01 level (2-tailed)

Table 3: *Pearson Correlations Between Lab-TAB 'Bead Sorting' Variables*

Variables	Latency to Quit	Time Sorting	Beads Sorted
Latency to Quit		.33**	.33**
Time Sorting			.79**
Beads Sorted			

* Correlation significant at the .05 level (2-tailed);
**Correlation significant at the .01 level (2-tailed)

Table 4: *Pearson Correlations Between Lab-TAB 'Tower of Patience' Variables*

Variables	Waits Turn	Blocks Added	Prompts Examiner	Varies from Directions	Level of Engagement
Waits Turn		.93**	-.12	.97**	.27*
Blocks Added			-.21	.93**	.21
Prompts Examiner				-.14	.57**
Varies from Directions					.25*
Level of Engagement					

* Correlation significant at the .05 level (2-tailed);
**Correlation significant at the .01 level (2-tailed)

Table 5: *Pearson Correlations Between Lab-TAB 'Impossibly Perfect Green Circles' Variables*

Variables	Bodily Anger	Intensity of Protest	Intensity of Opposition	Bodily Sadness	Intensity of Resignation
Bodily Anger		-.02	-.03	.09	.00
Intensity of Protest			.27*	.14	.67**
Intensity of Opposition				.35**	.52**
Bodily Sadness					.10
Intensity of Resignation					

* Correlation significant at the .05 level (2-tailed);
**Correlation significant at the .01 level (2-tailed)

CHAPTER III

RESULTS

Sleep Distribution

Napping. A majority of children in the current sample were napping based on both caretaker-report and actigraphy data. Napping was classified in two ways: (a) whether children were napping ("yes" or "no"), and (b) whether children were habitually napping ($\geq$ 4 days per week). Separate logistic regression analyses were used to examine the relationship between age, gender, race, and napping. Nap frequency data is presented in Table 6. Based on caretaker report, 80% of White children and 88% of Black children were napping at least one day per week. Habitual napping was reported for 54% of White children and 72% of Black children. These caretaker-reported differences were not significantly different. Actigraphy data indicated that significantly more Black children (89%), compared to White children (68%), napped at least one day per week during the evaluation period ($\beta = 1.4$, Wald $\chi^2 = 3.9$, $p = .050$, OR = 4.1). Although actigraphy data indicated that more Black children (54%) than White children (35%) habitually napped, the difference was not statistically significant.

Among children reported to be napping by caregivers, the average total number of naps per week did not differ significantly for White (4.6 days) and Black (4.9 days) children. Caregivers provided separate details about the frequency, duration, and timing of naps for weekdays and weekends (see Table 7). On weekdays, the number of days per week napping and the duration of nap periods did not differ significantly for White and Black children. Children from both groups were reported to nap approximately four days per week for about 1 hour and 40 minutes. Although caregivers of Black children reported earlier weekday nap start times (White: 13:11; Black: 12:41) and end times

(White: 14:49; Black 14:26) than those reported for White children, the differences were not significant. On weekends, caregivers of White and Black children reported similar information for nap frequency (White: 1.7 days; Black: 1.4 days) and duration (White: 110 minutes; Black: 113 minutes). These differences were not statistically different. In contrast to what was reported on weekdays, Black children began (White: 13:30; Black 13:49; $F = 5.9$, $df = 1/28$, $p = .022$, $\eta^2 = .17$) and ended (White: 15:20; Black 15:44; $F = 5.5$, $df = 1/28$, $p = .026$, $\eta^2 = .17$) their weekend naps later than White children, both significant differences.

Table 6: *Frequency of Napping for Caretaker-Report and Actigraphy.*

Sleep Variable	Total Sample	White	Black	Significant Comparisons[a]
CAREGIVER REPORT	($n = 67$)	($n = 35$)	($n = 32$)	
Percent Napping (≥ 1 day/week)	83.6	80.0	87.5	*n.s.*
Percent Habitually Napping (≥ 4 days/week)	62.7	54.3	71.9	*n.s.*
ACTIGRAPHY	($n = 62$)	($n = 34$)	($n = 28$)	
Percent Napping (≥ 1 day/week)	77.4	67.6	89.3	$\beta = 1.4$, Wald $\chi^2 = 3.9$, $p = .050$, OR = 4.1 (95% CI = 1.0-16.6)
Percent Habitually Napping (≥ 4 days/week)	43.5	35.3	53.6	*n.s.*

[a] Comparisons between White and Black children

Actigraphy data for napping children indicated that, on average, White (3.0 days) and Black (3.8 days) children do not differ significantly in the number of days they nap each week. Napping data collected via actigraphy was aggregated to provide separate data for weekdays and weekends (see Table 8). On weekdays, Black children (3.5 days), compared to White children (2.4 days), napped significantly more days per week (F = 8.9, df = 1/48, p = .004, η^2 = .16). Nap start times (White: 14:25; Black: 13:22) were significantly earlier for Black children (F = 5.4, df = 1/48, p = .025, η^2 = .10). Nap end times (White: 15:46; Black: 14:58) were also significantly earlier for Black children (F = 4.0, df = 1/49, p = .050, η^2 = .08). The duration of the weekday nap period and the amount of scored sleep time did not differ between the groups. The percent of scored sleep (an indicator of sleep quality) was also similar for White and Black children.

Actigraphy data for weekend napping indicated that White children napped an average of 1.4 days on weekends compared to 1.1 days for Black children, a non-significant difference. Although the duration of the nap period and the amount of scored sleep was similar for White and Black children, the timing of the nap periods was much different between the groups. White children began (White: 14:48; Black: 16:34; F = 7.5, df = 1/21, p = .013, η^2 = .26) and ended (White: 16:12; Black: 18:04; F = 5.1, df = 1/20, p = .035, η^2 = .20) their naps an average of almost two hours earlier than Black children. The percent of scored sleep did not differ between the groups.

Nocturnal Sleep. Based on caregiver-report, Black children had less nocturnal sleep on weekday and weekend nights than White children (see Table 9). On weekday nights, Black children were reported to go to bed later (White: 20:35; Black: 21:09) and rise earlier (White: 7:20; Black: 7:03) than White children, but these differences were not

Table 7: *Means and (SD) for Weekday and Weekend Caretaker-Report of Diurnal Sleep Variables for Napping Children.*

Sleep Variable	Total Sample (n = 56)	White (n = 28)	Black (n = 28)	Significant Comparisons[a]
Total Days Per Week Napping	4.8 (1.8)	4.6 (1.9)	4.9 (1.8)	*n.s.*
WEEKDAY	(n = 56)	(n = 28)	(n = 28)	
Number of Days Napping	3.9 (1.4)	3.7 (1.4)	4.1 (1.3)	*n.s.*
Nap Start Time	12:56 (0:55)	13:11 (0:56)	12:41 (0:51)	*n.s.*
Nap End Time	14:37 (0:52)	14:49 (0:58)	14:26 (0:43)	*n.s.*
Nap Time in Bed (minutes)	103.4 (33.9)	98.6 (28.4)	108.2 (38.6)	*n.s.*
WEEKEND	(n = 31)	(n = 15)	(n = 16)	
Number of Days Napping	1.6 (0.5)	1.7 (0.5)	1.4 (0.5)	*n.s.*
Nap Start Time	13:40 (1:03)	13:30 (0:39)	13:49 (1:19)	$F = 5.9$, $df = 1/28$, $p = .022$, $\eta^2 = .17$
Nap End Time	15:32 (1:13)	15:20 (0:40)	15:44 (1:34)	$F = 5.5$, $df = 1/28$, $p = .026$, $\eta^2 = .17$
Duration of Nap Period (minutes)	111.3 (25.9)	110.0 (21.7)	112.5 (30.0)	*n.s.*

[a] Comparisons between White and Black children

Table 8: *Means and (SD) for Weekday and Weekend Actigraphic Recording of Diurnal Sleep Variables for Napping Children.*

Sleep Variable	Total Sample ($n = 51$)	White ($n = 26$)	Black ($n = 25$)	Significant Comparisons[a]
Total Days Per Week Napping	3.4 (1.7)	3.0 (1.6)	3.8 (1.7)	*n.s.*
WEEKDAY	($n = 51$)	($n = 26$)	($n = 25$)	
Number of Days Napping	2.9 (1.5)	2.4 (1.2)	3.5 (1.5)	$F = 8.9$, $df = 1/48$, $p = .004$, $\eta^2 = .16$
Nap Start Time	13:54 (1:47)	14:25 (1:45)	13:22 (1:41)	$F = 5.4$, $df = 1/48$, $p = .025$, $\eta^2 = .10$
Nap End Time	15:22 (1:26)	15:46 (1:31)	14:58 (1:14)	$F = 4.0$, $df = 1/49$, $p = .050$, $\eta^2 = .08$
Duration of Nap Period (minutes)	92.9 (28.0)	85.6 (22.9)	100.4 (31.2)	*n.s.*
Nap Scored Sleep Time (minutes)	86.3 (25.6)	80.8 (22.3)	92.0 (27.9)	*n.s.*
Nap Period Percent Sleep	93.3 (5.1)	94.6 (4.7)	91.9 (5.2)	*n.s.*
WEEKEND	($n = 23$)	($n = 12$)	($n = 11$)	
Number of Days Napping	1.2 (0.5)	1.4 (0.6)	1.1 (0.3)	*n.s.*
Nap Start Time	15:39 (1:45)	14:48 (1:22)	16:34 (1:42)	$F = 7.5$, $df = 1/21$, $p = .013$, $\eta^2 = .26$
Nap End Time	17:06 (1:50)	16:12 (1:13)	18:04 (1:57)	$F = 5.1$, $df = 1/20$, $p = .035$, $\eta^2 = .20$
Duration of Nap Period (minutes)	82.3 (24.5)	83.7 (18.8)	80.8 (30.5)	*n.s.*
Nap Scored Sleep Time (minutes)	76.5 (23.3)	77.4 (18.1)	75.5 (28.8)	*n.s.*
Nap Period Percent Sleep	93.4 (4.4)	93.9 (5.2)	92.8 (3.5)	*n.s.*

[a] Comparisons between White and Black children

statistically significant. However; these differences resulted in ~45 fewer minutes in bed for Black children each weekday night ($F = 10.7$, $df = 1/63$, $p = .002$, $\eta^2 = .15$). Caregiver report of weekend sleep indicated that Black children go to bed more than an hour later than White children (White: 21:10; Black: 22:18; $F = 19.0$, $df = 1/64$, $p < .001$, $\eta^2 = .23$). Black children rise ~20 minutes later than White children on weekend mornings, but still have significantly less time in bed on weekend nights ($F = 8.2$, $df = 1/64$, $p = .006$, $\eta^2 = .11$). Across the week, these differences resulted in Black children spending approximately five fewer hours in bed compared to White children.

