SLEEP HABITS AND ACADEMIC PERFORMANCE

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SLEEP HABITS AND ACADEMIC PERFORMANCE

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SLEEP HABITS AND ACADEMIC PERFORMANCE

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Jennifer Paige Edwards, daughter of Jeannette Edwards, was born May 3, 1977, in Metairie, Louisiana. She graduated from Gilbert High School in 1995. She attended Auburn University, and graduated with a Bachelor of Arts degree in Psychology on March 18th, 2000. She then entered the School Psychology graduate program in August of 2000. She received her M.Ed. in 2002, and her Ed.S. in 2003. Jennifer has worked as a school psychologist in Columbus, Georgia, since 2001. In May of 2008, Jennifer received her Diplomate from the American Board of School-Neuropsychology.

DISSERTATION ABSTRACT

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This study examined the effects of poor sleep habits on the academic performance of children. The role of poverty rate, medical diagnoses, napping and medication on sleep habits was also assessed. One hundred ninety-one parents of Kindergarten-4th grade students completed the Children's Sleep Habits Questionnaire (CSHQ), as well as an informal survey. Children who were referred to the Student Support Team (SST) had significantly higher scores on the CSHQ subscale Night Wakings. Children who had a diagnosed

medical condition had significantly higher scores on the CSHQ Total Score, as well as the subscales Sleep Onset Delay, Sleep Anxiety, Night Wakings, Parasomnias and Sleep Disordered Breathing. Children taking medication had significantly higher scores on the CSHQ Total Score, as well as the subscales Sleep Onset Delay, Night Wakings, Parasomnias and Sleep Disordered Breathing. Children from an elementary school with a 97.7% poverty rate had significantly higher scores on the CSHQ subscales Sleep Onset Delay and Night Wakings. These results highlight the importance of sleep education in the schools, as well as the need to address the issue of sleep in Student Support Team meetings.

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CHAPTER ONE

INTRODUCTION

Sleep is a vital part of child and adolescent development. Poor or inadequate sleep can have a dramatically negative impact on a child's daily functioning, particularly school performance. Side effects may include off-task behavior, drowsiness, irritability and an inability to focus.

Neurobiological theories propose that every part of the body, down to the smallest cell, is involved with the process of sleep. Sleep gives the brain time to integrate and process the information learned during the day. The process of sleep is so necessary for daily functioning that extended sleep deprivation can lead to death.

The benefits of good, quality sleep are endless. Children who feel more rested report a greater motivation to do their best, have a more positive self-image as a student, and are more open to teacher influence (Meijer, Habekothe, & Van Den Wittenboer, 2000). Children who get

an adequate amount of sleep also report higher grades. This is supportive of the neurobiological theories of information integration and processing during sleep.

Sleep disturbance is becoming increasingly more common. According to survey studies, twenty to thirty percent of parents report the existence of sleep disturbance in their children (Liu, Liu, Owens & Kaplan, 2005). The television, the Internet, cell phones and caffeine can all have an impact of the length/quality of a child's sleep. In addition, a child must cram homework, sports, and extra-curricular activities into the small period of time between school and bedtime. These activities increase the chance that bedtime will be pushed back.

PROBLEM STATEMENT

Research in the area of sleep problems and children is a relatively new field. There is even less research when it comes to examining the issue of sleep problems and the effect it has on academic performance. A child who is struggling in school may be dealing with the effects of

poor or inadequate sleep, rather than a lack of ability. Studies suggest that adolescents who get an optimal amount of sleep report higher grades than their sleepy counterparts (www.sleepfoundation.org). In addition, those children labeled as having attentional issues may also be experiencing the effects of poor sleep.

PURPOSE OF THE STUDY

The purpose of this study is to examine sleep and academic performance in school aged children. There were five primary goals of this study. The first goal of this study was to determine the extent of the relationship between sleep habits and academic performance of school-aged children.

Sleep habits of children were defined as the total test scores and subtest scores from the Children's Sleep Habits Questionnaire (Owens, Spiritu & McGuinn, 2000). Student Support Team referrals were used to measure academic performance; a referral to the Student Support Team was considered poor academic performance. Although there are numerous studies investigating the relationship between sleep habits of children and their academic

performance, no existing study has investigated this particular relationship. It was hypothesized that children who had been referred to the Student Support Team would have poorer sleep habits than their counterparts.

The second goal of this study was to determine the extent of the relationship between medical diagnoses and the sleep habits of children. It was hypothesized that children who had medical diagnoses (e.g. ADHD, allergies, etc.) would have poorer sleep habits than those with no diagnosed medical problems.

The third goal of this study was to determine the extent of the relationship between school poverty rate and the sleep habits of children. It was hypothesized that children in schools with a higher poverty rate would have poorer sleep habits than those in schools with a lower poverty rate.

The fourth goal of this study was to determine the extent of the relationship between napping and the sleep habits of children. It was hypothesized that children who did not take naps would have poorer sleep habits than those who did.

The final goal of this study was to determine the extent of the relationship between medication and the sleep

habits of children. It was hypothesized that children who took medication had poorer sleep habits than those who do not.

Findings from this study will contribute to a better understanding of sleep problems of children, as well as to highlight the need to address the issue of sleep in the schools. A child who is struggling in school may be affected by poor or inadequate sleep.

Research Questions

1. To what extent is there a relationship between sleep habits and academic performance?
2. To what extent is there a relationship between medical diagnoses and sleep habits?
3. To what extent is there a relationship between school poverty rate and sleep habits?
4. To what extent is there a relationship between napping and sleep habits?
5. To what extent is there a relationship between medication and sleep habits?

Null Hypotheses:

1. There is no relationship between sleep habits and academic performance.
2. There is no relationship between medical diagnoses and sleep habits.
3. There is no relationship between school poverty rate and sleep habits.
4. There is no relationship between napping and sleep habits.
5. There is no relationship between medication and sleep habits.

Definition of Terms:

Parasomnias: a general term used to describe uncommon disruptive sleep-related disorders, such as sleep-walking, sleep terrors and teeth grinding.

Student Support Team: a multi-disciplinary school team that meets to discuss the academic and behavioral needs of students.

CHAPTER TWO

REVIEW OF RELEVANT LITERATURE

Sleep is an important factor in a child's life, affecting development, as well as emotional and physical well-being. Sleep problems can have an impact on a child's daytime functioning, and they are not uncommon. Estimates of the number of children with sleep problems range from as low as twenty percent (Liu et al., 2005), to as high as over fifty percent (Buckhalt & Wolfson, 2006).

The Neurobiology of Sleep

Sleep is a fundamental part of life. It is not just a function of the body, it is an active process. Sleep is so vital to the body's daily functioning that a prolonged loss of sleep impairs metabolism, immune function, temperature control and can ultimately lead to death (Rechtshaffen & Bergmann, 2002).

As with other functions of the body, sleep cannot be localized to just one part of the brain. Its control mechanisms are entrenched at every level, starting with the

cells. The same mechanisms that control autonomic functions, cognition, behavior, arousal and motor functions are all involved with the process of sleep.

The 24-hour sleep/wake cycles, called circadian rhythms, developed as a response to the 24-hour astronomical cycle that all living things are exposed to (Pace-Schott & Hobson, 2002). The circadian system helps the body cycle through these phases. This system includes the retina, suprachiasmatic nuclei (SCN), the retinohypothalamic tract and the pineal gland.

The suprachiasmatic nuclei is located in the hypothalamus, above the optic chiasm. It acts as a sort of clock, receiving photic information from the retina (via the retinohypothalamic tract) and regulating the timing and length of sleep (Kotagal & Pianosi, 2006). This “master clock” is so vital to the sleep-wake cycle that if the SCNs in hamsters with normal circadian rhythms are transplanted into those with abnormal rhythms, normal periodicity will be restored (Pace-Schott & Hobson, 2002).

Once the SCN has determined that the sleep cycle needs to begin, it signals the pineal gland to secrete melatonin, a sleep-inducing hormone. Melatonin secretion is at its highest level when there is a lack of light. Studies have

shown that melatonin secretion levels dramatically decrease when light is shined on the retina (Richardson, 2005). The SCN neurons communicate the circadian time to other structures in the brain via action potentials.

In addition to the circadian rhythms, the homeostatic sleep drive also contributes to the sleep/wake cycle. The homeostatic sleep drive is the body's need to attain the quantity of sleep needed for maximum alertness and daytime functioning (Richardson, 2005). As a person goes about their day, the need for sleep starts accumulating. During sleep, the need lessens. If the required amount of sleep has not occurred, the homeostatic sleep drive will intensify its need for sleep. Consequently, there is a higher likelihood of sleep occurring at atypical times (Richardson, 2005).

Ultradian rhythms are those cycles that last less than 24 hours, such as the REM and NREM stages of sleep. These stages of sleep will alternate throughout the night.

NREM sleep (also known as non-rapid eye movement) is the stage in which information learned throughout the day is repeated. The hippocampus consolidates this information and transfers it to the cortex for long-term storage. Body

movement is involuntary and episodic at this stage, and a dream-like state increases (Hobson & Pace-Schott, 2002).

NREM is divided into four phases. Each phase relates to the level of sleep achieved; the higher the level, the deeper the sleep. Stages 3 and 4, the deepest levels of sleep, are also known as delta or slow-wave sleep. As an individual ages, they require less slow-wave sleep. NREM sleep is deeper early on in the night, with less time devoted to REM sleep. Later on, NREM sleep becomes shallower, while REM takes up the majority of the cycle.

REM sleep (also known as rapid eye movement) allows for the integration of information. The dream-like state peaks in this stage, and body movement is inhibited. As the body moves from NREM to REM sleep, logical thinking decreases and hallucinosis increases. This explains the bizarre dreams one may experience in REM sleep (Hobson & Pace-Schott, 2002).

