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Sleeping the way to success: Examining the relationship between sleep and academic success among college students

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Sleeping the Way to Success:

Examining the Relationship between Sleep and Academic Success Among College Students

(TITLE)

BY

Jennifer M. Hedges

THESIS

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Sleeping the Way to Success:

Examining the Relationship between Sleep and Academic Performance in College Students

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Abstract

The negative effects of poor sleep habits have been widely studied, although there is little research focusing on the academic impact that poor sleep has among the college student population, where poor sleep seems to be prevalent. Research studies have consistently documented that sleep difficulties and daytime tiredness affect more than half of college students. Daytime naps, pulling "all-nighter" cram sessions, and late bedtimes and rise times are just a few of the common scenarios that deeply disturb the sleep quality and quantity of college students. The American Sleep Association (2007) has shown that sleep is necessary for survival in animals and absolutely essential to humans for support in their daily functioning. This study sought to examine the relationship between sleep patterns and academic performance of college students in a mid-size state university setting in east-central Illinois. Through a quantitative study, the student's sleep quantity and sleep quality were examined in relation to their academic performance, measured by grade point average and other self-reported factors that are considered crucial for academic success, such as attending class. Although the findings of the present study did not show a great deal of statistical significance, it should be noted that statistically significant differences were found in grade point average among the short, average and long sleepers. These findings could serve as a guide for additional research on the target population. Findings could also potentially equip student affairs professionals with valuable information to assist them in the development and implementation of a sleep hygiene education program for students in an effort to improve their overall health and academic performance.

Dedication

I would like to dedicate this thesis to my husband, John W. Hedges III. His love and support has sustained me through the challenges of this journey. He was the one to offer the "tough love" when I found myself without motivation to get back on track. Through this long and often grueling process, we have welcomed our second child, Camden, into this world and have celebrated his first birthday. Our first child, Alaina, is now 5 years old and has grown up knowing all about mommy going to school and writing a Master's thesis! Both of my children have lovingly sacrificed for the completion of my Master's degree and I can only hope that I will be an inspiration to them someday! This accomplishment belongs to John, Alaina, and Camden, just as much as it does to me. I love them all dearly and couldn't have done it without their support!

Acknowledgements

I would like to acknowledge that the journey of completing this study was one that I could not have taken alone. The support and encouragement of countless friends, family and colleagues has gotten me through.

I wish to thank my husband, John, from the bottom of my heart for his encouragement and love. At times, he was extremely tough on me, but his "tough love" got me through this! I wish to thank my children, Alaina and Camden, for their love and sacrifice.

A special thank you to Dr. Eric Davidson for guiding me through this process. Your help with the statistical analyses was more valuable than I can say! I appreciate you stepping forward and offering me support at each stage of the process. I could not have done this without you!

Thank you to my colleagues and friends from the Student Affairs program. We grew together as a cohort and your support has been essential to me through this process. I especially want to thank Brian Neighbors, who has always been there to support me and has become a great friend.

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Chapter I

Introduction

Sleep is a fundamental part of life for all living things. In fact, in a laboratory study, rats (while typically having a life span of two-three years) only survived about five weeks when deprived of REM sleep and only about three weeks when not allowed any sleep. REM or Rapid Eye Movement Sleep stimulates the brain regions used in learning and it is hypothesized that deprivation of REM sleep affects learning of certain mental skills (American Sleep Association, 2007). When these findings are considered in regards to the human population, it is easy to imagine that poor sleep can be a matter of "life or death" and may affect the daily functioning of college students. Practicing good sleep habits should be an important consideration for student affairs professionals, academic personnel and students alike. Academic success is one of the primary initiatives of higher education and with so many students sleeping poorly, the successful achievement of this goal is compromised.

According to the American Sleep Association (2007), teenagers need approximately nine hours of sleep per night, while the average adult needs seven to eight hours. Through their college career, traditional-aged students are transitioning from the teenage years to young adulthood and thus need adequate sleep to aid in this crucial development period. Research has shown that an overwhelming majority of college students do not get nearly enough sleep. Several studies have narrowed the dependence of learning to the REM stage of sleep (De Koninck, Lorrain, Christ, Proulx, & Coulombe, 1989; Buboltz, Brown, & Soper, 2001). Students who demonstrated a significant increase in REM sleep following an intensive learning period performed significantly

better on examinations. The role that REM sleep plays in the learning process is of particular importance for those students consistently receiving less than eight hours of sleep per night, as most REM sleep occurs in the last few hours of sleep. The numerous academic and social demands on college students coupled with newfound independence create a hostile environment for good sleep habits. As much as K-12 educators seek to prepare students for higher education, one of the central components of college is learning to balance responsibilities and learning to exhibit self-control without parental guidance, and many students come to college ill-prepared in this regard (Chickering & Riesser, 1993). Kelly, Kelly, and Clanton (2001) sought to pinpoint the relationship between length of sleep and grade point average among a sample of 191 undergraduate and graduate college students. For the purpose of their study, long sleepers were defined as those sleeping more than nine hours per 24 hour period, average sleepers were those who slept 7-8 hours and short sleepers slept six or less hours. The authors indicated that long sleepers (mean GPA = 3.24) reported significantly higher GPA's than short sleepers (mean GPA = 2.74). Average sleepers fell in the middle of the distribution (mean GPA = 3.01). The authors recommended further investigation to confirm sleep length or quantity with academic performance of college students.

Although quantity of sleep is a contributing factor, quality of sleep seems to be more important in determining overall health and well-being (Buboltz et al., 2001). Only 11% of the college students in their sample (n = 21) would be considered to have good sleep quality based on the results of the Sleep Quality Index. Among respondents, 73% of the sample (n = 139) indicated occasional sleep problems and 15% (n = 28) were considered "poor" sleepers (p. 132). In a more recent study, Forquer, Camden, Gabriau,

& Johnson (2008) examined the sleep patterns of college students and noted that among the 313 participants in their study, "33% (n = 103) took more than 30 minutes to fall asleep and 43% (n = 134) woke more than once a night" (p. 564).