Table 9: *Means and (SD) for Caregiver-Reported Nocturnal Sleep Variables.*

Sleep Variable	**Total Sample** ($n = 67$)	**White** ($n = 35$)	**Black** ($n = 32$)	**Significant Comparisons**[a]
WEEKDAY				
Bedtime	20:51 (0:52)	20:35 (0:45)	21:09 (0:55)	*n.s.*
Wake Time	7:12 (0:51)	7:20 (0:39)	7:03 (1:02)	*n.s.*
Night Time in Bed (minutes)	622.0 (59.3)	642.9 (39.6)	599.2 (68.8)	$F = 10.3$, $df = 1/65$, $p = .002$, $\eta^2 = .14$
WEEKEND				
Bedtime	21:42 (1:03)	21:10 (0:55)	22:18 (0:50)	$F = 19.0$, $df = 1/64$, $p < .001$, $\eta^2 = .23$
Wake Time	8:03 (1:07)	7:54 (0:47)	8:13 (1:23)	*n.s.*
Night Time in Bed (minutes)	621.0 (65.4)	645.4 (37.4)	594.4 (78.6)	$F = 8.2$, $df = 1/64$, $p = .006$, $\eta^2 = .11$

[a] Comparisons between White and Black children

Actigraphy data identified patterns similar to those reported by caregivers (see Table 10). On weekday nights, Black children went to sleep more than 60 minutes later than White children (White: 21:29; Black: 22:32; $F = 11.0$, $df = 1/58$, $p = .002$, $\eta^2 = .16$) and woke up 4 minutes earlier. Scored sleep time for Black children (458 minutes) was significantly less than for White children (523 minutes) on weekday nights ($F = 14.9$, $df = 1/59$, $p < .001$, $\eta^2 = .20$). On weekend nights, Black children went to sleep more than 70 minutes later than White children (White: 21:55; Black: 23:08; $F = 10.5$, $df = 1/53$, $p = .002$, $\eta^2 = .17$) and woke up ~20 minutes later on weekend mornings. The scored sleep time for Black children on weekend nights (468 minutes) was significantly less than the amount of sleep obtained by White children (525 minutes; $F = 9.3$, $df = 1/54$, $p = .004$, $\eta^2 = .15$).

Total Sleep Duration. Average total sleep duration per day was calculated based on the weighted average of diurnal and nocturnal sleep on weekdays and weekends (i.e., [WD diurnal + nocturnal averages x 5] + [WE diurnal + nocturnal averages x 2] / 7). Data for caregiver-report and actigraphy are presented in Table 11. Caregivers of Black children reported less time in bed each day compared to caregivers of White children (White: 696 minutes; Black 665 minutes), but the difference was not significant. Actigraphy data indicated that Black children slept an average of 509 minutes each day, compared to 553 minutes for White children ($F = 7.3$, $df = 1/54$, $p = .009$, $\eta^2 = .12$).

Table 10: *Means and (SD) for Actigraphically Recorded Nocturnal Sleep Variables.*

Sleep Variable	Total Sample (n = 62)	White (n = 34)	Black (n = 28)	Significant Comparisons[a]
WEEKDAY				
Bedtime	21:57 (1:00)	21:29 (0:55)	22:32 (0:49)	F = 11.0, df = 1/58, p = .002, η^2 = .16
Wake Time	7:23 (0:54)	7:25 (0:49)	7:21 (0:59)	*n.s.*
Duration of Sleep Period (minutes)	567.6 (58.5)	596.2 (42.2)	533.0 (57.4)	F = 18.6, df = 1/59, p < .001, η^2 = .24
Duration Night Scored Sleep Time (minutes)	493.7 (62.2)	522.7 (55.7)	458.4 (50.8)	F = 14.9, df = 1/59, p < .001, η^2 = .20
Night Period Percent Sleep	87.2 (5.7)	87.8 (6.0)	86.5 (5.4)	*n.s.*
WEEKEND				
Bedtime	22:27 (1:11)	21:55 (1:00)	23:08 (1:05)	F = 10.5, df = 1/53, p = .002, η^2 = .17
Wake Time	7:59 (1:07)	7:51 (1:01)	8:08 (1:15)	*n.s.*
Duration of Sleep Period (minutes)	572.9 (51.2)	596.5 (34.0)	542.9 (51.2)	F = 14.6, df = 1/54, p < .001, η^2 = .21
Duration Night Scored Sleep Time (minutes)	500.1 (61.4)	525.4 (53.5)	467.6 (56.1)	F = 9.3, df = 1/54, p = .004, η^2 = .15
Night Period Percent Sleep	87.5 (5.8)	88.2 (6.0)	86.7 (5.4)	*n.s.*

Note: WD = weekday, WE = weekend; [a] Comparisons between White and Black children

Table 11: *Means and (SD) for Caregiver-Reported and Actigraphically Recorded Average Daily Sleep (Weekday/Weekend, Diurnal/Nocturnal) Variables.*

Sleep Variable	Total Sample	White	Black	Significant Comparisons[a]
CAREGIVER	(n = 67)	(n = 35)	(n = 32)	
Average Daily Time in Bed (minutes)	681.3 (53.8)	695.8 54.9)	665.4 (48.5)	*n.s.*
ACTIGRAPHY	(n = 62)	(n = 34)	(n = 28)	
Average Daily Total Scored Sleep (minutes)	533.6 (51.9)	552.6 (54.9)	509.4 (36.0)	$F = 7.3$, $df = 1/54$, $p = .009$, $\eta^2 = .12$

[a] Comparisons between Caucasian and African-American groups

Napping and Psychosocial Functioning

The relationship between napping and psychosocial functioning, as measured by the BASC-II, was assessed in several ways. Among the children in this sample, 83.6% were reported by caregivers to nap $\geq$ 1 days per week. Average nap duration ranged from 60 to 180 minutes (Weekday M = 103.4, SD = 33.9; Weekend M = 111.3, SD = 25.9). Comparisons of napping and non-napping children, based on caregiver report, were made for each of the BASC-II composite and subscale scores (see Table 12). Significant relationships were found on the Externalizing Problems Composite, and the Hyperactivity, Anxiety, and Depression subscales. In each of these relationships, significantly higher levels of clinical symptomatology were reported for non-napping children. Separate analyses were conducted comparing children who habitually nap (62.7%; $\geq$ 4 days per week) to those who do not on BASC-II scores. No significant relationships were found.

Table 12: *Means and (SD) for BASC-II Scores for Caregiver-Reported Napping and Non-Napping Children.*

	Napping (n = 56)	Non-Napping (n = 11)	Significant Comparisons[a]
BASC-II COMPOSITES			
Externalizing Problems[b]	51.8 (8.0)	57.6 (11.0)	$F = 4.3$, $df = 1/64$, $p = .041$, $\eta^2 = .06$
Internalizing Problems[b]	51.9 (10.0)	58.1 (9.7)	*n.s.*
Behavioral Symptoms Index[b]	51.3 (8.2)	56.0 (10.8)	*n.s.*
Adaptive Skills[c]	52.5 (8.9)	51.0 (8.9)	*n.s.*
BASC-II SUBSCALES			
Hyperactivity[b]	52.5 (7.8)	57.8 (11.2)	$F = 3.9$, $df = 1/64$, $p = .05$, $\eta^2 = .06$
Aggression[b]	50.9 (9.6)	56.5 (11.8)	*n.s.*
Anxiety[b]	51.3 (9.7)	59.3 (8.9)	$F = 6.4$, $df = 1/64$, $p = .014$, $\eta^2 = .09$
Depression[b]	53.2 (9.4)	59.9 (10.6)	$F = 4.5$, $df = 1/64$, $p = .039$, $\eta^2 = .07$
Somatization[b]	49.2 (8.9)	48.9 (8.3)	*n.s.*
Atypicality[b]	50.1 (9.3)	52.0 (12.0)	*n.s.*
Withdrawal[b]	46.5 (8.9)	43.6 (10.7)	*n.s.*
Attention Problems[b]	53.1 (8.6)	53.9 (11.4)	*n.s.*
Adaptability[c]	51.0 (10.0)	48.4 (9.9)	*n.s.*
Social Skills[c]	53.6 (8.9)	50.0 (9.2)	*n.s.*
Activities of Daily Living[c]	51.8 (10.8)	52.3 (7.6)	*n.s.*
Functional Communication[c]	51.7 (8.5)	52.3 (9.1)	*n.s.*

Note: BASC = Behavioral Assessment System for Children;
[a] Comparisons between Napping (≥ 1 day/week) and Non-Napping groups
[b] Higher scores represent increased clinical symtomatology
[c] Higher scores represent more adaptive level of functioning

Based on actigraphy data, 77.4% of children were napping ≥ 1 days per week. Average scored nap sleep time ranged from 42 to 137 minutes (Weekday $M = 88.3$, $SD = 25.5$; Weekend $M = 76.5$, $SD = 23.3$). Comparisons of napping and non-napping children, based on actigraphy, were made for each of the BASC-II composite and subscale scores (see Table 13). Significant relationships were found on the Internalizing Problems and Behavioral Symptoms Index Composites, and the Hyperactivity, Anxiety, and Depression subscales. In each of these relationships, significantly higher levels of clinical symptomatology were reported for non-napping children. Separate analyses were conducted comparing habitually napping (43.5%) to non-habitually napping children on BASC-II scores. No significant relationships were found.