REM sleep is also called paradoxical sleep, because there are qualities of deep and light sleep at the same time. The loss of muscle tone and decrease in respiration, heart rate and temperature are more evident in this phase of sleep. However, brain activity increases in this phase, which resembles wakefulness. A person in REM sleep is more

easily awakened than in NREM sleep. REM sleep occurs in approximately 90-minute cycles throughout the night (Dahl & Lewin, 2002).

The amount of sleep required decreases as an individual ages. The average infant sleeps approximately 16 hours a day, and by one year of age sleeps approximately 11 hours with an additional 2.5 hours of naps. An average 3 year-old gets 10.5 hours of sleep with a 1.5 hour nap. By age 18, total sleep has decreased to approximately 8 hours (Dahl & Lewin, 2002).

Sleep Hygiene

Sleep hygiene, according to LeBourgeois et al (2005) consists of "behavioral practices that promote good sleep quality, adequate sleep duration, and full daytime alertness." Such practices include: avoiding caffeine, alcohol and tobacco before bedtime; avoiding late-afternoon naps; maintaining a steady sleep schedule; sleeping alone; sleeping in a quiet, toxin-free environment; having a bedtime routine; only using the bed for sleep; and avoiding activities at bedtime that promote emotional, physiological and cognitive activity.

Children have extraordinary demands on their time. Extra-curricular activities, cell phones, the Internet, television and homework have to be crammed into the small period of time between school and bedtime. With all of these factors, it would be very easy to delay bedtime until much later (Kotagal & Pianosi 2006). It may be because of these pressures that sleep onset increases with a child's age. Sadeh, Gruber and Raviv (2000) found that sleep onset time for sixth graders was more than an hour later than second graders. Consequently, they reported more drowsiness in the morning than younger children.

Excessive Television and Computer Consumption

The television also plays a role in the delay of sleep onset, while decreasing sleep duration. American children spend around twenty-five hours a week watching television, almost as much time as they spend in school (Owens et al., 1999). Television viewing habits related to the highest number of sleep disturbances were television viewing at bedtime and the amount of television viewed each day. In addition, more and more television sets are found in

children's rooms, which are the most powerful predictors of overall sleep disturbance.

Dworak et al. (2007) conducted a study in which children were exposed to excessive television and computer game use. A verbal and visual memory test was conducted before the exposure and after a subsequent sleeping period. Excessive computer game use resulted in a significant decrease in the amount of slow-wave sleep, as well as a significant decrease in verbal memory performance. Sleep onset latency also increased, as well as the amount of stage 2 sleep. Television viewing significantly decreased the amount of sleep efficiency.

Employment

Results from a survey of over 3000 high school students in Rhode Island found that close to 60 percent of the sample reported holding part-time jobs, and nearly 30 percent stated that they work twenty hours or more each week (Millman, 2005; Wolfson & Carskadon, 1998). Those who did work indicated that they had difficulty staying awake while driving, in class, and while reading or doing homework. A higher rate of caffeine, alcohol/drugs and

tobacco use was also reported (Millman, 2005; Wolfson & Carskadon, 1998).

Stress

Individuals deal with stress in different ways. Sadeh, Keinan and Daon (2004) refer to three different types of coping: problem-focused coping, emotional-focused coping and disengagement. Problem-focused coping tends to occur when an individual feels as though the stressful conditions can be managed or changed. Emotional-focused coping is designed to regulate the emotional response to the problem. This type of coping is more likely to occur when the individuals feel as though nothing can be done to change the stressful situation (Morin, Rodrigue & Ivers, 2003).

Sadeh et al. (2004) found that individuals with high problem-focused coping scores had longer periods of sleep and more true sleep time. Those with high emotional-focused coping scores experienced a decrease in the amount of sleep, as well as a decrease in sleep quality.

School Start Times

The United States has a history of early school start times. A vast majority of school districts have high schools starting first, then middle schools, with elementary schools starting the latest. In a 2001-2002 survey, thirty-five percent of 50 high schools started earlier than 7:30 am, nearly fifty percent started between 7:31 and 8:14 am, and sixteen percent started from 8:15 am to 8:55 am (Millman et al., 2006). The United States is not the only country to insist on early school start times; school start times in India, Italy, Korea, China and Japan are usually before 7:30 in the morning (Owens, 2004).

With sleep onset occurring later in the evening for adolescents, an early school start time can have detrimental effects. The decrease in total sleep that occurs with an earlier start time is associated with poor school performance for adolescents. Children may tend to try to "make up" for their lack of sleep during the school week. This is also known as weekend oversleep. In a study by Szymczak, Jasinska, Pawlak and Zwierzykowska (1993), Polish students ten through fourteen years of age were followed for more than a year. Results revealed that the

students slept longer on weekends and during vacation by waking up later (Szymczak et al., 1993).

Changing school start times is an alternative that has had good results. In 1997, Minneapolis Public Schools changed the start times for their high schools, from 7:15 am to 8:40 am. Effects of the later start time were examined by the Center for Applied Research and Educational Improvement at the University of Minnesota. Daily attendance rates increased, and the dropout rate decreased (Wahlstrom, Davison, Choi & Ross, 2001). Fifty-seven percent of teachers reported that students were more alert during the first two periods of the day after the change in school start times. Fewer students were observed sleeping at their desks, and teachers also had more team planning time in the morning (Wahlstrom et al., 2001).

Administrators and counselors also saw changes in students. Significantly fewer students were coming to the counselors with reports of peer or parent relationship issues. Five out of 8 principals reported that they dealt with fewer disciplinary referrals, and had fewer students reporting as tardy (Wahlstrom et al., 2001). Three years after the later start time was established, the attendance rates for non-continuously enrolled 9th graders climbed from

72 to 76 percent. The combined rates for 10th and 11th graders increased from 73.7% to 77.5 percent (Wahlstrom, 2002).

Other schools have found success with switching school start times. Jessamine County School District in Kentucky moved their elementary school start time from 8:30 to 8:00, their middle schools from 7:40 to 8:50, and their high schools from 7:30 to 8:40. The Wilton Connecticut School District, located in Connecticut, also switched school start times. Grades 3-5 originally started at 8:15, and Grades 6-12 started at 7:35. The school district decided to simply switch start times.

Both school districts had very few problems with transportation, which was an initial concern of both school districts. In fact, there were numerous positive changes that occurred. Teachers at Wilton reported that students had better attitudes and were more awake. Parents also saw positive changes in their children's behavior. The high school athletic programs saw an increase in participation, as well as extra-curricular activities for grades 3-5 (www.sleepfoundation.org).

Cultural Differences and Similarities

Sleep problems "are universal and exist across all cultures" (Owens, 2005). In 2003, the International Pediatric Sleep Education Task Force (IPSE) was created in order to investigate cultural differences/similarities impacting the sleep practices of children, as well as to address the gap between sleep education and parents and professionals (Owens, 2005). This task force consisted of pediatric sleep experts from around the world.

At the 2003 meeting of IPSE, surprising similarities were found to exist across all cultures. The task force found that a 25% rate of parent-reported sleep problems in children was often found, regardless of culture. Many cultures also suffered from specific sleep issues, such as the influence of TV and other devices on sleep, academic rigors and school schedules, insufficient sleep in children and adolescents, the effects of alcohol and tobacco use on sleep, and problems melding sleep practices with the family lifestyle (Owens, 2005).

While sleep problems do exist in every culture, each culture has a different concept of sleep hygiene. The concept of co-sleeping is a good example. Co-sleeping is a

common practice in the majority of cultures around the world. Liu et al. (2005) found that young children in China are more likely to co-sleep with their parents. This may be due to the tendency of the Asian culture to embrace family closeness and the development of interpersonal relationships, while Western culture places an emphasis on the importance of independence and individualism (Liu et al., 2005). Co-sleeping also occurs in India, due to problems with overcrowding (Owens, 2005).

In the United States, certain ethnic groups (e.g. African Americans, Hispanics and South East Asians) have high rates of co-sleeping. Interestingly, co-sleeping in Caucasian families is often associated with decreased parental education, decreased socio-economic status, increased family stress and a more ambiguous maternal attitude towards child-rearing (Owens, 2004).

According to results from Liu et al.'s 2005 study, sleep onset was delayed with increasing age. The average sleep duration for Chinese children was one hour less than that of American children. Parents in both China and the United States were given the Children's Sleep Habits Questionnaire (CSHQ), with results indicating more sleep problems in Chinese children.

Differences in factors associated with shorter daily sleep duration were found between cultures. In the United States the factors included: problems falling asleep, trouble sleeping away, and bedtime resistance. In China, going to bed at different times and having a fear of sleeping alone were associated with shorter daily sleep duration (Liu et al., 2005). The fear of sleeping alone may be due to the co-sleeping that occurs in the Asian culture.

LeBourgeois et al. (2005) examined the relationship between sleep hygiene and self-reported sleep quality in American and Italian adolescents. They found that sleep hygiene of Italian adolescents was much better than that of American adolescents. Italians also reported a better quality of sleep than the American adolescents did. The authors speculated that the sleep hygiene practices of Italian adolescents may be due to the level of parental involvement into early adolescence.

Buckhalt, El-Sheikh and Keller (2007) found that after controlling for SES, African American children with sleep disturbance had lower cognitive performance on the Woodcock-Johnson III: Tests of Cognitive Abilities than European American children. When sleep was optimal, both

groups of children had very similar performance. African American children also had shorter Sleep Duration, less Sleep Activity, more delayed Sleep Onset Times on weekdays, higher levels of self-reported Sleepiness and Sleep/Wake Problems, and more variability in Sleep Onset Time.