One of the most important factors in determining sleep quality seems to be consistent sleep scheduling. College students probably vary their sleep schedules more than the average adult with later bedtimes and wake times on weekends, naps, and all night "cram" sessions on school nights. Forquer, Camden, Gabriau and Johnson (2008) noted that college students consistently reported later bedtimes and wake times on weekends than on weekdays. Trockel, Barnes, and Egget (2000) analyzed the effect of several health-related variables on GPA. Among the factors analyzed were eating certain foods, work hours, prayer, exercise, emotional health, emotional support system, total amount of sleep hours, bedtimes, and wake times. "Results indicated that weekday and weekend wake-up times had the largest relative effects on semester GPA. For each hour of delay in average reported wake-up time, the predicted GPA decreased by 0.132 on a standard of 0.00 to 4.00 grading scale" (p. 128).

There has been little research focusing on the effects of naps on academic performance. In 1976, Taub, Tanguay, and Clarkson performed an experimental study on male college students. In their sample of 505, 78.6% (n = 396) of the students surveyed reported napping and 51.5% (n = 260) reported napping one or more times per week. Results of the study showed improved academic performance following naps. While the results of their study somewhat contradict more recent findings, their study is one of the only studies focusing on the effects of daytime napping on academic performance in college students; therefore, it is important to note. Students may view napping as a way

of "making up" for lost sleep or "preparing" for a big night ahead. Edens (2006) determined that 42% of the 377 undergraduate students she studied suffered from excessive daytime sleepiness. Perhaps students are napping during the day because they are excessively tired and view napping as beneficial to their overall performance. Analyzing whether these naps actually help or hinder students' performance could be significant to the student affairs profession.

Daytime sleepiness is one of the contributing factors to poor academic performance; however, the relationship is not a causal one, but rather a cyclical relationship. Just as poor sleep quality may affect a student's academic performance, the stress related to academic demands may cause the students to sleep poorly (Buboltz et al., 2001). Other factors may also contribute to poor sleep or poor academic skills such as substance use, caffeine consumption, exercise and depression (Trockel, Barnes, & Egget, 2000). Therefore, determining a causal relationship between sleep and academic performance is nearly impossible. Instead, a correlational relationship can be more effectively studied.

Sleep seems to be a widely researched topic because it is so complex and because it is such an important part of human life; however, there seems to be very little research on the relationship between poor sleep and academic performance in American undergraduate college students. Previous studies have documented that college students suffer from sleep difficulties and practice poor sleep hygiene, and some studies have even alluded to a correlational relationship between sleep and academic performance.

Clearly, sleep difficulties affect college students and it is imperative that student affairs professionals understand these shortcomings and are prepared to overcome the

obstacles they will likely face with sleep deprived students. Buboltz, Brown, and Soper (2006) developed the Sleep Treatment and Education Program for Students (STEPS) and administered it to a sample of students in an experimental study. The treatment group exposed to the STEPS program showed significant improvements in sleep quality and sleep hygiene six weeks following the treatment compared to the control group that did not receive the STEPS education information. Perhaps the STEPS program could be used as a program model in institutions of higher education; however, additional research is needed.

Purpose of the Study

The primary purpose of the present study is to assess the relationship between sleep quantity, sleep quality, and traditional measures of academic success among randomly selected college students at a mid-size state university in east-central Illinois.

Research Questions

1) Does a statistically significant relationship exist among sleep length and traditional measures of academic success (semester grade point average, failed course, dropped or incomplete course)?
2) Does a statistically significant relationship exist among sleep quality and traditional measures of academic success (semester grade point average, failed course, dropped or incomplete course)?
3) Do statistically significant differences exist among demographic variables (gender, grade class, grade point average) and self-reported sleep length?
4) Do statistically significant differences exist among demographic variables (gender, grade class, grade point average) and self-reported sleep quality?

5) Does napping significantly impact academic performance as measured by traditional measures of academic success (semester grade point average, failed course, dropped or incomplete course)?

Research Design

The present study is framed on a descriptive research design that surveys undergraduate and graduate college students.

Method

Participant Selection.

The Institutional Review Board approved this study in December 2010 and electronic surveys were distributed to two thousand undergraduate students at a mid-sized, four-year state university in east-central Illinois in January 2011. The students were randomly selected from the Spring 2011 enrollment roster and were sent an email to their university email account providing a brief description of the study, informed consent and the survey materials. The study sample makes up 18% of the 11,178 students at the institution.

Instrumentation.

The Pittsburgh Sleep Quality Index (PSQI), developed by Buysse, Reynolds III, Monk, Berman, and Kupfer (1989), was used to measure sleep quality. The PSQI is a 19-item self-rated questionnaire designed to measure sleep quality over a one-month period. The nineteen items are grouped into seven component scores, each weighted equally on a 0-3 scale, where 0 represents no difficulty and 3 represents severe difficulty. The seven component scores are standardized measures of the areas that are typically examined in patients with sleep complaints and include sleep quality, sleep latency, sleep duration,

habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction. The components are then summed to yield a global PSQI score, which has a range of 0-21; a score greater than five generally indicates poor sleep quality and higher scores indicate progressively worsening sleep quality.

The Pittsburgh Sleep Diary, developed by Monk et al. (1994) was used in partial form to measure sleep quantity. The diary consists of bedtime and waketime components. Participants are asked to complete the questions associated with the appropriate section each day and evening for seven consecutive days. The bedtime components relate the events of the day preceding sleep, waketime components relate the sleep period just completed. For the purpose of this study, the participants were only asked to recall what time they typically go to bed and rise on each of the seven days. All other items of the sleep diary were excluded for the purpose of this study.