Logistic regression analysis was employed to predict the probability that BASC-II scores would fall in the "at-risk" *or* "clinically significant" range depending on whether children napped ("yes" or "no") based on both caregiver-report and actigraphy. A summary of the significant relationships identified in these analyses are presented in Table 14. Non-napping children, based on caregiver-report, were more than four times more likely to have BASC-II scores in the "at-risk" *or* "clinically significant" range for the Externalizing Problems and Behavioral Symptoms Index Composites and the Depression subscale. Non-napping children were seven times more likely to have scores on the Hyperactivity subscale in the "at-risk" *or* "clinically significant" range. Children identified as non-nappers based on actigraphy data were 8.7 and 3.8 times more likely, respectively, to have BASC-II Depression and Anxiety scores in the "at-risk" *or* "clinically significant" range.

Table 13: *Means and (SD) for BASC-II Scores for Actigraphically Recorded Napping and Non-Napping Children.*

	Napping ($n = 48$)	Non-Napping ($n = 14$)	Significant Comparisons[a]
BASC-II COMPOSITES			
Externalizing Problems[b]	52.2 (8.6)	56.5 (9.3)	*n.s.*
Internalizing Problems[b]	51.9 (9.6)	58.0 (9.9)	$F = 4.3$, $df = 1/59$, $p = .043$, $\eta^2 = .07$
Behavioral Symptoms Index[b]	51.3 (8.5)	56.4 (9.4)	$F = 4.1$, $df = 1/59$, $p = .048$, $\eta^2 = .07$
Adaptive Skills[c]	53.1 (8.7)	49.9 (9.7)	*n.s.*
BASC-II SUBSCALES			
Hyperactivity[b]	52.4 (8.1)	58.1 (9.5)	$F = 5.6$, $df = 1/59$, $p = .021$, $\eta^2 = .09$
Aggression[b]	51.7 (9.9)	54.1 (11.3)	*n.s.*
Anxiety[b]	51.3 (9.5)	58.7 (9.3)	$F = 6.5$, $df = 1/59$, $p = .014$, $\eta^2 = .10$
Depression[b]	53.2 (8.5)	60.3 (10.8)	$F = 6.8$, $df = 1/59$, $p = .011$, $\eta^2 = .10$
Somatization[b]	49.4 (9.1)	48.4 (8.6)	*n.s.*
Atypicality[b]	50.6 (9.3)	51.3 (12.2)	*n.s.*
Withdrawal[b]	46.0 (8.5)	47.3 (12.6)	*n.s.*
Attention Problems[b]	52.7 (8.8)	55.9 (9.4)	*n.s.*
Adaptability[c]	50.8 (10.1)	49.0 (9.0)	*n.s.*
Social Skills[c]	54.0 (8.9)	49.7 (9.1)	*n.s.*
Activities of Daily Living[c]	53.1 (10.0)	47.9 (10.3)	*n.s.*
Functional Communication[c]	52.0 (8.2)	52.5 (9.3)	*n.s.*

Note: BASC = Behavioral Assessment System for Children;
[a] Comparisons between Napping ($\geq$ 1 day/week) and Non-Napping groups
[b] Higher scores represent increased clinical symtomatology
[c] Higher scores represent more adaptive level of functioning

Table 14: *Percent of BASC Scores in 'At-Risk' or 'Clinically Significant' Range for Napping and Non-Napping Children.*

	Caregiver Report			Actigraphy		
BASC Composite/Subscale	**Napping (n = 56)**	**Non-Napping (n = 11)**	**Significant Comparisons[a]**	**Napping (n = 48)**	**Non-Napping (n = 14)**	**Significant Comparisons[a]**
Externalizing Problems Composite	17.9	45.5	$\beta = 1.5$, Wald $\chi^2 = 4.0$, $p = .046$, OR = 4.5 (95% CI = 1.0 – 20.1)			*n.s.*
Behavioral Symptoms Index Composite	17.9	45.5	$\beta = 1.4$, Wald $\chi^2 = 3.9$, $p = .049$, OR = 4.2 (95% CI = 1.0 – 17.4)			*n.s.*
Hyperactivity Subscale	21.4	63.6	$\beta = 2.0$, Wald $\chi^2 = 7.1$, $p = .008$, OR = 7.0 (95% CI = 1.7 – 29.5)			*n.s.*
Depression Subscale	26.8	63.6	$\beta = 1.6$, Wald $\chi^2 = 5.1$, $p = .024$, OR = 4.8 (95% CI = 1.2 – 18.7)	22.9	71.4	$\beta = 2.2$, Wald $\chi^2 = 9.8$, $p = .002$, OR = 8.7 (95% CI = 2.2 – 33.7)
Anxiety Subscale			*n.s.*	20.8	50.0	$\beta = 1.3$, Wald $\chi^2 = 4.3$, $p = .039$, OR = 3.8 (95% CI = 1.1 – 13.3)

Note: BASC = Behavioral Assessment System for Children;
[a] Comparisons between Napping and Non-Napping groups

The relationship between napping and psychosocial functioning, as measured by the Lab-TAB episodes, was assessed in a similar fashion to the BASC-II scores. Comparisons of napping and non-napping children, based separately on caregiver report and actigraphy, were made for each of the Lab-TAB composites (see Table 15). No significant relationships were identified regardless of whether napping status was based on caregiver-report or actigraphy. Separate analyses were conducted comparing children who habitually nap to those who do not on the Lab-TAB composites. No significant relationships were found in these analyses.

Table 15: *Means and (SD) for Lab-TAB Scores (Z-scores) for Caregiver-Reported and Actigraphically Recorded Napping and Non-Napping Children.*

LAB-TAB COMPOSITES	**Napping**	**Non-Napping**	**Significant Comparisons[a]**
Caregiver-Report	(*n* = 51)	(*n* = 11)	
Activity[b]	-0.1 (0.8)	0.1 (0.7)	*n.s.*
Persistence[b]	0.0 (0.8)	0.0 (0.9)	*n.s.*
Inhibitory Control[b]	0.0 (0.9)	-0.1 (0.7)	*n.s.*
Distress[b]	0.1 (0.8)	-0.4 (0.6)	*n.s.*
Actigraphy	(*n* = 48)	(*n* = 13)	
Activity[b]	0.0 (0.8)	0.0 (0.9)	*n.s.*
Persistence[b]	0.0 (0.8)	-0.2 (0.9)	*n.s.*
Inhibitory Control[b]	0.0 (0.9)	0.0 (0.7)	*n.s.*
Distress[b]	0.0 (0.8)	-0.2 (0.8)	*n.s.*

[a] Comparisons between Napping and Non-Napping groups
[b] Higher scores represent increased levels of the identified construct (e.g., more persistence)

Mann-Whitney U analyses were used to test differences between napping and non-napping children on the Anger and Sadness variables from the Lab-TAB. Based on caregiver-report, the sum of the average Sadness scores for napping children was significantly higher (*M* rank = 34.4, *n* = 51) than the sum of the average Sadness scores for non-napping children (*M* rank = 34.4, *n* = 11), $z(62) = -2.78$, $p = .005$. That is, napping children express more bodily sadness during the Impossibly Perfect Green Circles episode than non-napping children. A similar result was found using actigraphy to define napping. The sum of the average Sadness scores for napping children was significantly higher (*M* rank = 33.8, *n* = 48) than the sum of the average Sadness scores for non-napping children (*M* rank = 20.6, *n* = 13), $z(61) = -2.43$, $p = .015$. No significant differences were identified in Anger scores for caregiver-reported napping (*M* rank = 30.8, *n* = 51) and non-napping children (*M* rank = 35.0, *n* = 11), $z(62) = -0.74$, $p = .46$. Similar non-significant findings were produced using actigraphy data (Napping: *M* rank = 31.4, *n* = 48; Non-Napping: *M* rank = 29.6, *n* = 13; $z(61) = -0.34$, $p = .73$.