Sleep Disorders

Learning difficulties, hyperactivity, aggression, and reduced achievement are common pediatric complaints which are associated with underlying sleep disorders.

Narcolepsy

Narcolepsy is a neurological disorder that is characterized by excessive sleepiness, cataplexy, hypnogogic hallucinations, disturbed night sleep and sleep paralysis (Zeman et al., 2004). Narcolepsy often starts in the teens or twenties. However, it can also occur as late as middle age, or as early as two years of age (Kotagal & Pianosi 2006).

With narcolepsy, there is a continuous feeling of sleepiness at all times, with the urge to sleep sometimes becoming irresistible. Sleep is likely to occur at

inappropriate times during the day. Cataplectic episodes (a sudden decrease or loss of voluntary muscle tone after emotion) can last only a few seconds, but can also last as long as ten minutes (Douglas, 2001).

The origins of this disorder are still mysterious, and there is no one definitive treatment for narcolepsy. The use of different types of medication, scheduled brief naps and dietary changes have proven useful with helping control the symptoms of this disorder (Guilleminault & Brooks, 2001).

Delayed Sleep Phase Syndrome

Delayed Sleep Phase Syndrome occurs mainly in boys, and usually starts in adolescence. Sleep becomes impossible to attain before two to four in the morning. These individuals prefer to wake in the late morning or early afternoon, and become extremely sleepy if forced to conform to typical sleep/wake schedules. However, if allowed to sleep without restrictions, they are able to attain normal sleep quality and quantity (Kotagal & Pianosi, 2006). This syndrome is thought to be due to a maturational delay in the “master clock” (Doghramji, 2004). Treating Delayed

Sleep Phase Syndrome involves gradual phase advance (by 15-30 minutes every night) combined with bright light exposure upon awakening (Douglas, 2001).

Sleep Disordered Breathing

Obstructive sleep apnea occurs when the airway completely collapses during sleep. This causes breathing to stop for 10 seconds or more. Due to the lack of oxygen, blood-oxygen levels decrease, and sleep becomes continually interrupted. When the brain realizes that breathing has ceased, it immediately starts to tighten the airway muscles and restores them to waking levels. The process then starts over again (Guilleminault & Brooks, 2001).

OSA usually tends to occur in individuals who snore. Symptoms include mouth breathing, snoring, bed-wetting, mood swings, inattentiveness, daytime fatigue, inability to focus, distractibility and restless sleep (Kotagal & Pianosi, 2006; Goll & Shapiro, 2006).

The inattentive and hyperactive behaviors that can occur as a result of sleep apnea are also characteristics of Attention Deficit/Hyperactivity Disorder (ADHD). In a study of 866 children, Chervin et al. (2002) found that

inattention and hyperactivity were associated with increased sleepiness in the daytime, as well as other symptoms of sleep disordered breathing.

Restless Legs Syndrome

Restless Legs Syndrome is characterized by a tremendous need to move the legs, as well as motor restlessness. These symptoms are worse in the evening and night (Douglas, 2001). It is an autosomal dominant, sensorimotor disorder, which is aggravated by keeping the limbs still. Relief occurs when there is movement.

This disorder interferes with sleep onset, as well as the quality of sleep. Consequences include daytime fatigue, sleepiness, and inattentiveness (Kotagal & Pianosi, 2006). An inability to focus and distractibility are also behavioral symptoms associated with this disorder (Goll & Shapiro, 2006).

Periodic Limb Movements of Sleep

Periodic Limb Movements of Sleep (PLMS) occurs when the limbs exhibit repetitive, involuntary movements during

sleep, usually every twenty to forty seconds (Douglas, 2001). PLMS occurs more frequently with older individuals. These movements occur more often in light NREM sleep than delta sleep, and very rarely occur during REM sleep. If these movements occur often enough, then sleep is interrupted and daytime functioning is impaired. PLMS often occurs with those individuals who suffer from Restless Legs Syndrome (Guilleminault & Brooks, 2001).

Sleep and Other Disorders

A study by O'Brian et al. (2003) revealed that parents of children with Attention Deficit Hyperactivity Disorder report more problems with initiating sleep, bed-time resistance, nighttime wakings, enuresis, sleep-related anxiety and excessive daytime sleepiness. One interesting result from O'Brian et al.'s study was that those pre-adolescent children with ADHD had less REM sleep and increased REM latency than the study controls.

Autism is the most common pervasive developmental disorder on the autism spectrum. Although a difficulty with sleep is not a requirement for a diagnosis of autism or any of the pervasive developmental disorders, many children who are autistic are affected by sleep problems.

A study by Lerner, Hoffman and Sweeney (2005) found that parents of children with autism reported significantly greater difficulties with sleep than parents whose children were not autistic. In a study by Honomichl, Goodlin-Jones, Burnham, Gaylor, and Anders (2002) it was found that problem sleep was reported by 54 percent of parents of children with a pervasive developmental disorder. Those children displayed delayed sleep onset and greater sleep fragmentation (Honomichl et al., 2002).

Individuals diagnosed with psychiatric disorders are also plagued with sleep problems. Many depressed individuals suffer from insomnia, while a smaller subset (those diagnosed with atypical depression) have problems with excessive daytime sleepiness (Guilleminault & Brooks, 2001). Depressing or negative thoughts, one of the hallmarks of depression, exacerbate the insomnia.

Children diagnosed with depression have been found to have increased sleep latency, while some studies involving adolescents with depression detected prolonged sleep latency and reduced REM latency (Dahl & Lewin, 2002).

Consequences of Inadequate Sleep

Achievement and Self-Image

If an individual is not getting the right quantity or quality of sleep, their daytime functioning will suffer. Alertness and vigilance become irregular, cognitive and motor reactions become delayed, and there is a greater chance of falling asleep in quiet settings. Children may fall asleep in class, and their task performance may suffer.

A study was done by Meijer et al. (2000) that focused on seventh and eighth graders' perceptions of their school functioning and their sleep/wake schedules. Those who had problems getting up in the morning reported being less motivated to perform their best in school. Children who felt more rested had greater motivation to do their best, had a more positive self-image as a student, and were more open to teacher influence (Meijer et al., 2000).

Grades also tend to be affected by length of sleep, as well as the regularity of sleep/wake schedules. A study by Wolfson and Carskadon (1998) indicated that adolescents with self-reported higher grades also reported being on regular sleep/wake schedules, as well as having more total

sleep. Students who had As and Bs went to bed earlier and awakened earlier than those with grades of C or below.

Similar results were also found during the 2006 Sleep in America Poll. Eighty percent of adolescents who get an optimal amount of sleep report that they achieve A's and B's in school, while those who get insufficient amounts of sleep are more likely to get lower grades (www.sleepfoundation.org).

According to the 2006 Sleep in America Poll, at least once a week, 22% of high school students fall asleep doing homework, 14% arrive late or miss school because they oversleep, and more than ¼ fall asleep in school. In addition, mood can be affected by sleep problems. Seventy-three percent of adolescents who reported being unhappy or tense most often feel that they don't get enough sleep. Fifty-nine percent report feeling too sleepy during the day (www.sleepfoundation.org)

Injuries

Accidental injuries are also more likely to occur when there are problems with sleep. Giannotti and Cortesi (2003) found that there was a positive correlation between sleep problems, daytime sleepiness and the occurrence of

accidental injuries, while Wolfson and Carskadon (1998) found that there were significantly more injuries among 11th and 12th graders with irregular sleeping patterns than those who had adequate sleep.

Even among small children, the likelihood of injury is greater when there is inadequate sleep. Pre-school boys who slept less than 10 hours a day had an increased chance of injury (Valent, Brusaferro & Barrone, 2001). In a study of 71 pediatric clinic patients between the ages of three and seven years, those children who were more prone to injuries and displayed more behaviors associated with injury were also more significantly sleep disturbed. Sleep Anxiety, one of the subscales on the Children's Sleep Habits Questionnaire, was the subscale most significantly associated with injuries and behaviors associated with injuries (Owens, Fernando & McGuinn, 2005).

Neurobiological Effects

All of the aforementioned consequences of inadequate sleep have neurobiological roots. Some theories promote the idea that the hippocampus and neo-cortex interact during sleep, in order to store and consolidate information

learned during the wake cycle. This occurs during NREM sleep and quiet waking.

During REM sleep, new associations are formed between those memories stored in the neo-cortex (Hobson and Pace-Schott, 2002). These theories support the results of studies suggesting that children with regular sleep/wake cycles have better grades than those with irregular cycles. Those children with regular sleep/wake cycles allow their brains time during the night to process, store and integrate all of the information they learned during the day.

In addition, if the homeostatic sleep drive is not satisfied, a sleep debt occurs. The debt grows larger over time. Adolescents tend to be the population that has the greatest sleep debt; they are the ones less likely to get the necessary amount of sleep. Once the debt becomes large enough, mood problems, physical fatigue, drowsiness and cognitive impairment are likely to occur (Pilcher & Huffutt, 1996; Dinges et al., 1997).

Studies have suggested that the prefrontal cortex is the area of the brain that is the most sensitive to sleep disorders or a lack of sleep (Sadeh et al., 2003; Dahl, 1996; Drummond & Brown, 2001; Horne, 1993; Jones &

Harrison, 2001). The main role of the prefrontal cortex (PFC) is to mediate and control executive functions. The dorsolateral prefrontal cortex (DLPFC) is the area of the PFC that acts as the executive control system. The DLPFC regulates planning, set-shifting, decision-making abilities, monitoring, verbal and design fluency, as well as many other functions. These complex functions are based on simpler cognitive functions such as attention, inhibition and working memory (Muzur, Pace-Schott & Hobson, 2002)

Executive Functions

Numerous studies have shown how problematic a lack of sleep can be on children and adolescents. Pilcher and Walters (1997) conducted a study in which college students were either deprived of sleep for 24 hours or allowed to sleep for approximately eight hours. The students then completed the Watson-Glaser Critical Thinking Appraisal, as well as two questionnaires. One questionnaire looked at self-reported effort, concentration and estimated performance, while the other assessed off-task thoughts.