In order to measure academic performance, students were asked to report their semester Grade Point Average for the preceding semester (Fall 2010) and were asked to answer a question inquiring about impediments to academic performance as a result of sleep in the preceding month (December 2010) (failed courses, dropped courses or incomplete courses). The question is similar to question number forty-five in the National College Health Survey aiming to assess impediments to academic performance, but is structured to answer the research questions for the purpose of this study; therefore, a substantial portion of the question was excluded.

Data Collection.

Student responses were submitted electronically through survey management software. Participants were sent two e-mail reminders; one sent five days following

initial e-mail solicitation, and a second reminder two weeks following the initial e-mail solicitation. One hundred and ninety five participants completed the survey.

Assumptions

1) Participants responded honestly and accurately to survey items based on actual behaviors.
2) Participants understood survey items and interpreted them as the researcher intended.
3) Surveys are valid and reliable, thus were accurate in measuring intended constructs.
4) Students check their university e-mail accounts, or have e-mails forwarded on to another e-mail account that is frequently checked.

Limitations

1) Length and depth of survey may have led some students to discontinue the survey or abstain from answering some of the survey items.
2) Timing of the survey administration may have limited involvement by participants whose schedules conflict with other academic, extracurricular activities, work, or personal commitments.
3) Recall of sleep behaviors and quality may be limited as one tries to remember past sleeping situations, thus creating potential for less precise data responses.
4) The findings from this study may not be generalizable for college students from other institutions.
5) The threat of selection exists because although the participants were randomly selected, there is a possibility that the "motivated" students, with higher

GPA's, completed the survey and the "less motivated" students, with lower GPA's, did not complete the survey.

Definitions

Sleep hygiene: Practicing behaviors that facilitate sleep and avoiding behaviors that interfere with sleep (Mastin, Bryson, & Corwyn, 2006, p.223

Sleep quality: For the purposes of this study, sleep quality was measured by the Pittsburgh Sleep Quality Index, developed by Buysse et al., (1989) and was based on responses to questions on sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction.

Good sleep quality: As measured by the PSQI, scores of 0-5 indicate good sleep quality in survey respondents (Buysse et al., 1989).

Poor sleep quality: As measured by the PSQI, scores of 6-21 indicate poor sleep quality in survey respondents (Buysse et al., 1989).

Grade Point Average: For the purposes of this study, grade point average or GPA refers to each student's self reported semester GPA from the fall 2010 semester, based upon a 4 point scale.

Chapter II
Literature Review

Overview of Sleep

> Until the 1950's, most people thought of sleep as a passive, dormant part of our daily lives. We now know that our brains are very active during sleep. Moreover, sleep affects our daily functioning and our physical and mental health in many ways that we are just beginning to understand (American Sleep Association, 2007, p.1).

According to Mastin, Bryson and Corwyn (2010), "the biological function of sleep remains one of the greatest mysteries of all time, although it is known that sleep is essential and that sleep deprivation, either resulting from lifestyle or sleep disorders will cause both short and long-term consequences" (p. 132). Some of the possible short-term consequences include impaired attention and concentration, impaired quality of life and increased rates of absenteeism with decreased productivity. Long-term effects could include increased mortality as a result of automobile accidents, coronary artery disease, heart failure and high blood pressure. Other possible long-term effects are obesity, Type II diabetes, stroke, memory impairment and depression.

Most humans pass through five stages of sleep: Stages 1-4 (non-rapid eye movement sleep - NREM) and Rapid Eye Movement sleep (REM). About 50% of our total sleep time is spent in Stage 2, 20% in REM sleep and the remaining 30% is spent in the other sleep stages combined (American Sleep Association, 2007; Chokroverty, 2010). NREM sleep is characterized by progressively decreased responsiveness to external stimulation. REM sleep is characterized by rapid eye movements and further reduction

of responsiveness to stimulation (Chokroverty, 2010). Curcio, Ferrara, and Gennaro (2006) hypothesized that procedural memory benefits from REM sleep and declarative memory is linked to NREM sleep. Procedural knowledge is comprised of memories of how to perform a skill or how to solve a problem (the 'know how'). Declarative memories are those which are accessible to conscious recollection or the 'know that'. Although the direct relationships between types of memory and learning to various sleep stages are still somewhat unclear, it is widely known that sleep does indeed play an essential role in learning capacity and memory. The American Sleep Association (2007) documents that sleep is essential for our health. In fact, rats (while typically having a life span of two-three years), only survived about five weeks when deprived of REM sleep and only about three weeks when not allowed any sleep.

According to the National Center for Sleep Disorders Research (2010), more than 40 million Americans suffer from chronic sleep disorders. Over 30% of the population has difficulty falling asleep, maintaining sleep, early morning awakening or non-restorative sleep (Mastin, Bryson & Corwyn, 2010; Buboltz, Brown & Soper, 2006). Buboltz, Brown, and Soper (2001) sampled 191 undergraduate students about their sleep habits using the Sleep Quality Index and a sleep-habits questionnaire. Results indicated that only 11% of the college students in the sample would be considered to have good sleep quality; 73% of the sample indicated occasional sleep problems and 15% of the sample were considered "poor" sleepers. This would suggest that sleep problems are even more predominant in the college population than any other age group.

Sleep Length

According to the American Sleep Association (2007), teenagers need approximately nine hours of sleep per night, while the average adult needs seven to eight hours. Noland, Price, Dake, and Telliohann (2009) studied 384 high school students randomly selected from three high schools. They examined the students' sleep behaviors and perceptions of sleep with the use of a questionnaire administered to the students. Results showed that 91.9% of the students obtained inadequate sleep (<9 hrs).