Racial Differences in Napping and Psychosocial Functioning

Racial differences in napping and psychosocial functioning, indexed by scores on the BASC-II and Lab-TAB, were analyzed in several ways. Among White children in the sample, 80.0% were reported by caregivers to nap $\geq$ 1 days per week. Nap duration ranged from 60 to 165 minutes (Weekday *M* = 98.6, *SD* = 28.4; Weekend *M* = 110.0, *SD* = 21.7). For Black children, 87.5% were reported by caregivers to nap $\geq$ 1 days per week. Nap duration ranged from 60 to 180 minutes (Weekday *M* = 108.2, *SD* = 38.6; Weekend *M* = 112.5, *SD* = 30.0). A series of 2 (race) x 2 (napping status) ANCOVAS, controlling for sex, were conducted to test for interaction effects between race and napping status on

each of the BASC-II composite and subscale scores (see Table 16). A main effect of race was significant on the Aggression subscale, but none of the interaction effects were significant. Separate analyses were conducted comparing White and Black children who habitually nap (≥ 4 days/week; White 54.3%, Black 71.9%) based on caregiver report. A main effect of race on the Activities of Daily Living subscale was significant, but none of the interaction effects were significant. The small number of non-napping children may have impacted the ability to detect differences in these analyses.

Based on actigraphy data, 67.6% of White children were napping ≥ 1 days per week. Nap duration ranged from 44 to 126 minutes (Weekday $M = 80.8$, $SD = 22.3$; Weekend $M = 77.4$, $SD = 18.1$). For Black children, 89.3% were found to be napping, based on actigraphy data. Nap duration ranged from 42 to 137 minutes (Weekday $M = 92.0$, $SD = 27.9$; Weekend $M = 75.5$, $SD = 28.8$). Another series of 2 (race) x 2 (napping status) ANCOVAS, controlling for sex, were conducted to test for differences on each of the BASC-II composite and subscale scores (see Table 17). Main effects for race were significant on the Depression and Activities of Daily Living subscales. None of the interaction effects were significant. Separate analyses were conducted comparing White and Black children who habitually nap (≥ 4 days/week; White 54.3%, Black 71.9%) based on actigraphy. A main effect of race on the Activities of Daily Living subscale was significant, but none of the interaction effects were significant. Again, having a limited number of non-napping children may have impacted the ability to detect differences.

For the Lab-TAB analyses, 2 (race) x 2 (napping status) ANCOVAS, were conducted to test for racial differences on each of the composite scores based on both actigraphy and caregiver-report of napping (see Table 18). A main effect for race was

Table 16: *Means and (SD) for BASC-II Scores for Caregiver-Reported Napping and Non-Napping White and Black Children.*

	WHITE		BLACK		SIG.[a]
	Napping ($n = 28$)	Non-Napping ($n = 7$)	Napping ($n = 28$)	Non-Napping ($n = 4$)	
BASC-II COMPOSITES					
Externalizing Problems[b]	53.0 (8.6)	59.7 (11.4)	50.6 (7.4)	53.8 (10.5)	*n.s.*
Internalizing Problems[b]	53.0 (9.2)	60.1 (10.9)	50.8 (10.8)	54.5 (7.0)	*n.s.*
Behavioral Symptoms Index[b]	52.1 (8.4)	56.1 (10.5)	50.4 (8.1)	55.8 (12.8)	*n.s.*
Adaptive Skills[c]	51.5 (9.3)	51.3 (8.4)	53.5 (8.5)	50.5 (11.1)	*n.s.*
BASC-II SUBSCALES					
Hyperactivity[b]	53.4 (8.0)	57.7 (11.4)	51.7 (7.6)	58.0 (12.4)	*n.s.*
Aggression[b]	52.5 (10.2)	61.0 (11.8)	49.3 (8.8)	48.5 (7.2)	*n.s.*
Anxiety[b]	53.6 (9.8)	60.0 (10.5)	48.9 (9.1)	58.0 (6.3)	*n.s.*
Depression[b]	54.4 (8.8)	63.3 (9.9)	52.0 (10.0)	54.0 (10.2)	*n.s.*
Somatization[b]	48.0 (8.4)	49.3 (10.4)	50.3 (9.4)	48.3 (3.5)	*n.s.*
Atypicality[b]	50.0 (9.2)	49.0 (12.3)	50.1 (9.5)	57.3 (11.2)	*n.s.*
Withdrawal[b]	46.9 (9.2)	40.1 (7.7)	46.0 (8.8)	49.5 (13.8)	*n.s.*
Attention Problems[b]	53.3 (8.0)	52.1 (10.0)	52.9 (9.3)	57.0 (14.5)	*n.s.*
Adaptability[c]	51.8 (10.2)	48.4 (8.9)	50.2 (10.0)	48.3 (13.1)	*n.s.*
Social Skills[c]	53.0 (8.8)	51.1 (8.5)	54.3 (9.2)	48.0 (11.3)	*n.s.*
Activities of Daily Living[c]	47.9 (10.9)	50.0 (6.2)	55.8 (9.4)	56.3 (9.0)	*n.s.*
Functional Communication[c]	52.0 (8.3)	54.6 (9.7)	51.3 (8.8)	48.3 (7.4)	*n.s.*

Note: BASC = Behavioral Assessment System for Children;
[a] Comparison of interaction effects between napping status and race
[b] Higher scores represent increased clinical symtomatology
[c] Higher scores represent more adaptive level of functioning

Table 17: *Means and (SD) for BASC-II Scores for Caregiver-Reported Napping and Non-Napping White and Black Children.*

	WHITE		BLACK		SIG.[a]
	Napping ($n = 23$)	Non-Napping ($n = 11$)	Napping ($n = 25$)	Non-Napping ($n = 3$)	
BASC-II COMPOSITES					
Externalizing Problems[b]	53.1 (9.3)	57.1 (9.9)	51.3 (8.0)	54.33 (8.1)	*n.s.*
Internalizing Problems[b]	52.5 (9.1)	59.3 (10.2)	51.4 (10.2)	53.3 (8.5)	*n.s.*
Behavioral Symptoms Index[b]	51.4 (8.6)	56.8 (8.8)	51.3 (8.7)	55.0 (13.5)	*n.s.*
Adaptive Skills[c]	52.9 (8.5)	49.4 (9.8)	53.2 (9.0)	51.7 (10.8)	*n.s.*
BASC-II SUBSCALES					
Hyperactivity[b]	52.2 (8.1)	58.4 (9.3)	52.6 (8.3)	57.3 (12.2)	*n.s.*
Aggression[b]	53.9 (10.5)	55.2 (12.6)	49.6 (9.0)	50.3 (3.5)	*n.s.*
Anxiety[b]	53.0 (9.9)	59.1 (10.1)	49.8 (9.1)	57.3 (7.0)	*n.s.*
Depression[b]	53.6 (7.9)	63.0 (9.1)	52.8 (9.2)	50.3 (12.7)	*n.s.*
Somatization[b]	48.7 (8.5)	48.0 (9.7)	50.1 (9.8)	50.0 (0.0)	*n.s.*
Atypicality[b]	49.7 (9.1)	49.8 (11.7)	51.5 (9.5)	56.7 (15.3)	*n.s.*
Withdrawal[b]	45.1 (7.9)	47.2 (12.1)	46.9 (9.2)	47.7 (17.0)	*n.s.*
Attention Problems[b]	52.3 (7.9)	55.2 (9.3)	53.0 (9.8)	58.7 (11.1)	*n.s.*
Adaptability[c]	51.6 (9.6)	48.7 (9.9)	50.0 (10.8)	50.0 (5.6)	*n.s.*
Social Skills[c]	54.1 (8.4)	50.7 (8.5)	53.8 (9.5)	46.0 (12.3)	*n.s.*
Activities of Daily Living[c]	50.2 (9.8)	45.7 (9.8)	55.7 (9.6)	56.0 (9.2)	*n.s.*
Functional Communication[c]	53.0 (8.2)	52.6 (9.4)	51.0 (8.2)	52.3 (11.0)	*n.s.*

Note: BASC = Behavioral Assessment System for Children;
[a] Comparison of interaction effects between napping status and race
[b] Higher scores represent increased clinical symtomatology
[c] Higher scores represent more adaptive level of functioning

significant for the Persistence composite for analyses including habitual napping as the indicator of napping status. There were no significant interaction effects identified between napping and scores on the Lab-TAB. Racial differences on the Anger and Sadness variables were assessed with a Mann-Whitney U analysis. No significant differences were identified in Anger scores for White (*M* rank = 30.4, *n* = 33) and Black children (*M* rank = 32.7,*n* = 29); *z*(62) = -0.53, *p* = .60. Similar non-significant findings were found for Sadness scores between White (*M* rank = 27.7, *n* = 33) and Black (*M* rank = 35.8, *n* = 29); *z*(61) = -1.80, *p* = .07.