Those students who were deprived of sleep performed significantly lower than their counterparts. Interestingly, they also rated their concentration, effort and estimated performance higher than those students who received eight hours of sleep (Pilcher & Walters, 1997).

Steenari et al. (2003) found that in a study of sixty children ages six to thirteen years of age, lower sleep efficiency and increased sleep latency were associated with an increase in the number of incorrect responses on a working memory task.

Randazzo et al. (1998) randomly assigned children to either a control group with eleven hours of sleep or an experimental group with five hours of sleep. Both groups were administered a battery of sleepiness measures and performance measures the following day. Group differences were found on the Wisconsin Card Sorting Test, as well as on verbal creativity tasks. Results suggested that higher cognitive functions are impaired after a single night of restricted sleep (Randazzo et al., 1998).

Procedural memory consolidation also occurs during sleep. Gais et al. (2000) conducted a study in which each of the fifteen subjects learned a visual discrimination task with a period allowed for retention in between

learning the task and the retrieval interval. The length of time between learning and the retrieval interval was eight hours. The retention interval occurred either during the early or late half of the night.

The participants were randomly assigned to either a control group (which stayed awake during the retention interval) or a sleep group (which had a three hour period of sleep during the retention interval). Visual discrimination skills decreased in the control group, with no sleep allowed during the retention period. However, visual discrimination skills increased when the retention interval contained early sleep. If the retention interval only consisted of late sleep, visual discrimination skills did not improve. Results suggest that sleep (especially early sleep) is necessary after practicing visual discrimination tasks, in order for improvement to occur (Gais et al., 2000).

Walker et al. (2002) found that performance speed and accuracy on a finger tapping task can significantly improve after a night of sleep. In 2005, Walker et al. conducted another study that repeated the same task used in previous investigations (finger tapping). Participants were involved in a repeated measures design, which consisted of

a day-wake and a night-sleep phase. The night-sleep phase required participants to train on a motor sequence in the evening. Twelve hours later (after a night of sleep), they were retested while undergoing an fMRI. Then the participants were trained and immediately retested while undergoing another fMRI. Subjects repeated the same events during the day-wake phase, but in the morning (Walker et al., 2005).

Results suggested that improved performance accuracy in the night-sleep phase compared to the day-wake phase. This indicates that overnight sleep-dependent consolidation enhances learning motor sequences (Walker et al., 2005).

Few studies have been conducted in order to investigate whether sleep-dependent learning occurs with procedural tasks that are bimanual, as well as longer and more complex. Kuriyama et al. (2004) strove to research these very issues. Subjects (all right-handed individuals) were assigned to four different groups, each having a different task configuration (uni-manual 5-element configuration, bi-manual 5-element configuration, uni-manual 9-element configuration, bi-manual 9-element configuration).

Participants were required to repeatedly tap the designated sequence as accurately and as quickly as possible. Performance was evaluated using overall trial-performance measures, as well as measures within sequences. There were significant overnight increases in performance for both five-element groups, regardless of whether one hand or both hands were required for the sequence (Kuriyama et al, 2004).

Longer sequences, however, produced even more significant overnight increases in performance. These results strengthen the hypothesis that there is a sleep-dependent mechanism that is responsible for the consolidation of real-life motor skills such as speech articulation, learning a sport and playing a musical instrument (Kuriyama et al, 2004).

Sleep is also vital for the consolidation of declarative memories. Sleep allows memories to be reprocessed and strengthened. Information may be transferred from the hippocampus to the neocortical brain regions, where newly attained memories form associations with long-term memories (Gais & Born, 2004).

Wilhelm et al. (2008) conducted a study similar to Gais et al. (2000). However, this investigation studied

the effects of post-learning sleep on both declarative and procedural memories in children and adults. Like Gais et al.'s 2000 study, each subject participated in a sleep and a wake condition, with both a retention period and retrieval interval.

Declarative memory was assessed using a word-pair associate learning task, as well as a 2-D objection location task. Procedural memory was assessed by a finger sequence tapping test. Results suggested that sleep supported the consolidation of declarative memories in both children and adults. However, children exhibited a smaller amount of improvement than adults in the finger sequence tapping tasks (Wilhelm et al., 2008).

CHAPTER THREE

METHODOLOGY

Participants

The custodial parents of one hundred and ninety-one Kindergarten through fourth grade students participated in this study. Three elementary schools in the state of Georgia participated in this study. In all of these schools, a packet was sent home with every child in Kindergarten through 4th grade, requesting their parents' participation in this study.

Of the population sample of 191, 51 of the children were in Kindergarten, 41 were in first grade, 39 were in second grade, 37 were in 3rd grade, and 23 were in 4th grade.

Demographics of Community and School District

The sample population was drawn from a school district in south Georgia. As of the 2000 Census, there were 186,291 people residing in this county. The racial demographics were as follows: 50.42% White, 43.74% Black or African American, 0.38% Native American, 1.54% Asian,

0.14% Pacific Islander, 1.90% from other races, 1.87% from 2 or more races, and 4.49% Hispanic or Latino of any race (http://www.census.gov/).

There were 32,090 students enrolled in the school district. Fifty-nine percent of the students enrolled are African American, 32% are White, 3% are Multi-racial, 1% are Asian and 3% are Hispanic (www.dca.state.ga.us).

Instrumentation

Children's Sleep Habits Questionnaire (CSHQ)

The Children's Sleep Habits Questionnaire (CSHQ) (Owens et al., 2000) is a 45-item parent questionnaire which examines eight sleep domains: (1) parasomnias, (2) bedtime resistance,(3) sleep duration, (4) sleep onset delay,(5) night wakings, (6) sleep anxiety, (7) daytime sleepiness and (8) sleep disordered breathing (Owens et al., 2000). It is a sleep screening instrument, designed to identify sleep problems in school-aged children. The CSHQ has been used in numerous studies on sleep disturbance in children (Honomichl et al., 2002; Liu et al., 2005; Owens

et al., 1999; Owens et al., 2006). For the purpose of this study, the brief form (33 items) of the CSHQ was used.

The CSHQ investigates sleep behaviors in children ages four through ten that happen over a typical recent week. Responses are rated on a three-point Likert-type scale. A score of 1 indicates that a behavior occurs never or 1 time during the week, a score of 2 indicates that it occurs 2-4 times a week, and a score of 3 indicates that a behavior occurs 5 or more times a week. Six items are to be reversed scored. This has been done to ensure that a higher score on this instrument is indicative of more disturbed sleep (Owens et al., 2000).

The CSHQ had an internal consistencies of .68 for the community sample (469 children) on which it was normed, and .78 for the clinical sample (154 children) in the norming group. Test-retest reliability was assessed in a sample of 60 parents from the community sample, who completed another CSHQ after a two-week span of time. There were acceptable correlations for each subscale, with scores ranging from .62 to .79 (Owens et al., 2000).

Sleep Survey

A brief survey developed by the researcher was also distributed to the participants. This survey focused on: parental occupation, napping habits of the child, sleeping conditions, any medical conditions that the child may have, whether the child has been referred to the Student Support Team, and if the child had been made eligible for any special education services.

Procedures

Via the classroom teacher, a packet containing an informed consent/parent permission form, the survey, and the CSHQ was sent home to every parent of a child in grades kindergarten through fourth grade at the three participating elementary schools in Georgia. The packet did not include any identifying information (e.g. name, address, social security number) for either the child or the parent.

Each item in the packet was given the same identification number, in case the forms became separated. Parents returned the packets to their child's classroom

teacher, and the teachers placed the packets in a drop box located in the mailroom. A total of 1020 packets were distributed and 191 were returned. The response rate was 18.7 percent.

Each completed CSHQ was scored according to the test instructions. All scores above 41 would be considered to lie in the "clinical" range. The total test score of the CSHQ for each child, as well as each of the eight subscales, were entered into SPSS. The completed surveys were also entered into SPSS.

CHAPTER FOUR

RESULTS

The findings are presented in seven sections: (1) a one-sample t-test was conducted to compare population means of the current sample with the psychometric data from the test author; (2) an analysis of variance between students referred/not referred to the student support team and subtest scores/total scores on the CSHQ was conducted; (3) an analysis of variance between students with/without a medical diagnosis and subtest scores/total scores on the CSHQ was conducted; (4)an analysis of variance between the poverty rate of the schools and subtest scores/total scores on the CSHQ was conducted; (5) an analysis of variance between students who do/do not nap and subtest scores/total scores on the CSHQ was conducted; (6) an analysis of variance between students taking/not taking medications and subtest scores/total scores on the CSHQ was conducted.

(7) descriptive statistics for each variable were run. (8) the decision to accept/reject each null hypothesis was made.

One-Sample T-Test Groups and Test Results

Nine one-sample t-tests were conducted to compare the means of this study sample populations with the psychometric data from the original study. The CSHQ total test score mean of the sample was compared to the total test score mean from the original study. In addition, the mean of each of the eight CSHQ subscale scores from this sample was compared to the subscale score means from the original study.

Results can be seen in Table 1. The mean CSHQ total test score from this sample (M=45.34) is close to the community sample from original study (M=45.5). All subtest score means from this sample, with the exception of Daytime Sleepiness closely compared to the means of the original study.