Kelly, Kelly, and Clanton (2001) studied the relationship between length of sleep and grade point averages among undergraduate college students. For the purpose of the study, long sleepers were defined as those sleeping more than nine hours per 24 hour period, average sleepers were those who slept 7-8 hours and short sleepers slept six or less hours per 24 hour period. They hypothesized that long sleepers would report higher grade point averages (GPA's) than short sleepers due to an overall higher functioning level of those individuals who sleep a larger quantity of hours. The results indicated that long sleepers (mean = 3.24) reported significantly higher GPA's than short sleepers (mean = 2.74). Average sleepers fell in the middle of the distribution (mean = 3.01) (p. 85).

Hawkins and Shaw (1992) surveyed 67 undergraduate students from a state university in California. The students were asked to complete three separate 7-day sleep logs, each during the seven days prior to an exam in their psychology course. The data were gathered only during exam periods as a control since other studies had mentioned that sleep quality and sleep length fluctuates from exam periods to non-exam periods. Three main variables were studied, (1) total amount of time in bed, (2) number of

recalled night awakenings and (3) self-rated sleep quality. Results indicated that there were no significant age or gender differences associated with any of the variables measured. The sleep patterns of the students, regardless of sex or age, did show a progressive decline in the amount of time in bed as the semester progressed. Interestingly, even with receiving less sleep, students did not report lower sleep quality. "The lack of linkage across the semester between time in bed and sleep quality suggests that the psychological perception of sleep quality may be independent of increases in chronic sleep need" (Hawkins & Shaw, 1992, p. 549).

Trockel, Barnes, and Egget (2000) analyzed the effect of several health-related variables on the grade point average (GPA) of first-year college students. Among the factors analyzed were exercise, sleep habits, nutrition, mental health, time management, social support system and spirituality. "Results indicated that weekday and weekend wake-up times had the largest relative effects on semester GPA of all the factors studied. For each hour of delay in average reported wake-up time, the predicted GPA decreased by 0.132 on a standard of 0.00 to 4.00 grading scale." (p. 128).

Sleep Quality

"Sleep difficulties go beyond simply getting insufficient sleep to include not getting the right kind of sleep" (Brown & Buboltz, 2002, p.411). "Good sleep quality can be viewed as the seamless integration of sleep into a sleep/wake oscillatory pattern that meets sleep-related needs" (LeBourgeois et al., 2005, p. 261). Brown, Buboltz, and Soper (2006) estimated that only 11% of the students in their study met the criteria for "good" sleep quality.

One of the most important factors in determining sleep quality seems to be consistent sleep scheduling. College students probably vary their sleep schedules more than the average adult population, with later bedtimes and wake times on weekends, naps, and all night "cram" sessions on school nights. Forquer, Camden, Gabriau, and Johnson (2008) examined sleep patterns of American college students in an attempt to identify problem areas. The students consistently reported later bedtimes and wake times on weekends than on weekdays. Results indicated that, "of the participants, 33% took more than 30 minutes to fall asleep and 43% woke more than once a night" (p. 564). In addition, more than 33% of the participants reported being tired all day when asked how they felt during waking hours.

Carney, Edinger, Meyer, Lindman, and Istre (2006) studied the relationship between reported sleep quality and the social rhythms of 243 undergraduate college students. They concluded that "college students with self-reported poor sleep quality (42% of the sample) had greater schedule variability in the timing of social rhythms than did self-reported good sleepers" (p. 633). Some of the social rhythms that were monitored included getting out of bed, first contact with a person, first morning beverage, lunch, watching television, getting in to bed, etc. It appeared that the good sleepers were much more likely to get out of bed, consume their morning beverage, and go outside for the first time earlier than those students who were poor sleepers. Another strong correlation linked an earlier mean bedtime with good sleep quality. The second component of the study examined the effects of social interaction on the sleep quality of students. Carney et al. (2006) noted that "engaging in activities with other people seems to increase regularity, and is thus protective of sleep" (p. 634).

Sleep hygiene is another widely discussed topic of interest in sleep research. Riedel (2000) described sleep hygiene as practicing behaviors that facilitate sleep and avoiding behaviors that interfere with sleep. The New York Sleep Institute (2006) outlines several recommended sleep hygiene behaviors. Among the recommended personal habits are exposure to plenty of morning sunlight, exercising regularly and reducing or eliminating alcohol, caffeine and nicotine use. When getting ready for bed, one should eat a light carbohydrate-rich snack, take a warm bath, induce relaxation of muscles and create a comfortable sleep environment. Maintaining sleep routines is also another very important behavior of good sleep hygiene. One should go to bed when tired, maintain bedtime rituals and use their bed for sleeping only. Another very important suggestion by the New York Sleep Institute was to get out of bed and engage in a relaxing activity if unable to fall asleep within 15-20 minutes. Finally the article suggested that bad sleep habits should be avoided. Naps after 3 PM should be limited to no more than 30 minutes. Large meals or strenuous exercise should be avoided the few hours preceding bedtime and individuals should not go to bed until drowsy.

Brown, Buboltz, and Soper (2002) studied the sleep hygiene awareness and the sleep quality of 74 undergraduate students. Results indicated that variable sleep length, noise disturbance, going to bed thirsty, and worrying about the ability to fall asleep at bedtime were the most significant indicators of overall sleep quality.