Table 18: *Means and (SD) for Lab-TAB Scores (Z –scores) for Caregiver-Reported and Actigraphically Recorded Napping and Non-Napping White and Black Children.*

	WHITE		**BLACK**		**SIG.**[a]
LAB-TAB COMPOSITES	**Napping**	**Non-Napping**	**Napping**	**Non-Napping**	
Caregiver-Report	(*n* = 26)	(*n* = 7)	(*n* = 25)	(*n* = 4)	
Activity[b]	0.0 (0.9)	0.0 (0.9)	0.0 (0.8)	0.1 (0.6)	*n.s.*
Persistence[b]	-0.1 (0.8)	0.1 (0.9)	0.2 (0.9)	-0.5 (0.4)	*n.s.*
Inhibitory Control[b]	-0.1 (0.8)	-0.4 (0.7)	0.2 (0.8)	-0.2 (0.6)	*n.s.*
Distress[b]	0.1 (0.7)	0.1 (0.8)	-0.1 (0.9)	0.1 (1.2)	*n.s.*
Actigraphy	(*n* = 23)	(*n* = 10)	(*n* = 25)	(*n* = 3)	
Activity[b]	-0.1 (0.9)	0.1 (0.9)	0.1 (0.8)	-0.4 (0.6)	*n.s.*
PersistenceAggression[b]	-0.1 (0.8)	0.1 (0.7)	0.1 (0.9)	-0.1 (0.7)	*n.s.*
Inhibitory Control[b]	-0.1 (0.8)	-0.2 (0.8)	0.2 (0.8)	-0.1 (0.6)	*n.s.*
Distress[b]	0.2 (0.7)	0.0 (0.9)	-0.1 (0.9)	-0.8 (0.8)	*n.s.*

[a] Comparison of interaction between napping status and race
[b] Higher scores represent increased levels of the identified construct (e.g., more persistence)

CHAPTER IV

DISCUSSION

Summary

In the current study, caregiver-report and actigraphy were used to assess racial differences in the sleep patterns of 4- to 5-year-old children. Data from both methods indicate that a majority of White and Black children in this age group are napping ($\geq$ 1 day/week). Caregivers of children from both groups report similar rates of napping, but actigraphy data indicated that significantly more Black children were napping during the evaluation period. Rates of habitual napping ($\geq$ 4 days/week) were similar for White and Black children, although lower rates of habitual napping were identified in the actigraphy data, compared to caregiver report. On weekdays, the number of days per week napping, nap start times, nap end times, and nap duration did not differ for White and Black children based on caregiver report. In comparison, actigraphy data on weekdays indicated that Black children napped significantly more days per week and began and ended their naps significantly earlier than White children. On weekends, caregivers of Black children reported nap start and end times that were significantly later than those reported for White children. Actigraphy data indicated that the timing of naps (i.e., nap start/end time) for Black children was delayed by approximately two hours relative to White children on weekends. Days napping and sleep time did not differ for White and Black children on weekends.

Differences in nocturnal sleep were also evident for White and Black children. On weekdays, caregivers of Black children reported later bedtimes and earlier rise times. Although these differences were not statistically significant, they resulted in Black

children spending approximately 44 minutes less time in bed each weeknight compared to White children. Reported bedtimes for Black children were significantly later (>60 minutes) on weekends. Although weekend rise times did not differ significantly, the later bedtimes for Black children resulted in them obtaining 51 minutes less time in bed on weekend nights. Actigraphy data indicated that bedtimes were significantly later for Black children on weekday and weekend nights, with no differences in wake times. On both weekday and weekend nights, Black children slept ~60 minutes less than White children.

Considering total sleep time (diurnal plus nocturnal), the actigraphy data from this study indicate that Black children averaged approximately 5 hours less sleep than White children across the week. Although there is less discrepancy on weekdays, when Black children are napping, on average, one more day per week than White children, data indicate that significant differences in weekday and weekend sleep exist. Caregivers report similar patterns of sleep across the week with Black children averaging 3.5 hours less time in bed than White children. The difference between actigraphy and caregiver-report is consistent with research indicating that parents overestimate their children's sleep time in comparison to objective reports (Sekine et al., 2002).

The racial differences in sleep and napping patterns highlighted in this study differ from those identified in earlier research with young children. In two previous studies, based on caregiver-report of sleep behaviors, minority (including Black) children napped more days per week than White children, but spent less time in bed at night. Averaged across the 24-hour period, there were no significant differences between the groups in terms of total time in bed (Crosby et al., 2005; Lavigne et al., 1999). In the

current sample, actigraphy data show that Black children nap significantly more on weekdays, but not enough to compensate for the large differences in nocturnal sleep. Overall, Black children in the current sample obtained less sleep than White children. Adam, Snell, and Pendry (2007) found a pattern similar to this in a group of 12- to 19-year-old children/adolescents. In their sample, Black children/adolescents slept significantly fewer hours than children of other racial/ethnic groups on both weekdays and weekends after controlling for demographic variables and including nap time in the computation of total time in bed. Other research with school-age children also identified shorter sleep duration for Black children, relative to White children, but did not include assessments of napping (McLaughlin Crabtree et al., 2005; Buckhalt, El-Sheikh, & Keller, 2007).

The racial differences in sleep behavior described here are unlikely to be caused by group differences in SES, as measured in this study, as this variable did not account for a significant proportion of the variance between race and sleep variables. Although cross-national research suggests that culture impacts the ways in which parents manage sleep behavior (e.g., Valentin, 2005; Morelli, Rogoff, Oppenheim, & Goldsmith, 1992), some have suggested that in the United States it is difficult to differentiate whether group differences in children's sleep reflect distinct values or confounding sociodemographic factors (Milan, Snow, & Belay, 2007). They question whether consideration of SES as a broader set of contextual factors (e.g., physical living space, work schedules, number of children in the family) may be needed to understand group differences in children's sleep. In the current study, SES only encompassed family income and level of education, variables that may not have a direct impact on sleep behavior. Alternatively, minority

families tend to have larger families, live in smaller homes, and work in jobs with irregular hours (U.S. Census Bureau, 2000). Characteristics such as these may impact caregivers' ability to maintain regular sleep schedules and assure that children obtain the necessary amount of sleep. Even when considering these types of variables, a challenge remains in differentiating family values from contextual factors. For example, is sibling room-sharing a reflection of economic factors or does it reflect parents' goals for increasing family relationships? These relationships cannot be considered in the current data, but warrant consideration in future research.

The findings of this study indicate that significant relationships exist between napping and indicators of psychosocial functioning. In the current sample, napping was related to caregiver-reported internalizing and externalizing problems, including hyperactivity, anxiety, and depression. Non-napping children were rated as having significantly more symptoms and were much more likely to be classified in an "at-risk" or "clinically significant" range in each of these areas of functioning. During laboratory tasks assessing behavioral and emotional functioning, non-napping children were significantly less likely to exhibit sadness in response to a distress task. No racial differences were found in the relationship between napping and any of the measures of psychosocial functioning, perhaps due to the limited number of non-napping children or main effects for race that were observed on some subscales on measures of psychosocial functioning.

The impact of napping on hyperactivity, anxiety, and depression is not surprising given the associations between inadequate or poor-quality sleep and social, behavioral, and emotional functioning. However, the relationships, or lack of relationships, observed

in the laboratory tasks were unexpected. It was unforeseen that the absence of napping would be related to less expression of sadness. One possible explanation for this is that the absence of daytime naps has a blunting effect on children's ability to express emotion during a frustrating task. Alternatively, children who don't nap may be less engaged in the task which results in less expression of emotion. It was also surprising that no other significant relationships emerged from the laboratory tasks. It may be the case that the effects of napping are less evident in a single observation that occurs over a brief period of time than on a global measure of functioning completed by caregivers. It is possible that the caregiver report represents "trait" characteristics while the laboratory tasks are more likely to represent "state" levels of functioning. Only one previous study (Crosby et al., 2005) is known to have looked at the impact of napping on psychosocial functioning. It that sample of 3- to 5-year-old children, no significant relationships were identified. The only obvious difference between that study and the current research was the inclusion of 3-year-olds in the earlier study. It may be the case that the consequences of napping become more pronounced with age and that the inclusion of younger children dampened the effect. Alternatively, the relationships found may be unique to the current sample.

Limitations and Future Directions

Several limitations in the current study should be noted. First, the inclusion of only 4- to 5-year-old children in the sample limits the generalizability of the findings. There is a need to have objective sleep data (including napping) for children of all ages to better understand changes in sleep across development. A second limitation involves the comparison of children from only two racial groups. Given the increasing diversity of the

population in the United States, there is a need to understand the sleep patterns of children from various backgrounds. The differences between White and Black children emerging in the literature may be only one part of a wide range of differences that exist. In addition to measuring sleep, researchers should begin to assess contextual factors that may be impacting differences in sleep. A third limitation of this study is the assessment of psychosocial functioning. Although significant relationships between napping and daytime functioning were identified, the ability to understand the impact of these results on the individual child's developmental trajectory (e.g., development of psychopathology) based on these tools is limited. It is also important to note that each of the relationships between napping and psychosocial functioning identified here are correlational in nature. It cannot be determined in the current design if impairments in psychosocial functioning lead to reduced napping or if reduced napping precedes problems in psychosocial functioning. Alternatively, it is possible that a third variable (e.g., parenting practices) is causally related to napping and psychosocial functioning. Finally, the small number of non-napping children may have limited the ability to detect interaction effects between race and napping on measures of psychosocial functioning. Inclusion of older children, who are less likely to be napping, would help with this problem, but older children are required to attend school and the influence of social demands becomes more prominent at that point. Additionally, some kindergarten programs allow napping during the school day, while others do not. Screening children for napping status during recruitment may be the most viable solution to aid the study of these types of relationships.

Conclusion

The current study has extended a growing body of research showing racial differences in sleep during early childhood and increased the understanding of the relationship between napping and psychosocial functioning in preschool children. The results further highlight the importance of collecting normative data on sleep organized by racial groups. There is also a need for research examining the contextual variables that may be related to these differences and to study the functional effects of sleep problems in early childhood in developmentally sensitive ways. The results of this study may have important implications for a wide range of professionals, including researchers and clinicians interested in children's sleep/wake patterns and the impact of sleep on daytime functioning.