ANOVA Groups and Test Results

An analysis of variance (ANOVA) was used to investigate statistically significant differences between the test scores (total test scores and each of the 8 subscales) of the students in each diagnostic group (those referred to SST, and those not referred to SST). Results for the groups can be seen in Table 2. Results showed statistically significant differences between diagnostic groups and the CSHQ subscale Night Wakings (p=.008). There were no statistically significant differences between diagnostic groups and the total test score of the CSHQ, or the other seven subscales, although some subscales were relatively close (e.g. Sleep Duration p=.057; Sleep Disordered Breathing p=.086).

An analysis of variance (ANOVA) was used to investigate statistically significant differences between the diagnostic groups (students with medical diagnoses, students without medical diagnoses). Results for the groups can be seen in Table 3. Results showed statistically significant differences between diagnostic groups and the CSHQ total test score (p=<.01). Statistically significant differences were also found between the diagnostic groups

and five of the eight subscale scores (Sleep Onset Delay p=.040; Sleep Anxiety p=.020; Night Wakings p=<.01; Parasomnias p=<.01; Sleep Disordered Breathing p=<.01).

An analysis of variance (ANOVA) was used to investigate statistically significant differences between the diagnostic groups (25% poverty rate, 45.3% poverty rate, 97.7% poverty rate). Results for the groups can be seen in Table 4. Results showed statistically significant differences between diagnostic groups and two of the eight subscales: Sleep Onset Delay p=.024 and Night Wakings p=.014. No other statistically significant differences between diagnostic groups were found.

An analysis of variance (ANOVA) was conducted in order to investigate statistically significant differences between the diagnostic groups (napping on weekdays vs. not napping on weekdays; napping on weekends vs. not napping on weekends). Results for the groups can be seen in Tables 5 and 6. Results did not show any statistically significant differences between diagnostic groups.

An analysis of variance (ANOVA) was used to investigate statistically significant differences between the diagnostic groups (students taking medication, students not taking medication). Results for the groups can be seen

in Table 7. Results showed statistically significant differences between the diagnostic groups and the CSHQ total test score (p=<.01), as well as four out of the eight subscales (Sleep Onset Delay p=.006; Night Wakings p=<.01; Parasomnias p=<.01; Sleep Disordered Breathing p=<.01).

Descriptive Statistics

Frequencies and percentiles for all variables were used, aiding the ANOVAS in determining in which direction the significant differences lie. Results can be seen in Table 8. Although many of the variables were not used in the ANOVAS, they can still provide useful information. Some interesting results are the number of children who share a bedroom (n=73), have a TV in their bedroom (n=113), have a Nintendo in their bedroom (n=52), have medical conditions (n=60) and take medication regularly (n=47).

Null Hypotheses

The following null hypotheses were generated prior to data collection. The decision to either accept or reject each null hypothesis based on the data is also included.

1. There is no relationship between sleep habits and academic performance. Children referred to the Student Support Team had significantly higher scores on the CSHQ subscale Night Wakings. **Status: Rejected**
2. There is no relationship between medical diagnoses and sleep habits. Children who were diagnosed with a medical condition had significantly higher CSHQ total scores, as well as significantly higher scores on the subscales Sleep Onset Delay, Sleep Anxiety, Night Wakings and Parasomnias. **Status: Rejected**
3. There is no relationship between school poverty rate and sleep habits. Children from the school with a 97.7% poverty rate had significantly higher scores on the subscales Sleep Onset Delay and Night Wakings than children from schools with either a 45.3% or 25% poverty rate. **Status: Rejected**
4. There is no relationship between napping and sleep habits. No significant differences were found between children who take naps (either on weekdays or the weekend) and those who do not. **Status: Fail to reject**
5. There is no relationship between medication and sleep habits. Children taking medication had higher total scores on the CSHQ, as well as on the subscales Sleep

Onset Delay, Night Wakings, Parasomnias and Sleep Disordered Breathing. **Status: Rejected**

CHAPTER FIVE

SUMMARY OF FINDINGS

This study examined the extent of the relationship between sleep habits of children and academic performance. Numerous studies have been conducted in regards to children and sleep habits. However, little research has been done focusing on sleep habits and academic performance at the pre-referral level. Hopefully, the results from this study will give impetus for more research in this area.

The research questions from this study are examined by focusing on whether a relationship exists, to what extent it exists, and how the results fit in with the limited research in this area. Next, the limitations of this study are also discussed. Implications of this study for school psychologists, school personnel, and parents are also examined. Finally recommendations for future research are offered, in order to further expand the field of sleep habits and academic performance.

The first goal of the present study was to determine the extent of the relationship between sleep habits of children (as measured by the total test score and subscale scores of the CSHQ) and academic performance (defined by the presence of or lack of a referral to the Student Support Team).

An overview of the results indicated that there was a significant relationship between student support team referrals and the Night Wakings (NW) subscale of the CSHQ. Children referred to the SST had significantly higher scores on this subscale than children not referred to the SST. There were no significant relationships between student support team referrals and either the CSHQ total test score or the other seven subscales of the CSHQ.

One potential explanation for this could be parental confusion as to what constitutes a referral to the Student Support Team. Some parents may not know what a Student Support Team is, either because they have never heard that term before, or they may not be as aware of events that occur in their child's educational career. Therefore, they may decide to either leave that item on the sleep survey blank or mark it with a "no".

The second goal was to examine the extent of the relationship between sleep habits and medical diagnoses. Significant relationships were found between medical diagnoses and the total test score of the CSHQ, as well as five of the eight subscales (Sleep Onset Delay, Night Wakings, Parasomnias, and Sleep Disordered Breathing). Children with medical diagnoses had significantly higher scores in these areas when compared to children without medical diagnoses.

Out of the 60 children who were reported to have medical diagnoses, the majority had allergies (n=28), while ADHD (n=9) and Asthma (n=7) came in a distant second and third. An explanation for these results may be that the symptoms of a child's medical diagnosis (e.g. coughing and sneezing) may be causing him or her to wake up in the middle of the night, have problems getting to sleep, and even interfere with breathing.

The third goal was to examine the extent of the relationship between sleep habits and school poverty rate. The three schools involved in this study had vastly different levels of poverty rates (25%, 45.3% and 97.7%). Although there was no significant relationship between the poverty rate of the schools and the total test score of the

CSHQ, there were significant relationships between the poverty rate and two of the eight subscales (Sleep Onset Delay and Night Wakings). Children from the school with a 97.7% poverty rate had significantly higher scores on those two subscales.

The fourth goal of the present study was to examine extent of the relationship between sleep habits and napping. Contrary to expectations, no significant relationship was found between any of the four diagnostic groups (nap on weekdays, no nap on weekdays, nap on weekends, no nap on weekends) and either the total test score or subscale scores of the CSHQ. Out of the 191 children in this study, very few children took naps on weekdays (n=11) or weekends (n=38). One explanation may be that napping is not as popular in the American culture as it is in others. Another explanation may be that with as many activities that a child has in a day, there may not be time for a nap.

The final goal of this study was to determine the extent of the relationship between sleep habits and medication (defined as taking medication or not taking medication). Results supported the research hypothesis. There were significant relationships between those

taking/not taking medication and the total test score of the CSHQ, as well as four of the CSHQ subscales (Sleep Onset Delay, Night Wakings, Parasomnias, and Sleep Disordered Breathing). Students taking medication had significantly higher scores on the total test score and subscales when compared to children not taking medication.

Forty-three children were reported to be taking medications. Twenty-six of them were on multiple medications, usually consisting of at least one allergy medicine. An explanation of these results may be that the side effects of the medication are affecting how long it takes the child to go to sleep, waking him or her up at night, etc.

Limitations of Study

The findings of this study are presented with the recognition of several limitations. One limitation was that the participants of this study were from three schools in a single school district in the state of Georgia. It is therefore unknown how the results of this study generalize to the national population. Another limiting factor was the parameter put on grade level. Only children in

Kindergarten through 4th grade were considered for this study, due to the age limits on the CSHQ.

An additional limitation of this study was the type of instrumentation used. A caregiver report measure (CSHQ) was used rather than a child-reported measure, in order to ensure anonymity. Future studies may benefit from using multiple informants. A final limitation was that the CSHQ does not give classification levels (e.g. mild, moderate, severe, etc.). A score above 41 is considered to be in the "clinical" range, but there is nothing at this time to classify a score of 60 as being in a different range as a score of 42.

Implications and Recommendations for Future Research

Despite the limitations previously discussed, this was the first study to examine the relationship between sleep habits and referrals to the Student Support Team. Results support the need to address the issue of sleep in the schools. Sleep is a necessity for positive academic performance, and the issue needs to be discussed with parents, teachers and children before there is a problem. Oftentimes, the issue is not discussed until the child has

already been experiencing failure in the classroom, if it is even ever discussed.

At the bare minimum, children's sleep habits should be discussed at the very first Student Support Team meeting. Since school psychologists are members of that multi-disciplinary team, they are in the perfect position to discuss the children's sleep habits, as well as educate others on the effects of poor sleep habits on academic performance. The Children's Sleep Habits Questionnaire, or any other sleep measure, could easily be given out at these meetings to get insight into each child's sleep habits. An informal sleep survey would also be helpful.

School psychologists also need to take the issue of sleep into account when conducting psychological evaluations. Getting input from the teacher, parent and student would be beneficial when deciding what time of the day to test. For instance, if the student is more productive and alert during the morning, then an evaluation during the morning hours would produce more accurate results.

Future research in this area is vital. Legislation is now focusing on pre-referral intervention before a referral

to special education. Addressing sleep issues at Student Support Team meetings rather than later may decrease the number of special education referrals.

REFERENCES

Acebo, C., Wolfson, A. & Carskadon, M. (1997). Relations among self-reported sleep patterns, health and injuries among adolescents. *Journal of Sleep Research, 26,* 149.

Buckhalt, J., El-Sheikh, M. & Keller, P. (2007). In press. Children's sleep and cognitive functioning: Race and socioeconomic status as moderators of effects. *Child Development.*

Buckhalt, J.A. & Wolfson, A.R. (2006). Sleep, school performance, and school psychology practice. Unpublished manuscript.