LeBourgeois, Giannoti, Cortesi, Wolfson, and Harsh (2005) studied 776 Italian and 572 American adolescents to examine the relationship between self-reported sleep quality and sleep hygiene practices. The students completed several questionnaires to better enable the researchers to find group disparities and as many other variables as

possible. For example, it was determined from the results that "American adolescents were more likely to take medications affecting sleep and/or wakefulness (eg, antidepressants, antihistamines, stimulants) and reported a higher prevalence of medical illnesses/disabilities (e.g., asthma, attention-deficit/hyperactivity disorder, diabetes) than did Italian adolescents" (p. 259). Results of the study indicated that not only did Italian adolescents practice substantially better sleep hygiene, but they also reported better sleep quality than that of American adolescents. Both populations did exhibit a lower success rate in going to bed, which is typical of the adolescent population as they are more likely to delay bedtime than other age groups. In addition, adolescents who took daytime naps, engaged in cognitively and emotionally activating bedtime behaviors and those who had less stable sleep schedules were more likely to have less success in returning to wakefulness in the morning.

Pallos, Gergely, Yamada, Miyazaki, and Okawa (2007) analyzed the data collected from 219 Japanese graduate students focusing on their sleep quality and related lifestyle and psychological components. The students were randomly selected from 12 different institutions in Kyoto, Japan and were administered the Pittsburgh Sleep Quality Index along with various socio-demographic and lifestyle related questions relating to the students overall health, academic-related stress, living arrangements, caffeine consumption, etc. Results indicated that 25.6% of the students were poor sleepers based on their PSQI scores and the researchers felt these numbers were conservative. In addition, significant correlations were found between poor sleep and students who perceived their health as bad and students who were smokers.

Coping with sleep problems

Cockcroft, Grasko, and Fridjhon (2006) discovered that 23% of the 307 students that they sampled suffered from primary insomnia. The study was performed at a University in South Africa and the sample population was an introductory psychology class. Following their preliminary study, the authors determined that they would further examine only the students exhibiting characteristics of primary insomnia. This sub-set of students were asked how they coped with their insomnia and the coping strategies were then correlated with the student's ability to sleep better. The most frequently reported coping strategies were alcohol, recreational drugs, over-the-counter medication, herbal remedies, relaxation techniques and stopping their minds from working. The students who reported the most success seemed to favor using herbal remedies and those with the least amount of success with sleep reported trying to stop their minds from working. The second most unsuccessful strategy was the use of recreational drugs. Some of the students in the sub-set reported not trying to combat the insomnia at all and of those who used coping strategies, very few reported them successful.

Brown, Buboltz, and Soper (2002) studied the sleep hygiene awareness and the sleep quality of 74 undergraduate students. They administered the Pittsburgh Sleep Quality Index (PSQI) and the Sleep Hygiene Awareness and Practice Scale (SHAPS) to the students on two different occasions with a four-week time lapse. Results indicated that knowledge of good sleep hygiene does not necessarily influence sleep quality as many students who are aware of proper sleep habits do not practice them. This is an important notation as college student affairs professionals consider how best to proceed with this troubling issue affecting students.

Despite these results, Brown, Buboltz, and Soper (2006) developed, implemented and evaluated the Sleep Treatment and Education Program for Students (STEPS) because they saw the drastic effects of this very important issue on the college campus. They estimated that only 11% of students met the criteria for "good" sleep quality. During the implementation phase of the STEPS program, the researchers organized a double-blind repeated measures experimental design. The control group received a 30-minute presentation on the importance of the scientific method and the experimental group received the STEPS training, which consisted of a 30-minute presentation describing the impact that poor sleep hygiene can have on academic performance and mood. In addition, the experimental group also received various hand-outs about sleep hygiene guidelines, stimulus control instructions and information about caffeine. Results indicated that the greatest impact of the program was on sleep hygiene practices. The authors concluded that "37% of the participants did not initially fall into the range of poor sleep quality. Comprising a study of only those in need of treatment would likely increase the power and effect sizes, but it would also reduce the relevance of STEPS as a preventative measure" (p. 235).

Excessive Daytime Sleepiness

Edens (2006) examined the correlation between Excessive Daytime Sleepiness (EDS) and academic goal orientation, self-efficacy and tendency to procrastinate among undergraduate students at a large university in the United States. An astonishing 42% of the 377 students in the sample reported experiencing EDS.

EDS affects the performance of students and it is essential to examine what factors are directly causing the daytime sleepiness. Breslau, Roth, Rosenthal, and

Andreski (1997) studied 1007 randomly sampled young adults, aged 21-30 years of age, in an effort to determine which suspected risk factors have the most significant relationship with EDS. Among the factors examined were inadequate nocturnal sleep, a pattern of activities that does not conform to the circadian sleep-wake rhythm, factors that influence sleep quality, central nervous system pathology and sedating effects of psychoactive substances such as alcohol and antihistamines. The average number of sleep hours on weekdays was 6.7 and on weekends was 7.4. Results indicated that hours of sleep predicted daytime sleepiness, with each additional hour of sleep associated with a reduction of .40 in the daytime sleepiness score.

Impact on Academics

Lust, Ehlinger, and Golden (2007) sampled 24,018 undergraduate college students from fourteen different colleges and universities in the state of Minnesota to determine how various health-related variables affected the academic performance of the students. Of all the factors assessed, sleep difficulties was one of the only factors that affected a very large percentage of the population studied (50.3%) and had a consistently negative impact on the student's GPA. Lust and colleagues found that students' GPA increased with the number of days of adequate sleep over the previous seven days. "Students who did not experience sleep difficulties have a mean grade point average of 3.27, whereas students who did experience the problem and say that it affected their academic work have a mean GPA of 3.08" (p. 20).

Edens (2006) examined the correlation between excessive daytime sleepiness (EDS) and academic goal orientation, self-efficacy and tendency to procrastinate among undergraduate students at a large university in the United States. Results of the

correlations indicated that "students who do not experience excessive daytime sleepiness tend to have mastery goals, which are typified by a desire to acquire new knowledge or learn a new skill; while those with EDS tend to have performance goals, which are based on a desire to appear competent" (p. 438). Edens (2006) also noted that students who are excessively sleepy are much more likely to engage in procrastination than students who are well-rested.