APPENDIX A

Child Demographics/Sleep Questionnaire

Directions: These questions ask basic information about your child and your family. Some questions will ask you to write in the answers. For the other questions, put an "X" in the circle next to your answer.

1. Today's Date (mm/dd/yyyy): _____ / _____ / _____

2. Child's Date of Birth (mm/dd/yyyy): _____ / _____ / _____

3. Person filling out this form:
   - ☐ Child's mother
   - ☐ Child's father
   - ☐ Other _____

4. Child's Sex:
   - ☐ Male
   - ☐ Female

5. Child's race:
   - ☐ Caucasian
   - ☐ African American
   - ☐ Asian American
   - ☐ Hispanic
   - ☐ American Indian
   - ☐ Multiracial
   - ☐ Other

6. How many children are in your family? _____

7. Has your child taken any medication on a regular basis during the last month?
   - ☐ Yes
   - ☐ No

   IF YES – Please describe (med name, reason for taking):

   _____

   _____

   _____

8. Does your child have any chronic medical or psychological conditions that have been diagnosed
   by a health professional?
   - ☐ Yes
   - ☐ No

IF YES – Please describe:

_____

_____

_____

9. Does your child attend daycare or preschool?
   - ☐ Yes
   - ☐ No

10. Hours per week in preschool/daycare? _____

11. Time child goes to preschool/daycare: ____:____ ☐ am ☐ pm

12. Select one of the following for household contributor(s):
   - ☐ One spouse, male or female, gainfully employed
   - ☐ Both spouses gainfully employed
   - ☐ Head of house has never been married
   - ☐ Divorced person, employed full-time
   - ☐ Widow or widower who is not gainfully employed
   - ☐ Separated or divorced person who receives support payments

13. Total household income before taxes:
   - ☐ Less than $15,000
   - ☐ $15,000 to $24,999
   - ☐ $25,000 to $49,999
   - ☐ $50,000 to $99,999
   - ☐ $100,000 to $149,999
   - ☐ $150,000 or more

14. Contributor 1: Relationship to child:
   - ☐ Mother
   - ☐ Father
   - ☐ Other

15. Contributor 1: Highest level of education:
   - ☐ Jr. High
   - ☐ High School
   - ☐ Vocational
   - ☐ Some College
   - ☐ College Graduate
   - ☐ Graduate/Professional school

16. Contributor 1: Job title _____

17. Contributor 1: Age _____

18. Contributor 2: Relationship to child:
    - ☐ Mother
    - ☐ Father
    - ☐ Other
19. Contributor 2: Highest level of education:
    - ☐ Jr. High
    - ☐ High School
    - ☐ Vocational
    - ☐ Some College
    - ☐ College Graduate
    - ☐ Graduate/Professional school

20. Contributor 2: Job title _____

21. Contributor 2: Age _____

22. What is your child's usual bedtime on weekdays? ____:____ ☐ am ☐ pm

23. What is your child's usual wake time on weekdays? ____:____ ☐ am ☐ pm

24. What is your child's usual bedtime on weekends? ____:____ ☐ am ☐ pm

25. What is your child's usual bedtime on weekends? ____:____ ☐ am ☐ pm

26. How many days does your child naps during the week (Monday – Friday): _____

27. If you child naps during the week, write in the usual time that this nap begins:

    ____:____ ☐ am ☐ pm

28. If you child naps during the week, write in the usual time that this nap ends:

    ____:____ ☐ am ☐ pm

29. How many days does your child naps during the weekend (Saturday - Sunday):

    _____

30. If you child naps during the weekend, write in the usual time that this nap begins:

____:____ ☐ am ☐ pm

31. If you child naps during the weekend, write in the usual time that this nap ends:

____:____ ☐ am ☐ pm

APPENDIX B

SLEEP/WAKE DIARY

Day of Week (circle): Mon Tues Wed Thurs Fri Sat Sun ID: _____ Date: _____

ANSWER 1 – 9 JUST AFTER YOUR CHILD WAKES UP

1. *Number of times child awakened during the night:* ___0 ___1 ___2 ___3 ___4+
   For a total of _____ minutes
2. *Child's sleep disturbed last night by (you can check more than one):* ___Did not wake during night ___Noise ___Bathroom ___Body ache/sick ___Too hot or cold ___Other person ___Other _____
3. *Did child get enough sleep last night?* ____ No way! Not enough sleep ____Sort of the right amount ___Yes! She slept the needed amount
4. *Overall, child's sleep last night was:* ____ Very poor ___Poor ___Okay ___Good ___Very good
5. *Did child awaken before you today?* ____ Yes ____ No
6. *Time child finally woke up today:* _____ before noon / after noon (circle one)
7. *Child was awakened by:* ___Just woke up ___Noise ___ Parent/other person ___Alarm ___Other _____
8. *Time child finally got out of bed today:* _____ before noon / after noon (circle one)
9. *This morning child felt:* ____ Very tired ____A little tired ____Somewhat awake and rested ____Wide awake and well-rested

STOP! … Finish The Rest Of The Questions Later

ANSWER AFTER CHILD FALLS ASLEEP AT NIGHT

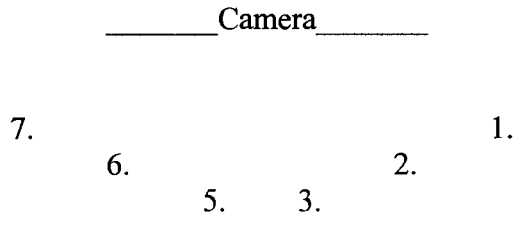
1. *Did any of these happen today?* ___None happened ___Holiday/vacation ___School/day care cancelled ___School/day care delayed ___Child sick ___Other event _____
2. *Overall, child's mood today:* ___Very bad mood ___Sort of a bad mood ___Pretty good mood ___Very good mood
3. *Overall, child's level of alertness today:* ___ Very tired ___A little tired ___Somewhat alert/energetic ___Very alert/energetic
4. *Any stress today for child?* ___Almost none ___ A little stress ___ A medium amount of stress ___A lot of stress
5. *Any excitement today for child?* ___Almost none ___ A little excitement ___ A medium amount of excitement ___A lot of excitement
6. *Any napping during the day?* ___ No nap opportunity ____ Nap opportunity, but child did not sleep ____Child accidentally fell asleep today
   ___ Scheduled Nap: Start time? _____ before noon / after noon How long? _____ min Where? _____
   ___ Accidental Nap: Start time? _____ before noon / after noon How long? _____ min Where? _____
7. *Any caffeine today?* ___ No caffeine today OR
   ___ Caffeine #1: Time? _____ before noon / after noon Type? _____ How much? _____
   ___ Caffeine #2: Time? _____ before noon / after noon Type? _____ How much? _____
8. *Any medicine today?* ___ No medicine today OR
   ___ Medicine #1: Time? _____ before noon / after noon Type? _____
   ___ Medicine #2: Time? _____ before noon / after noon Type? _____
9. *Took watch off today because:* ___ Time? _____ before noon / after noon How long? _____ Reason _____
   ___ Time? _____ before noon / after noon How long? _____ Reason _____
   ___ Time? _____ before noon / after noon How long? _____ Reason _____
10. *Tonight, child got into bed at (circle):* _____ before midnight / after midnight (circle one)
11. *Lights went/will need to be off today at (time):* _____ before midnight / after midnight (circle one)
12. *Length of time (minutes) for child to fall asleep after turning the lights out:* _____ minutes
13. *In the last hour before "lights out" child did the following (check all that apply):*
    ___ Played on computer
    ___ Played video games
    ___ Watched TV
    ___ Played with games/toys
    ___ Listened to music
    ___ Ate dinner
    ___ Ate snack
    ___ Showered/bath
    ___ Brushed teeth
    ___ Washed face
    ___ Quiet activity like reading
    ___ Played with brother/sister/parent/other person
    ___ Felt strong positive emotion (excited, happy)
    ___ Felt strong negative emotion (sadness, anger)
    ___ Other _____
14. *The LAST activity child did before "lights out" (trying to sleep) was:* _____ How long? _____ min

STOP!!! End Of Diary For Today

APPENDIX C

ARC OF TOYS EPISODE

PHYSICAL SETTING
The room is empty of all toys with the exception of the arc of prearranged stimulus toys. The diagram below illustrates the location of the toys (which are to be set up on the floor in the middle of the room).



Key to identification of toys:
1. Rubber ball
2. Etch-A-Sketch
3. Dump Truck
4. Xylophone
5. Elmo doll
6. Grocery cart & play food
7. Hula hoop

STIMULI
- Rubber ball
- Hula Hoop
- Xylophone
- Grocery Cart and play food
- Etch-A-Sketch
- Elmo doll
- Dump Truck

PROCEDURE
The examiner (E) escorts the child (C) into the room and to the center of the arc (facing the cameras). The E says: "Look at all these neat toys! You can play with them however you want." The E remains in the room for the duration of the task (five minutes). At then end of 5 minutes, the E delivers a "clean up" instruction to the C (e.g., "Jane, put all of the toys in the toy box.").

SCORING
This episode is divided into five, one minute intervals. The first interval begins after E says, "You can play with the toys however you want." The compliance portion of the episode begins after the E provides the instruction to the C.