Chervin, R., Archbold, K., Dillon, J., Panahi, P., Pituch, K., Dahl, R. & Guilleminault, C. (2002). Inattention, hyperactivity, and symptoms of sleep-disordered breathing. *Pediatrics, 109*, 449-456.

Dahl, R.E. & Lewin, D.S. (2002). Pathways to adolescent health: sleep regulation and behavior. *Journal of Adolescent Health, 31,* 175-184.

Dinges, D.F., Pack, F., Williams, K., Gillin, K.A., Powell, J.W., Ott, G.E. (1997). Cumulative sleepiness, mood disturbance, and psychomotor vigilance performance decrements during a week of sleep restricted to 4-5 hours per night. *Sleep, 20,* 267-277.

Doghramji, K. (2004). Assessment of excessive sleepiness and insomnia as they relate to circadian rhythm sleep disorders. *Journal of Clinical Psychiatry, 65,* 17-22.

Douglas, N.J. (2001). Why am I sleepy? Sorting the somnolent. *American Journal of Respiratory and Critical Care Medicine, 163,* 1310-1313.

Dworak, M., Schierl, T., Bruns, T., Struder, H. (2007). Impact of singular excessive computer game and television exposure on sleep patterns and memory performance of school-aged children. *Pediatrics, 120, (5),* 978-985.

Gais, S., Plihal, W., Wagner, U. & Born, J. (2000). Early sleep triggers memory for early visual discrimination skills. *Nature Neuroscience, 3,* (12), 1335-1339.

Gais, S. & Born, J. (2004). Declarative memory consolidation: mechanisms acting during human sleep. *Learning and Memory, 11,* 679-685.

Giannotti, F. & Cortesi, F. (2003). Sleep patterns and daytime functions in adolescence: an epidemiological survey of Italian high-school student population. In M.A. Carskadon (Ed.), *Adolescent sleep patterns: biological social and psychological influences* (pp. 132-147). New York: Cambridge University Press.

Goll, J.C. & Shapiro, C.M. (2006). Teaching case report: sleep disorders presenting as common pediatric problems. *Canadian Medical Association Journal, 174,* (5), 617-619.

Guilleminault, C. & Brooks, S. (2001). Excessive daytime sleepiness: a challenge for the practising neurologist. *Brain, 124,* 1482-1491.

Hobson, J.A. & Pace-Schott, E.F. (2002). The cognitive neuroscience of sleep: neuronal systems, consciousness and learning. *Neuroscience, 3,* 679-693.

Honomichl, R.D., Goodlin-Jones, B.L., Burnham, M., Gaylor, E. & Anders, T.F. (2002). Sleep patterns of children with pervasive developmental disorders. *Journal of Autism Developmental Disorders, 32*, (6), 553-561.

Kotagal, S. & Pianosi, P. (2006) Sleep disorders in children and adolescents. *British Medical Journal, 332,* 828-832.

Kuriyama, K., Stickgold, R. & Walker, M. (2004). Sleep dependent learning and motor-skill complexity. *Learning and Memory, 11,* 705-713.

LeBourgeois, M., Giannotti, F., Cortesi, F., Wolfson, A., Harsh, J. (2005). The relationship between reported sleep quality and sleep hygiene in Italian and American students. *Pediatrics, 115*, 257-265.

Lerner, M.B., Hoffman, C.D. & Sweeney, D.P. (2005). Sleep problems in children with and without autism. Poster presented at the meeting of the Western Psychological Association, Portland, OR.

Liu, X., Liu, L., Owens, J. & Kaplan, D. (2005). Sleep patterns and sleep problems among schoolchildren in the United States and China. *Pediatrics, 115*, 241-249.

Meijer, A.M., Habekothe, H.T. & Van Den Wittenboer, G.L. (2000). Time in bed, quality of sleep and school functioning of children. *Journal of Sleep Research, 9,* 145-153.

Millman, R., Working Group on Sleepiness in Adolescents/Young Adults, & AAP Committee on Adolescence. (2005). Excessive sleepiness in adolescents and young adults: causes, consequences and treatment strategies. *Pediatrics, 115*, 1774-1786.

Morin, K., Rodrigue, S. & Ivers, H. (2003). Role of stress, arousal and coping skills in primary insomnia. *Psychosomatic Medicine, 65,* 259-267.

Muzur, A., Pace-Schott, E. & Hobson, J.A. (2002). The prefrontal cortex in sleep. *Trends in Cognitive Sciences, 6,* (11), 475-481.

O'Brien, L.M., Ivanenko, A., Mclaughlin,V., Crabtree, C., Holbrook, R., Bruner, J., Klaus, C. & Gozal, D. (2003). Sleep disturbances in children with attention deficit hyperactivity disorder. *Pediatric Research, 54,* (2), 237-243.

Owens, J., Opipari, L., Nobile, C. & Spirito, A. (1998). Sleep and daytime behavior in children with obstructive sleep apnea and behavioral sleep disorders. *Pediatrics, 102*, 1178-1184.

Owens, J., Maxim, R., McGuinn, M., Nobile, C., Msall & M., Alario, A. (1999). Television-viewing habits and sleep disturbance in school children. *Pediatrics, 104*, 27-35.

Owens, J., Spirito, A. & McGuinn, M. (2000). The Children's Sleep Habits Questionnaire (CSHQ): psychometric properties of a survey instrument for school-aged children. *Sleep, 23*, 1-9.

Owens, J.A. (2004). Sleep in children: cross-cultural perspectives. *Sleep and Biological Rhythms, 2,* 165-173.

Owens, J., Fernando, S. & McGuinn, M. (2005). Sleep disturbance and injury risk in young children. *Behavioral Sleep Medicine, 3*, (1), 18-31.

Pace-Schott, E.F. & Hobson, J.A. (2002). The neurobiology of sleep: genetics, cellular physiology and subcortical networks. *Neuroscience, 3,* 591-605.

Pilcher, J.J., Huffcutt, A.I. (1996). Effects of sleep deprivation on performance: a meta-analysis. *Sleep, 19,* 318-326.

Pilcher, J.J. & Walters, A. (1997). How sleep deprivation affects psychological variables related to college students' cognitive performance. *Journal of American College Health, 46,* (3), 121.

Randazzo, A., Muehlbach, M., Schweitzer, P. & Walsh, J. (1998). Cognitive functioning following acute sleep restriction in children ages 10-14. *Sleep, 21,* (8), 861-880.

Rechtschaffen, A., Bergmann, B. (2002). Sleep deprivation in the rat: an update of the 1989 paper. *Sleep, 25,* (1), 18-24.

Richardson, Gary S. (2005). The human circadian system in normal and disordered sleep. *Journal of Clinical Psychiatry, 66*, 3-9.

Sadeh, A., Raviv, A. & Gruber, R. (2000). Sleep patterns and sleep disruptions in school-age children. *Developmental Psychology, 36*, 291-301.

Sadeh, A., Gruber, R., & Raviv, A. (2003). The effects of sleep restriction and extension on school-age children: what a difference an hour makes. *Child Development, 74*, 444-455.

Sadeh, A., Keinan, G. & Daon, K. (2004). Effects of stress on sleep: the moderating role of coping style. *Health Psychology, 23,* (5), 542-545.

Steenari, M., Vuontela, V., Paavonen, E., Carlson, S., Fjallberg, M., Aronen, E. (2003). Working memory and sleep in 6- to 13-year old schoolchildren. *Journal of the American Academy of Child and Adolescent Psychiatry, 42,* (1), 85-92.

Szymczak, J.T., Jasinska, M., Pawlak, E. & Zwierzykowska, M. (1993). Annual and weekly changes in the sleep-wake rhythm of school children. *Sleep, 16,* 433-435.

Valent, F., Brusaferro, S. & Barbone, F. (2001). A case-crossover study of sleep and childhood injury. *Pediatrics, 107* (2), 396.

Wahlstrom, K.L., Davison, M.L., Choi, J. & Ross, J.N. (2001). School Start Time Study, Minneapolis, MN: Center for Applied Research and Educational Improvement (CAREI), University of Minnesota.

Walhstrom, K. (2002). Changing times: findings from the first longitudinal study of later high school start times. *NASSP Bulletin, 86,* (633), 3-15.

Walker, M., Brakefield, T., Morgan, A., Hobson, J.A., & Stickgold, R. (2002). Practice with sleep makes perfect: sleep dependent motor skill learning. *Neuron, 35,* 205-211.

Walker, M., Stickgold, R., Alsop, D., Gaab, N. & Schlaug, G. (2005). Sleep-dependent motor memory plasticity in the human brain. *Neuroscience, 133,* 911-917.

Wilhelm, I., Diekelmann, S. & Born, J. (2008). Sleep in children improves memory performance on declarative but not procedural tasks. *Learning and Memory, 15,* 373-377.

Wolfson, A.R. & Carskadon, M.A. (1998). Sleep schedules and daytime functioning in adolescents. *Child Development, 69,* 875-887.

Zeman, A., Britton, T., Douglas, N., Hansen, A., Hicks, J., Howard, R., Meredith, A., Smith, I., Stores, G., Wilson, S. & Zaiwalla, Z. (2004). Narcolepsy and excessive daytime sleepiness. *British Medical Journal, 329*, 724-728.