Campos-Morales, Valencia-Flores, Castano-Meneses, Castaneda-Figueiras, and Martinez-Guerrero (2005) sought to compare basic academic activities in two groups of traditionally-aged Mexican undergraduate students with different levels of sleepiness, with the goal of determining the impact of daytime sleepiness on academic performance in college students. Of the sixty-four students studied, students scoring greater than eleven on the Epworth Sleepiness Scale, were considered "sleepy students" for the purpose of the study. The "sleepy students" spent more time on the mathematical problems and made more mistakes than the "non-sleepy students." Although there were no statistically significant differences in reading comprehension between the two groups of students, non-sleepy students showed significantly greater capacity to recall and learn, as tested by the Rey Auditory Verbal Learning Test. Another important finding of this study was that sleepiness in the students studied did not seem to be related to sleep debt, but rather showed a strong relationship to fragmented nighttime sleep.

Yeung, Chung, and Chan (2008) were the first to study the relationship between sleep/wake patterns and written examination results and clinical skills performance among Hong Kong medical students. "The written examination aims to assess the recall of factual information, which relies on an individual's declarative memory. The clinical

skills assessment examines the student's procedural skills and immediate response, hence involving the non-declarative memory" (p. 375). These researchers administered a sleep habit questionnaire, the Epworth Sleepiness Scale (ESS), the Functional Outcomes of Sleep Questionnaire (FOSQ) and some questions on academic performance to 249 second, third and fourth year medical students in Hong Kong. The students were asked to report their usual length of nighttime sleep, usual bedtime and rise time, sleep onset latency, number and duration of afternoon naps and perceived sleep quality over the course of the previous seven days. The average reported bedtime was 1:16 AM and the average wake-time was 7:24 AM. The average nighttime sleep duration was 5.9 hours and 63.9% of the students reported taking at least one nap in the past seven days. Of the findings, there was a significant correlation between written examination scores and students bedtimes and rise times. Students who went to bed and woke earlier had much higher scores on their written exams. When looking at the sleep habits of the students with the best clinical assessment results, one significant correlation can be made. The students with better sleep quality performed much better in clinical skills assessment.

In opposition, Howell, Jahrig, and Powell (2004) did not find any correlation between measures of sleep quality and sleep propensity with that of undergraduate student's grade point averages. They sampled 414 students from an introductory psychology course in an effort to explore the relationship between the two variables. The students reported a mean bedtime of 11:39 PM, a mean sleep latency of 25 minutes, a mean rise time of 7:24 AM and a mean number of hours slept of 6 hours and 51 minutes.

Engle-Friedman and Riela (2004) were interested in the comparison between self-reported sleep prior to exams and prior to typical class lectures among undergraduate

college students. They found that total sleep time was significantly reduced and reported sleepiness was significantly increased on exam days versus typical lecture days. In addition, study time was increased and pleasure activities, such as television watching, were decreased the night prior to an exam. It is likely that students were studying instead of sleeping in preparation for their exam. This loss of sleep caused the students to feel more tired on exam days. Although students reported expending more effort and concentration on exam days, it is unknown how these same students would have performed on their exams with additional sleep.

Napping and "All-nighters"

Taub, Tanguay, and Clarkson (1976) performed an experimental study on eighteen male college students who habitually napped one-half hour to two hours in the afternoon to examine the effects of naps on performance and mood. Subjects were given a simple auditory reaction test prior to and following both thirty minute and two hour naps to determine the effects of napping on performance. "There was a consistent pattern of improved performance and mood which occurred with the napping conditions relative to the control. In contrast, no systematic differences were present as a function of one-half hour compared with two hours of sleep" (p. 214).

Vela-Bueno et al. (2008) were also interested in napping among college students, specifically college freshmen. They examined the prevalence of napping in 1276 first-year college students in Madrid, Spain. Almost half (44%) of the students reported napping at least once per week and more males seemed to nap than females (54.1% vs. 39.2%). "Less actual weeknight sleep, a high level of weekday perceived sleep debt and an evening chronotype were significantly related to napping" (p.156). Those who napped

were more likely to report a perceived sleep debt and actually did receive less nighttime sleep than those students who did not nap. It is possible that these students were attempting to compensate for their sleep loss. When looking at the academic environment of these students, nappers were more likely to miss class and to fall asleep during class than the non-napping students. Although the academic performance of these students was not assessed, students who nap are clearly missing a portion of the academic material that is presented in class; therefore, may potentially have lower grade point averages than their non-napping counterparts.

In addition to napping, college students are infamously rumored to pull "all-nighter" cram sessions in an effort to complete their academic coursework. Thacher (2008) was interested in how these single nights of total sleep deprivation (SN-TSD) affected the academic performance and the overall sleep quality of the students who engaged in such behavior. Thacher defined a SN-TSD as "a night on which one stays up past their usual wake time" (Thacher, 2008, p. 20). Of the 120 students surveyed, about 60% of the students reported engaging in at least one SN-TSD over the course of the past semester. "In this subsample, one-third of the students reported that they remembered engaging in 1, 2 or 3 nights of total sleep deprivation, 14% reported between 4-9 nights and 11% reported 10 or more nights of total sleep deprivation" (p. 22). Engaging in SN-TSD was statistically significantly associated with an evening preference, lower grade point average, and consistently later bedtimes than those students who had not engaged in a SN-TSD.