Variables to be scored:

a. Latency to begin play
b. Number of toys manipulated
c. Vigor of activity
d. Task compliance
e. Latency to complete task

Definitions of variables:

a. Latency to begin play: Interval, in seconds, from the beginning of the episode to the first toy manipulated.

b. Number of toys manipulated: The number of different toys in each epoch that were manipulated. Each toy must be touched for the purpose of examining or playing with it. A new bout of play is usually signaled by the C picking up or touching a new toy. For instance, if the C plays with the ball and then the truck and then the ball again, s/he would receive a score of '3.' To count the same toy twice, the C must have stopped playing with it and played with another toy before manipulating it again (e.g., if C is bouncing the ball, only count the ball a second time if the child plays with another toy before coming back to the ball).

c. Vigor of activity: Intensity of activity while engaged in play. This is rated on a five point scale. The overall judgment of level of vigor should override any specific behavioral examples.
   0 = Extremely low vigor: Sitting or standing still, minimal movement, looking at toys without touching any.
   1 = Low vigor: Some movement, plays with one or two toys in the immediate area.
   2 = Moderate vigor: Moving to a couple of toys, walking around the room, manipulating several toys.
   3 = High vigor: Increased movements, walking from toy to toy, manipulating several toys for short periods of time, tossing toys.
   4 = Extremely high vigor: Rapid movements, running and jumping, banging and throwing toys in a rough manner.

d. Task compliance: The child initiates the given task within 5 seconds of the direction being given.
   1 = Yes
   2 = No

e. Latency to complete task: Interval, in seconds, from the E completing the direction to C completing the task.

Arc of Toys Coding Form

Latency to begin play: _____ (time in seconds)

Interval 1 (0:00-1:00)

Number of toys manipulated	
Vigor of activity (0-4)	

Interval 2 (1:01-2:00)

Number of toys manipulated	
Vigor of activity (0-4)	

Interval 3 (2:01-3:00)

Number of toys manipulated	
Vigor of activity (0-4)	

Interval 4 (3:01-4:00)

Number of toys manipulated	
Vigor of activity (0-4)	

Interval 5 (4:01-5:00)

Number of toys manipulated	
Vigor of activity (0-4)	

VIGOR OF ACTIVITY

0 = Extremely low vigor

1 = Low vigor

2 = Moderate vigor

3 = High vigor

4 = Extremely high vigor

NOTES:

APPENDIX D

BEAD SORTING TASK

PHYSICAL SETTING
The child is sitting at a table, facing the camera. The bead sorting containers and the bowl of beads is sitting in front of the child.

STIMULI
- One clear bowl of 300 beads of three different colors (100 of each color).
- Three clear, plastic bowls with different color beads attached to each for sorting.

PROCEDURE
The examiner (E) brings the bowl of beads and the sorting containers to child (C), puts them on the table, and says "I have something for you to do. My beads are all mixed together and I need you to sort them by color. See? You can put the blue ones in here, like this (E drops a blue bead into the bucket with the blue bead attached to the outside), the red ones in here, like this (E drops a red bead into the container with the red bead attached to the outside), and the white ones in here, like this (E drops a white bead into the container with the white bead attached to the outside). Will you work on this? I'll be back in just a few minutes." After three minutes the E returns and asks the C how s/he is doing. The E then compliments the child on the number of beads s/he has sorted and thanks the child for his or her help. Then the E says, "I'll sort the rest of these beads later."

SCORING
This episode is divided into three, one-minute intervals. Each interval is divided into six, 10 second epochs. The first interval begins when the E exits the experiment room.

Variables to be scored:
a. Amount of time child sorts beads
b. Latency to first quit task
c. Number of beads sorted

Definitions of variables:
a. Amount of time child sorts beads: Time child spends sorting beads during each epoch.

b. Latency to first quit task: Interval, in seconds, from the beginning of the episode to the first eye gaze directed away from the beads. "Beginning" is defined as time when coder hears the E shut the door as s/he leaves.

c. Number of beads sorted: Number of beads the child sorts during each 10 second epoch.

NOTE: If the child is randomly dropping beads into the containers (not sorting them) this will not be counted as sorting. If child gathers like-colored beads in her/his hands before actually placing them into the containers, the gathered beads will be counted as sorted.

Bead Sorting Coding Form

Latency to first quit task _____ (time in seconds)

Number of beads sorted: Red _____ White _____ Blue _____ Total _____

Interval 1 (0:00-1:00)

10s epochs	1	2	3	4	5	6
Time sorting (in seconds)						
Number of beads sorted						

Interval 2 (1:01-2:00)

10s epochs	1	2	3	4	5	6
Time sorting						
Number of beads sorted						

Interval 3 (2:01-3:00)

10s epochs	1	2	3	4	5	6
Time sorting						
Number of beads sorted						

NOTES:

APPENDIX E

TOWER OF PATIENCE TASK

PHYSICAL SETTING
The child is seated at a table, facing the camera. The examiner is to the right of the child and is present for the duration of the episode. The parent should not be present during this episode.

STIMULI
- 18 large cardboard blocks.

PROCEDURE
The examiner (E) brings the box of blocks into the room and says, "Let's play a game with these blocks. This is a game we play together, so I'll put these blocks where we can both reach them. The E places the blocks between himself and the child (C); in front of where the tower will be built. "We could build a tower as tall as you are. We'll take turns adding blocks to make it bigger. First I put one, then you put one, then I put one, then you put one. That's how we play the game. I'll start." The E then places the first block length-wise, and slightly to the right of the C. The C is encouraged to build the tower vertically. If the C tries to build several smaller towers, remove them and point to the top of the current tower saying, "We'll build one very tall tower."

Sequence of pauses by the E, beginning from the time C places a block on the tower (i.e., the sequence of pauses doesn't include the first block E puts down to start the tower): one immediate response with no pause, one 5 sec pause, one 10 sec pause, one 15 sec pause, one immediate response with no pause, one 20 sec pause, one 30 sec pause. The E should try not to look at his watch for extended periods of time during this trial. The E should look blankly at a wall or other things in the room.

Repeat once for a total of two trials. Between trials repeat the rule, "Remember how to play the game. First I put a block down, and then you put a block down, then I put one, then you put one. That's how we play the game"

SCORING
This episode consists of two trials. Each trial is divided into seven epochs. The first epoch begins as soon as the E's hands are out of contact with the first block and ends immediately after the C's hands leave the block at the end of his/her turn. The remaining epochs begin and end when the C removes his/her hands from the block.

Variables to be scored:
a. Waits turn
b. Number of blocks added
c. Prompts E
d. Varies from directions
e. Level of engagement

Definitions of variables:

a. Does not wait turn: Note whether the C waits his or her turn during each epoch
   1 = Does wait turn.
   2 = Does not wait turn.

b. Number of Blocks: The number of blocks C adds to the tower is noted during each epoch.

c. Prompts E: The number of prompts C directs toward E is noted during each epoch (e.g., pushing a block toward E, saying, "It's your turn").

d. Varies from directions: Whether or not the C deviates from given directions pertaining to construction of tower is noted in each epoch. This includes placing blocks horizontally after being instructed to place them vertically.
   1 = Follows directions.
   2 = Varies from directions.

e. Level of engagement: The degree to which the C is engaged in the task is rated on the following 3 point scale:
   0 = C exhibits low level of engagement in task. C seems neutral and/or disinterested and bored. C helps build tower with little excitement.
   1 = C exhibits intermediate level of engagement in task. C is careful about task, somewhat animated.
   2 = C exhibits high level of engagement in task. C is very careful while placing block on tower, very animated in body movement and/or speech. C gives off a general impression of high enthusiasm.

Tower of Patience Coding Form

Trial 1

Epochs	0s	5s	10s	15s	0s	20s	30s
Wait turn? (y/n)							
Number of blocks added							
# times C prompts E							
Varies from directions (y/n)							
Level of engagement (0-2)							

Trial 2

Epochs	0s	5s	10s	15s	0s	20s	30s
Wait turn? (y/n)							
Number of blocks added							
# times C prompts E							
Varies from directions (y/n)							
Level of engagement (0-2)							

WAITS TURN
1 = Does wait turn
2 = Does not wait turn

VARIES FROM DIRECTIONS
1 = Follows directions
2 = Varies from directions

LEVEL OF ENGAGEMENT
0 = Low engagement
1 = Intermediate engagement
2 = High engagement

NOTES:

APPENDIX F

IMPOSSIBLY PERFECT CIRCLES TASK

PHYSICAL SETTING
The child (C) is sitting at a table, facing the camera, and the examiner (E) is sitting to C's right. The parent is not present during this episode.

STIMULI
- One washable green marker
- One sheet of 11 x 17 white typing paper

PROCEDURE
The E enters the room with a piece of paper and a green pen and asks the C, "Can you do me a favor? I need the PERFECT green circle. Could you draw it for me? I need the perfect green circle." E then puts the paper on the table in front of the C and gives the C the green marker. EACH circle the C draws is critiqued by the E (in a neutral voice), then the E asks the C to draw another one. Critiques are specific, but do not include any information on how to rectify the problem. Some examples of critiques: "That one is too pointed (indicating point on circle). Draw another one," "That one is too flat, draw another one," That one is too skinny . . . , too small, too large, lopsided, is an oval, is not round, not quite right . . . .
The E should not allow the C to turn the paper over to continue drawing on the back. If this occurs (and it usually does) the E should stop the C and say, "No, I need you to draw the perfect circle on this side. Could you draw another one?" If the C says that there is no more room, the E says, "You can draw over the top of the other ones" (Some of the children do not want to cross any of the previous circles).
Three times throughout the episode, the E says " I need the PERFECT green circle." The task should be terminated after 3 ½ minutes. To bring the C back to baseline the E says (in a very pleasant voice), "That one looks pretty good (indicating the circle the C just completed). Circles are hard to draw, aren't they? Thanks for drawing all those circles. Would you like to make that one into a smily? (indicating a suitable circle)."