Web site: (n.d.) http://reportcard2005.gaosa.org

Web site: (n.d.) www.kidzzzsleep.org

Web site: (n.d.) www.sleepfoundation.org

Web site: (n.d.) http://www.census.gov/

Web site: (n.d.) www.dca.state.ga.us

APPENDICES

APPENDIX A

TABLES

TABLE 1 ONE-SAMPLE T-TESTS OF SAMPLE MEANS

Source	N	μ	μ_{pop} *
CSHQ Total Score	191	45.34	45.5
Bedtime Resistance	191	7.95	7.06
Sleep Onset Delay	191	1.38	1.25
Sleep Duration	191	3.85	3.41
Sleep Anxiety	191	5.28	4.89
Night Waking	191	3.74	3.51
Parasomnias	191	8.60	8.11
Sleep Disordered Breathing	191	3.43	3.24
Daytime Sleepiness	191	13.86	9.64

* Test publisher's control sample means

TABLE 2: ONE-WAY ANOVA
SST REFERRALS/NOT REFERRED TO SST AND CSHQ TOTAL TEST/SUBSCALE SCORES

Source	df	F	μ Referred	μ Not Referred	p
	Between Groups				
CSHQ Total Score	1	2.594	47.02	44.88	.109
BR	1	.008	8.00	7.96	.929
SOD	1	1.846	1.50	1.36	.176
SD	1	3.656	4.19	3.76	.057
SA	1	.000	5.29	5.29	.995
NW	1	7.077	4.14	3.62	.008*
P	1	1.154	8.83	8.52	.284
SDB	1	2.981	3.64	3.36	.086
DS	1	.487	14.17	13.76	.486

* p<.01

TABLE 3: ONE-WAY ANOVA
MEDICAL DIAGNOSES (YES/NO) AND CSHQ TOTAL TEST/SUBSCALE SCORES

Source	df	F	μ Diagnosis	μ No Diagnosis	p
	Between Groups				
CSHQ Total Score	1	18.562	48.67	43.77	<.01**
BR	1	3.437	8.47	7.72	.065
SOD	1	4.291	1.52	1.32	.040*
SD	1	2.714	4.08	3.75	.101
SA	1	5.525	5.73	5.07	.020*
NW	1	23.859	4.30	3.48	<.01**
P	1	38.585	9.62	8.12	<.01**
SDB	1	19.338	3.85	3.24	<.01**
DS	1	.705	14.13	13.70	.402

* p<.05 ** p<.01

TABLE 4: ONE-WAY ANOVA
SCHOOL POVERTY RATES AND CSHQ TOTAL TEST/SUBSCALE SCORES

Source Poverty Rates	df	F	μ 25%	μ 45.3%	μ 97.7%	p
	Between Groups					
CSHQ Total Score	2	2.362	44.79	45.08	48.52	.097
BR	2	.570	7.83	7.95	8.48	.566
SOD	2	3.795	1.29	1.43	1.65	.024*
SD	2	.528	3.79	3.88	4.09	.591
SA	2	.020	5.27	5.26	5.35	.980
NW	2	4.348	3.54	3.89	4.22	.014*
P	2	1.358	8.78	8.34	8.57	.260
SDB	2	1.946	3.40	3.35	3.78	.146
DS	2	.848	13.78	13.69	14.70	.430

* p<.05

TABLE 5: ONE-WAY ANOVA
NAPPING ON WEEKDAYS (YES/NO) AND CSHQ TOTAL TEST/SUBSCALE SCORES

Source	df	F	μ_{Nap}	$\mu_{No\ Nap}$	p
	Between Groups				
CSHQ Total Score	1	1.863	48.36	45.15	.174
BR	1	2.617	9.18	7.88	.107
SOD	1	1.291	1.18	1.39	.257
SD	1	.151	4.00	3.84	.698
SA	1	1.022	5.82	5.24	.313
NW	1	1.105	4.09	3.72	.295
P	1	.013	8.55	8.61	.909
SDB	1	.181	3.55	3.42	.671
DS	1	1.874	15.18	13.78	.173

TABLE 6: ONE-WAY ANOVA
NAPPING ON WEEKENDS (YES/NO) AND CSHQ TOTAL TEST/SUBSCALE SCORES

Source	df	F	μ_{Nap}	$\mu_{No\ Nap}$	p
	Between Groups				
CSHQ Total Score	1	1.065	46.47	45.05	.303
BR	1	2.103	8.50	7.82	.149
SOD	1	.209	1.34	1.39	.648
SD	1	.253	3.95	3.83	.616
SA	1	.021	5.32	5.27	.886
NW	1	1.981	3.97	3.69	.161
P	1	.173	8.50	8.63	.678
SDB	1	.065	3.39	3.44	.799
DS	1	.321	14.13	13.79	.571

TABLE 7: ONE-WAY ANOVA
TAKING MEDICATIONS (YES/NO) AND CSHQ TOTAL TEST/SUBSCALE SCORES

Source	df	F	μ_{Meds}	$\mu_{No\ Meds}$	p
	Between Groups				
CSHQ Total Score	1	13.009	48.32	44.06	<.01*
BR	1	.033	7.94	7.86	.856
SOD	1	7.678	1.57	1.30	.006*
SD	1	1.306	4.00	3.76	.255
SA	1	2.614	5.60	5.11	.108
NW	1	15.971	4.26	3.55	<.01*
P	1	13.277	9.32	8.33	<.01*
SDB	1	12.382	3.81	3.28	.001*
DS	1	2.997	14.55	13.60	.085

* p<.01

Table 8: Descriptive Statistics

Source	N	%
Student Grade		
Kindergarten	51	26.7
1st Grade	41	21.5
2nd Grade	39	20.4
3rd Grade	37	19.4
4th Grade	23	12.0
Does Child Ride Bus?		
Yes	24	12.6
No	167	87.4
Does Child Share Bedroom?		
Yes	73	38.2
No	118	61.8
Number of People Share Bedroom with		
0	118	61.8
1	48	25.1
2	6	3.1
3	1	.5
Does Child Share Bed?		
Yes	25	13.1
No	166	86.9
Number of People Share Bed with		
None	166	86.9
1	20	10.5
2	3	1.6
3	1	.5
Television in Bedroom		
Yes	113	59.2
No	78	40.8
Nintendo in Bedroom		
Yes	52	27.2
No	138	72.3
Does Child Have IPod		
Yes	16	8.4
No	174	91.1

Table 8, Continued.

Source	N	%
Does Child Have Cell Phone		
Yes	11	5.8
No	180	94.2
Does Child Sleep in Same House		
Yes	178	93.2
No	13	6.8
Does Child Nap on Weekends		
Yes	38	19.9
No	153	80.1
Does Child Nap on Weekdays		
Yes	11	5.8
No	180	94.2
Does Child Have Medical Condition		
Yes	60	31.4
No	130	68.1
List Medical Conditions		
Allergies	28	14.7
ADHD	9	4.7
Asthma	7	3.7
Asthma & Allergies	7	3.7
Diabetic	1	.5
Asthma & Heart Cond.	1	.5
ADHD & Asthma	1	.5
ADHD & Bipolar D/O	1	.5
Autism	1	.5
ADHD & Autism	1	.5
ADHD/Asthma/Allergies	1	.5
ADHD/Asthma/Allergies/ Generalized Anxiety	1	.5
Take Medication Regularly		
Yes	47	24.6
No	142	74.3

Table 8, Continued.

Source	N	%
Has Child Been Referred to the SST		
Yes	42	22.0
No	146	76.4
Number of Bedrooms in the House		
2	23	12.0
3	89	46.6
4	59	30.9
5 or more	18	9.4
Poverty Rate of School		
25%	103	53.9
45.3%	65	34.0
97.7%	23	12.0
Number of Occupants in House		
2	6	3.1
3	43	22.5
4	75	39.3
5	41	21.5
6	10	5.2
7	4	2.1
8	2	1.0
9	1	.5
Has Child Been Served in Special Education		
Yes	31	16.2
No	158	82.7
No response	1	.5

Table 8, Continued.

Source	N	%
Special Education Category		
Emotional/Behavioral D/O	3	1.6
Other Health Impairment	2	1.0
Learning Disability	2	1.0
Autism	1	.5
Significant Dev. Delay	1	.5
Speech Impairment	11	5.8
Visual Impairment and Speech Impairment	1	.5
Intellectual Disability and Speech Impairment	1	.5
Emotional/Behavioral D/O and Significant Dev. Delay	1	.5
Learning Disability and Autism	1	.5
Learning Disability and Speech Impairment	1	.5
Multiple Categories	3	1.6

APPENDIX B: CHILDREN'S SLEEP HABITS QUESTIONNAIRE

Child's Sleep Habits
(Preschool and School-Aged)
(Abbreviated Version)

Coding

The following statements are about your child's sleep habits and possible difficulties with sleep. Think about the past week in your child's life when answering the questions. If last week was unusual for a specific reason (such as your child had an ear infection and did not sleep well or the TV set was broken), choose the most recent typical week. Answer USUALLY if something occurs **5 or more times** in a week; answer SOMETIMES if it occurs **2-4 times** in a week; answer RARELY if something occurs **never or 1 time** during a week. Also, please indicate whether or not the sleep habit is a problem by circling "Yes," "No," or "Not applicable (N/A)".