Gender and grade class differences

Tsai and Li (2004) examined the gender and grade class effect on daily sleep patterns in traditionally-aged college students. Their sample consisted of 237 undergraduate students enrolled in the course entitled "Sleep Management." This course was open to all students at National Chung-Cheng University in Taiwan; and as part of their course assignments, the students were required to complete a seven-day sleep log. The sleep log asked questions regarding bedtime, time falling asleep, number of awakenings during the sleep period, time waking up, rise time, sleep quality evaluation, naptime and significant events on the previous day that may have affected sleep. For the purpose of this study, sleep difficulty was defined as time in bed less than seven hours, mean sleep latency (the time difference between bedtime and falling asleep) longer than 30 minutes, more than one night awakening, sleep efficiency less than 85%, rating of six or less on the sleep quality scale or napping longer than one hour. Results indicated that almost half of the students, both male and female, had short sleep time. Females experienced a much longer sleep latency, more night awakenings, lower sleep quality ratings, and longer naptimes than that of males. The authors examined possible contributing factors and determined that although women, in general, experience more night awakenings due to having young children and bed partner disturbances, only four of the students sampled reported having a bed partner and none of the students reported having children. When comparing sleep difficulties across grade classes, results indicated that significant differences only occurred on weekdays. It was determined that

freshmen students got up earlier and slept less compared to all other grade classes. In addition, seniors reported substantially longer sleep latency than any other grade class.

Howell, Jahrig, and Powell (2004) found that women had, on average, higher total scores than men on both the Pittsburgh Sleep Quality Index and the Epworth Sleepiness Scale. Women also had, on average, higher introductory psychology grades than men, but no mean GPA differences were detected. Thacher (2008) found that the percentage of students who reported engaging in at least one night of total sleep deprivation during their college careers was very similar across all grade classes.

Summary

The research indicates some compelling arguments when considering the relationship between sleep and academic performance. This chapter discussed the importance of sleep and offered a brief insight into recommended sleep hygiene practices. It also summarized relevant studies among college students, both domestically and internationally. Specific topics that were explored in the literature review are sleep length, sleep quality, napping among college students, impact on academic performance, and the use of coping strategies. While there was a substantial amount of literature available, few studies have focused on the relationship between sleep and academic performance among American college students. As student affairs professionals, it is imperative that we understand this relationship and actively seek to strengthen the academic performance of students by identifying impediments to academic success.

Chapter III
Research Design

Purpose of the Study

The primary purpose of the present study was to assess the relationship between sleep quantity, sleep quality, and traditional measures of academic success among randomly selected college students at a mid-size state university in East-central Illinois.

Research Questions

1) Does a statistically significant relationship exist among sleep length and traditional measures of academic success (semester grade point average, failed course, dropped or incomplete course)?
2) Does a statistically significant relationship exist among sleep quality and traditional measures of academic success (semester grade point average, failed course, dropped or incomplete course)?
3) Do statistically significant differences exist among demographic variables (gender, grade class, grade point average) and self-reported sleep length?
4) Do statistically significant differences exist among demographic variables (gender, grade class, grade point average) and self-reported sleep quality?
5) Does napping significantly impact academic performance as measured by traditional measures of academic success (semester grade point average, failed course, dropped or incomplete course)?

Research Design

The present study was framed on a descriptive research design that surveyed undergraduate and graduate college students.

Method

Participant Selection.

The Institutional Review Board approved this study in December 2010 and electronic surveys were distributed to two thousand undergraduate students at a mid-sized, four-year state university in east-central Illinois in January 2011. The students were randomly selected from the Spring 2011 enrollment roster and were sent an email to their university email account providing a brief description of the study, informed consent, and the survey materials. The study sample makes up 18 % of the 11,178 students at the institution. Of the randomly selected participants, 191 (9.6 % of those selected) students completed the survey materials.

Instrumentation.

The Pittsburgh Sleep Quality Index (PSQI), developed by Buysse et al. (1989), was used to measure sleep quality. The PSQI is a 19-item self-rated questionnaire designed to measure sleep quality over a one-month period. The nineteen items are grouped into seven component scores, each weighted equally on a 0-3 scale, where 0 represents no difficulty and 3 represents severe difficulty. The seven component scores are standardized measures of the areas that are typically examined in patients with sleep complaints and include sleep quality, sleep latency, sleep duration, habitual sleep

efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction. The components are then summed to yield a global PSQI score, which has a range of 0-21; a score greater than five generally indicates poor sleep quality and higher scores indicate progressively worsening sleep quality.

The Pittsburgh Sleep Diary, developed by Monk et al. (1994) was used in partial form to measure sleep quantity. The diary consists of bedtime and waketime components. Participants are asked to complete the questions associated with the appropriate section each day and evening for seven consecutive days. The bedtime components relate the events of the day preceding sleep, waketime components relate the sleep period just completed. For the purpose of this study, the participants were only asked to recall what time they typically go to bed and rise on each of the seven days. All other items of the sleep diary were excluded for the purpose of this study.

In order to measure academic performance, students were asked to report their semester Grade Point Average for the preceding semester (Fall 2010) and were asked to answer a question inquiring about impediments to academic performance as a result of sleep in the preceding month (December 2010) (absenteeism from class, tardiness, dropped courses or lower grade than expected on project or exam). The question is similar to question number forty-five in the National College Health Survey (American College Health Association, 2010) aiming to assess impediments to academic performance, but is structured to answer the research questions for the purpose of this study; therefore, a substantial portion of the question was excluded.

Data Collection

Student responses were submitted electronically through survey management software. Participants were sent two e-mail reminders; one sent five days following initial e-mail solicitation, and a second reminder two weeks following the initial e-mail solicitation. The first email was sent on Thursday January 20, 2011, the second on Tuesday January 25, 2011 and the third on Thursday February 3, 2011. One hundred and ninety one participants completed the survey, which is only 9.5 % of the selected sample.

Data Analysis

Research Question One.