SCORING
This episode lasts for three and one half minutes and is divided into 10 second epochs for scoring purposes. The coding for the episode begins when the experimenter says, "I need the perfect green circle" and ends when the E says to the C, "That one looks pretty good."

Variables to be scored:
a. Presence of bodily anger
b. Intensity of protest
c. Intensity of opposition
d. Presence of bodily sadness
e. Intensity of resignation

Definitions of variables:

a. Presence of bodily anger: Presence of bodily anger is noted in each epoch and rated on the following scale:
   0 = No detectable anger.
   1 = Detectable anger such as bodily tensing, slapping hand on the table.

b. Intensity of protest: Direct refusal to draw circles (e.g., "I won't do this" or just quitting). Peak intensity of protest is noted in each epoch and is rated on the following scale:
   0 = No apparent protest.
   1 = Behavioral protest.
   2 = Verbal protest.
   3 = Both verbal and behavioral protests are apparent.

c. Intensity of opposition: Indirect refusal to draw circles. Peak intensity of opposition is noted in each epoch and rated on the following scale:
   0 = No apparent opposition.
   1 = Behavioral opposition, swinging of legs, smirking or smiling at the E.
   2 = Verbal opposition, "I can't draw circles.", "It's kind of hard.", "I don't have any more room.", "I'm terrible at drawing circles."

d. Presence of bodily sadness: Presence of bodily sadness is noted in each epoch and rated on the following scale:
   0 = No detectable sadness.
   1 = Detectable sadness, slumping of shoulders, downcast head.

e. Intensity of resignation: Resignation is a passive behavior and should be scored as the child becomes more resigned to failing the task. Peak intensity of resignation is noted in each epoch and rated on the following scale:
   0 = No detectable resignation.
   1 = Mixed behavior, draws only one/few circles.
   2 = Gives up totally, clear resignation.

Impossibly Perfect Green Circles Coding Form

Interval 1 (0:00-1:00)

10s epochs	1	2	3	4	5	6
Presence of bodily anger (0/1)						
Intensity of protest (0-3)						
Intensity of opposition (0-2)						
Presence of bodily sadness (0-1)						
Intensity of resignation (0-2)						

Interval 2 (1:01-2:00)

10s epochs	1	2	3	4	5	6
Presence of bodily anger (0/1)						
Intensity of protest (0-3)						
Intensity of opposition (0-2)						
Presence of bodily sadness (0-1)						
Intensity of resignation (0-2)						

Interval 3 (2:01-3:00)

10s epochs	1	2	3	4	5	6
Presence of bodily anger (0/1)						
Intensity of protest (0-3)						
Intensity of opposition (0-2)						
Presence of bodily sadness (0-1)						
Intensity of resignation (0-2)						

Interval 4 (3:01-3:30)

10s epochs	1	2	3
Presence of bodily anger (0/1)			
Intensity of protest (0-3)			
Intensity of opposition (0-2)			
Presence of bodily sadness (0-1)			
Intensity of resignation (0-2)			

NOTES:

APPENDIX G

CONSENT FORM
AUTHORIZATION TO PARTICIPATE IN RESEARCH PROJECT

Your consent is being sought for your child's and your participation in a study exploring the relationship between children's sleep and daytime behavior. This study may be important to help researchers better understand how sleep patterns affect behavior in children.

There are three major parts to this study. During the first part, you will be asked to come to the USM Sleep Research Laboratory to fill out some questionnaires related to your child's sleep, social and behavioral development, and related family characteristics. These questionnaires will take approximately one hour of your time to complete.

The second part of this study requires your child to wear an actigraph on his or her wrist 24 hours each day (with the exception of bathing or swimming) for two weeks. An actigraph is similar to a watch and records your child's movement. It is very durable and will not harm your child. Several children in previous studies thought it was fun to wear an actigraph because it is like a watch. You will be trained how to use the actigraph during your first visit to the USM Sleep Research Laboratory. In addition to your child wearing the actigraph, you will complete a sleep/wake diary on a daily basis to report your child's daily events and sleep. It should take no more than five minutes each day to complete the sleep/wake diary.

The third part of this study involves bringing your child to the USM Psychology Department to complete a series of tasks under the supervision of a researcher from the USM Sleep Research Laboratory. Among a variety of activities, the tasks involve playing with toys, drawing, building with blocks, etc. It should take approximately 30 minutes to complete these tasks with your child. Your child will be videotaped during these tasks and the tapes will be used only for research purposes. By signing this form, you are giving permission for your child to be videotaped while participating in this study.

Your participation in this project is voluntary and you may withdraw from the study at any time. Any information obtained will be completely confidential. Only the researchers will have access to the material obtained from you or your child.

You will be compensated for your time spent participating in this study with a gift card to a local merchant and/or course extra credit. Gift cards ($20) will be presented upon completion of all three phases of this study. In addition, you may benefit from participation in this study by gaining an increased understanding of your child's sleep.

It is possible that your child may become upset while completing the tasks with the researcher during the third part of the study described above. If this occurs, the researcher will stop the tasks and consult with you regarding continuation of the tasks. You will be given the option of continuing participation or withdrawing from the study.

You will receive a copy of this form. If you have any questions about this study, you can contact Brian Crosby at (601) 266-4619 or Dr. John Harsh at (601) 266-4611. This project and this consent form have been reviewed by the Institutional Review Board, which ensures that research projects involving human subjects follow federal regulations. Any questions or concerns about rights as a research subject should be directed to the Chair of the Institutional Review Board, The University of Southern Mississippi, 118 College Drive #5147, Hattiesburg, MS 39406, (601) 266-6820.

I have read the description above and grant permission for my and my child's participation. I am also certifying that I hold legal custody of the child and have legal authority to authorize his or her participation.

Child's Name	Date of Birth
Signature of Parent/Guardian	Date
Researcher Obtaining Consent	Date

APPENDIX H

INSTITUTIONAL REVIEW BOARD APPROVAL FORMS

The University of Southern Mississippi

Institutional Review Board

118 College Drive #5147
Hattiesburg, MS 39406-0001
Tel: 601.266.6820
Fax: 601.266.5509
www.usm.edu/irb

HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE
NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **26041703**
PROJECT TITLE: **An Examination of Napping and Psychosocial Functioning in Pre-School Children**
PROPOSED PROJECT DATES: **03/01/06 to 03/01/07**
PROJECT TYPE: **Dissertation or Thesis**
PRINCIPAL INVESTIGATORS: **Brian Crosby**
COLLEGE/DIVISION: **College of Education & Psychology**
DEPARTMENT: **Psychology**
FUNDING AGENCY: **N/A**
HSPRC COMMITTEE ACTION: **Expedited Review Approval**
PERIOD OF APPROVAL: **04/17/06 to 04/16/07**

Lawrence A. Hosman

Lawrence A. Hosman, Ph.D.
HSPRC Chair

4-17-06
Date

The University of
Southern Mississippi

Institutional Review Board

118 College Drive #5147
Hattiesburg, MS 39406-0001
Tel: 601.266.6820
Fax: 601.266.5509
www.usm.edu/irb

HUMAN SUBJECTS PROTECTION REVIEW COMMITTEE
NOTICE OF COMMITTEE ACTION

The project has been reviewed by The University of Southern Mississippi Human Subjects Protection Review Committee in accordance with Federal Drug Administration regulations (21 CFR 26, 111), Department of Health and Human Services (45 CFR Part 46), and university guidelines to ensure adherence to the following criteria:

- The risks to subjects are minimized.
- The risks to subjects are reasonable in relation to the anticipated benefits.
- The selection of subjects is equitable.
- Informed consent is adequate and appropriately documented.
- Where appropriate, the research plan makes adequate provisions for monitoring the data collected to ensure the safety of the subjects.
- Where appropriate, there are adequate provisions to protect the privacy of subjects and to maintain the confidentiality of all data.
- Appropriate additional safeguards have been included to protect vulnerable subjects.
- Any unanticipated, serious, or continuing problems encountered regarding risks to subjects must be reported immediately, but not later than 10 days following the event. This should be reported to the IRB Office via the "Adverse Effect Report Form".
- If approved, the maximum period of approval is limited to twelve months. Projects that exceed this period must submit an application for renewal or continuation.

PROTOCOL NUMBER: **R26041703**
PROJECT TITLE: **An Examination of Napping and Psychosocial Functioning in Pre-School Children**
PROPOSED PROJECT DATES: **08/13/07 to 08/13/08**
PROJECT TYPE: **Dissertation or Thesis**
PRINCIPAL INVESTIGATORS: **Brian Crosby**
COLLEGE/DIVISION: **College of Education & Psychology**
DEPARTMENT: **Psychology**
FUNDING AGENCY: **N/A**
HSPRC COMMITTEE ACTION: **Renewal of a Previously Approved Project**
PERIOD OF APPROVAL: **08/13/07 to 08/12/08**

Lawrence A. Hosman
Lawrence A. Hosman, Ph.D.
HSPRC Chair

8-15-07
Date

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