Bedtime

Write in child's bedtime: _____

		3 Usually (5-7)	2 Sometimes (2-4)	1 Rarely (0-1)	Problem?		
1)	Child goes to bed at the same time at night **(R)**	☐	☐	☐	Yes	No	N/A
2)	Child falls asleep within 20 minutes after going to bed **(R)**	☐	☐	☐	Yes	No	N/A
3)	Child falls asleep alone in own bed **(R)**	☐	☐	☐	Yes	No	N/A
4)	Child falls asleep in parent's or sibling's bed	☐	☐	☐	Yes	No	N/A
5)	Child needs parent in the room to fall asleep	☐	☐	☐	Yes	No	N/A
6)	Child struggles at bedtime (cries, refuses to stay in bed, etc.)	☐	☐	☐	Yes	No	N/A
7)	Child is afraid of sleeping in the dark	☐	☐	☐	Yes	No	N/A
8)	Child is afraid of sleeping alone	☐	☐	☐	Yes	No	N/A

Sleep Behavior

Child's usual amount of sleep each day: _____ hours and _____ minutes (combining nighttime sleep and naps)

		3 Usually (5-7)	2 Sometimes (2-4)	1 Rarely (0-1)	Problem?		
9)	Child sleeps too little	☐	☐	☐	Yes	No	N/A
10)	Child sleeps the right amount **(R)**	☐	☐	☐	Yes	No	N/A
11)	Child sleeps about the same amount each day **(R)**	☐	☐	☐	Yes	No	N/A
12)	Child wets the bed at night	☐	☐	☐	Yes	No	N/A
13)	Child talks during sleep	☐	☐	☐	Yes	No	N/A
14)	Child is restless and moves a lot during sleep	☐	☐	☐	Yes	No	N/A
15)	Child sleepwalks during the night	☐	☐	☐	Yes	No	N/A
16)	Child moves to someone else's bed during the night (parent, brother, sister, etc.)	☐	☐	☐	Yes	No	N/A
17)	Child grinds teeth during sleep (your dentist may have told you this)	☐	☐	☐	Yes	No	N/A
18)	Child snores loudly	☐	☐	☐	Yes	No	N/A

CSHQ Abbreviated

Coding

Sleep Behavior (continued)

	3 Usually (5-7)	2 Sometimes (2-4)	1 Rarely (0-1)	Problem?		
19) Child seems to stop breathing during sleep	☐	☐	☐	Yes	No	N/A
20) Child snorts and/or gasps during sleep	☐	☐	☐	Yes	No	N/A
21) Child has trouble sleeping away from home (visiting relatives, vacation)	☐	☐	☐	Yes	No	N/A
22) Child awakens during night screaming, sweating, and inconsolable	☐	☐	☐	Yes	No	N/A
23) Child awakens alarmed by a frightening dream	☐	☐	☐	Yes	No	N/A

Waking During the Night

	3 Usually (5-7)	2 Sometimes (2-4)	1 Rarely (0-1)	Problem?		
24) Child awakes once during the night	☐	☐	☐	Yes	No	N/A
25) Child awakes more than once during the night	☐	☐	☐	Yes	No	N/A

Write the number of minutes a night waking usually lasts: _____

Morning Waking/Daytime Sleepiness

Write in the time of day child usually wakes in the morning: _____

	3 Usually (5-7)	2 Sometimes (2-4)	1 Rarely (0-1)	Problem?		
26) Child wakes up by him/herself **(R)**	☐	☐	☐	Yes	No	N/A
27) Child wakes up in negative mood	☐	☐	☐	Yes	No	N/A
28) Adults or siblings wake up child	☐	☐	☐	Yes	No	N/A
29) Child has difficulty getting out of bed in the morning	☐	☐	☐	Yes	No	N/A
30) Child takes a long time to become alert in the morning	☐	☐	☐	Yes	No	N/A
31) Child seems tired	☐	☐	☐	Yes	No	N/A

Child has appeared very sleepy or fallen asleep during the following (check all that apply):

	1 Not Sleepy	2 Very Sleepy	3 Falls Asleep
32) Watching TV	☐	☐	☐
33) Riding in car	☐	☐	☐

APPENDIX C: SLEEP SURVEY

Sleep Survey

Mother's Occupation:

Father's Occupation:

Number of bedrooms in your residence: 1 ☐ 2 ☐ 3 ☐ 4 ☐ 5 or more ☐

Does your child share a bedroom? ☐ Yes ☐ No If so, with how many people?

Does your child share a bed? ☐ Yes ☐ No If so, with how many people?

Number of occupants in your residence:

What time does your child wake up on weekdays?

What time does your child go to bed on weekdays?

Does your child ride the bus to school? Yes ☐ No ☐
If so, what time of the morning does the bus pick him or her up?

Does your child have a television in the bedroom? Yes ☐ No ☐
Does your child have Nintendo/PlayStation in the bedroom? Yes ☐ No ☐
Does your child have an IPod? Yes ☐ No ☐
Does your child have a cell phone? Yes ☐ No ☐

Does your child sleep in the same house every night? Yes ☐ No ☐

What time does your child wake up on weekends?

What time does your child go to bed on weekends?

Does your child take naps on weekends? Yes ☐ No ☐

If so, how often does your child nap?
How long do the naps last?

Does your child nap during the week? Yes ☐ No☐
If so, how often does your child nap?
How long do the naps last?

Does your child have any medical conditions, such as ADHD, asthma, or allergies?
Yes☐ No☐
If yes, please list the conditions:

Is your child regularly taking medications? Yes☐ No☐
If yes, please list the medications:

Has your child ever been referred to a team of teachers and other professionals called a Student Support Team, due to academic or behavioral difficulties? Yes☐ No☐

Has your child ever been served in a Special Education program? Yes☐ No☐
If so, please check which category or categories:
Emotional Behavior Disordered ☐ Other Health Impaired☐
Intellectual Disability ☐ Learning Disability ☐ Autism ☐
Deaf/Hard of Hearing ☐ Visual Impairment ☐ Traumatic Brain Injury ☐ Significant Developmental Delay ☐ Speech Impaired☐

APPENDIX D: AUBURN UNIVERSITY INSTITUTIONAL REVIEW BOARD (IRB) APPROVAL

AUBURN
UNIVERSITY

Office of Human Subjects Research
307 Samford Hall
Auburn University, AL 36849

Telephone: 334-844-5966
Fax: 334-844-4391
hsubjec@auburn.edu

May 4, 2007

MEMORANDUM TO: Jennifer P. Edwards
Counseling Psychology

PROTOCOL TITLE: "Sleep Habits and Academic Performance"

IRB FILE NO.: 07-111 EX 0704

APPROVAL DATE: April 26, 2007
EXPIRATION DATE: April 25, 2008

The referenced protocol was approved "Exempt" from further review under 45 CFR 46.101 (b)(2) by IRB procedure on April 26, 2007. Final revisions were received on April 30, 2007. You should retain this letter in your files, along with a copy of the revised protocol and other pertinent information concerning your study. If you should anticipate a change in any of the procedures authorized in this protocol, you must request and receive IRB approval prior to implementation of any revision. Please reference the above IRB file number in any correspondence regarding this project.

If you will be unable to file a Final Report on your project before April 25, 2008, you must submit a request for an extension of approval to the IRB no later than April 11, 2008. If your IRB authorization expires and/or you have not received written notice that a request for an extension has been approved prior to April 25, 2008, you must suspend the project immediately and contact the Office of Human Subjects Research for assistance.

A Final Report will be required to close your IRB project file. Please only use the stamped, approved information letter (enclosed) with your participants.

If you have any questions concerning this Board action, please contact the Office of Human Subjects Research at 844-5966.

Sincerely,

Niki L. Johnson, JD, MBA, Director
Office of Human Subjects Research
Research Compliance Auburn University

Enclosure

cc: Dr. Holly A Stadler
Dr. Joseph A Buckhalt

APPENDIX E: SCHOOL DISTRICT APPROVAL FORM

Muscogee County School District
Columbus, Georgia

Carol C. Bradshaw, Ph.D.
Director

Office of Research,
Accountability, and Assessment

April 19, 2007

TO: Jennifer Edwards

FROM: Dr. Carol C. Bradshaw

RE: Request to Conduct Research

Congratulations! your project has been approved. This approval allows you to collect data according to the proposal that was submitted to the Department of Research, Accountability, & Assessment.

These are things you should keep in mind:
1. Be sure that the respondents understand that participation in this project is voluntary.
2. Be sure that you send a copy of your final research paper to this office.

Good luck, and let me know if I can help further.

Copy to:
Roni Collins
Vanessa Biggers
Jeanella Pendleton

Post Office Box 2427, Columbus, GA 31902-2427
Phone (706) 748-2020 FAX (706) 748-2029
E-Mail: cbradshaw@mcsdga.net

APPENDIX F: INFORMATION LETTER

INFORMATION LETTER: Sleep Habits and Academic Performance

You are invited to participate in a study of children's sleep habits and their performance in school. This study is being conducted by Jennifer Edwards, a graduate student in school psychology, under the supervision of Professor Joe Buckhalt. You were selected as a possible participant because you are a parent of a 5 to 12 year-old child enrolled in an elementary school in Muscogee County School District.

If you decide to participate, you will complete the Children's Sleep Habits Questionnaire (CSHQ), as well as a brief survey. These questionnaires should take approximately ten minutes or less to complete.

There is no identifying information on either the questionnaire or the survey. Any information obtained in connection with this study will remain anonymous. All forms are given the same identifying number, in case they become separated. Information collected through your participation may be published in a dissertation, a professional journal, and/or presented at a professional meeting, but no identifiable information will be included.

You may return the completed packet either to your child's classroom teacher, or mail it to the investigator.

Your decision whether or not to participate will not jeopardize your future relations with Auburn University or Muscogee County Schools.

If you have any questions we invite you to ask them now. If you have questions later, please contact Jennifer Edwards at schoolpsych77@yahoo.com, or at 706-888-2091, and refer to the number assigned to your packet.

If you would like more information on sleep, the following websites may be helpful: www.sleepfoundation.org and www.kidzzzsleep.org

For more information regarding your rights as a research participant you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334) 844-5966 or email at hsubjec@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER TO PARTICIPATE IN THIS RESEARCH PROJECT. IF YOU DECIDE TO PARTICIPATE, THE DATA YOU PROVIDE WILL SERVE AS YOUR AGREEMENT TO DO SO. THIS LETTER IS YOURS TO KEEP.

_____ _____

Investigator's signature Date