In order to determine whether a significant relationship existed among sleep length and academic performance, an ANOVA and Pearson Chi-Square analyses were conducted. The average sleep length was calculated by subtracting the reported time taken to fall asleep from the difference between bedtime and wake time. Each of the seven days per week had a total sleep length and these daily totals were averaged to develop an average sleep length, which was the independent variable. Sleep length ranges were divided into three categories with long sleep length being measured as more than eight hours, average sleep length as seven to eight hours and short sleep length as less than seven hours (Kelly, Kelly, & Clanton, 2001). For the ANOVA, the average sleep length (short, average, and long sleepers) was measured against the dependent variable of reported semester Grade Point Average to test for significant differences. For the Chi-Square analyses, the independent variable was sleep length divided into short,

average and long sleepers. The dependent variables measured were dichotomous yes or no questions inquiring whether the following areas were affected by sleep-related issues as self-reported by the students. They were asked whether they had missed class, been tardy for class, failed a course and received a lower course grade than would otherwise have been earned. An alpha level of .05 was used as a statistical criterion for significant differences.

Research Question Two.

In order to determine whether a statistically significant relationship existed among sleep quality and academic performance, *t*-test and Pearson Chi-Square analyses were conducted. For the *t*-test, the independent variable was categorized into good and poor sleep quality as measured by each student's global score on the Pittsburgh Sleep Quality Index, where a score of five or less indicated good sleep quality and six to twenty one indicated poor sleep quality. The dependent variable was the student's reported semester grade point average. For the Chi-square analyses, the independent variable was categorized into good and poor sleep quality as measured by each student's global score on the Pittsburgh Sleep Quality Index, where a score of five or less indicated good sleep quality and six to twenty one indicated poor sleep quality. The dependent variables measured were dichotomous yes or no questions inquiring whether the following areas were affected by sleep-related issues as self-reported by the students. They were asked whether they had missed class, been tardy for class, or failed a course and received a lower course grade than would otherwise have been earned. An alpha level of .05 was used as a statistical criterion for significant differences.

Research Question Three.

In order to determine if statistically significant differences existed between demographic variables and reported sleep length, an ANOVA and *t*-test were conducted. The dependent variable was the average sleep length and was calculated by subtracting the reported time taken to fall asleep from the difference between bedtime and wake time. Each of the seven days per week had a total sleep length and were averaged to develop an average sleep length. The independent variables were grade class (freshmen, sophomore, junior, senior, graduate) and self-reported semester grade point average as categorized by high (3.0 and above), average (2.0- 3.0) and low (below 2.0) which were analyzed using an ANOVA. In addition, gender as categorized by male and female is an independent variable and was analyzed using a *t*-test. An alpha level of .05 was used as a statistical criterion for significant differences..

Research Question Four.

In order to determine if statistically significant differences exist between demographic variables and sleep quality, an ANOVA and *t*-tests were conducted. The dependent variable was sleep quality categorized into good and poor sleep quality as measured by each student's global score on the Pittsburgh Sleep Quality Index, where a score of five or less indicates good sleep quality and six to twenty one indicates poor sleep quality. The independent variables were grade class (freshmen, sophomore, junior, senior, graduate), gender (male, female) and cumulative grade point average as categorized by high (3.0 and above), average (2.0- 3.0) and low (below 2.0). To determine the relationship between sleep quality and grade class and sleep quality and GPA, ANOVA analyses were performed. A *t*-test was used to determine the relationship

between gender and sleep quality. An alpha level of .05 was used as a statistical criterion for significant difference.

Research Question Five.

A Pearson's Chi-square test was used to determine if a statistically significant relationship existed among napping and various measures of academic success. Respondents were asked about the frequency of their napping habits over the course of the previous month. The estimated number of naps taken were categorized into low (0-10 naps), medium (11-20 naps) and high (21-31 naps) for the purpose of this analysis. The nap category was the independent variable. Dependent variables included semester GPA as categorized by high (3.0 and above), average (2.0- 3.0) and low (below 2.0) and dichotomous yes or no questions inquiring whether the following areas were affected by sleep-related issues as self-reported by the students. They were asked whether they had missed class, been tardy for class, failed a course and received a lower course grade than would otherwise have been earned. An alpha level of .05 was used as a statistical criterion for significant difference.

Summary

The purpose of this chapter was to outline the study and its protocol. Data was collected via an electronic survey that was sent to 2000 randomly selected undergraduate and graduate college students in January 2011. Data collection technique, research design and instrumentation were discussed in detail in this chapter. In addition, each research question was specifically addressed and the descriptive data analyses that will be used to answer the above mentioned research questions were described in detail.

Chapter IV
Results

Overview

The purpose of this chapter is to highlight the findings of this study using narrative and visual numerical displays to illustrate the results. A thorough explanation of statistical analyses used is also provided.

Sample Demographics

Participants were randomly selected from the Spring 2011 enrollment roster at Eastern Illinois University. Two thousand students were randomly selected from the total student population of 11,178. Of the selected participants, 197 (9.9%) students initiated completion of the survey materials; however, due to partial incompletion, six of the surveys were excluded from this study. Of the 191 participants with completed surveys, 23.6% (n = 45) were male and 76.4% (n = 146) were female.

No participants were excluded from the study based on age; therefore, a wide diversity of age exists. Of the 191 participants, 149 (78%) were considered traditional-aged college students and forty-two participants (22%) were considered to be non-traditional in age. The largest proportion of students (n = 41, 21.5%) indicated that they were twenty-one years of age, followed by nineteen (n = 30, 15.7%), twenty (n = 28, 14.7%), twenty-two (n = 20, 10.5%), twenty-three (n = 11, 5.8%), and twenty-four (n = 11, 5.8%) years of age. Seventeen (8.9%) of the participants indicated that they were between the ages of twenty-five and twenty-nine years of age, fourteen (7.3%) indicated that they were between the ages of thirty and thirty-nine years, nine (4.6%) indicated they were between the ages of forty and forty-nine years and two participants (1%) indicated that they were between the ages of fifty and fifty-nine years of age (Figure 1).

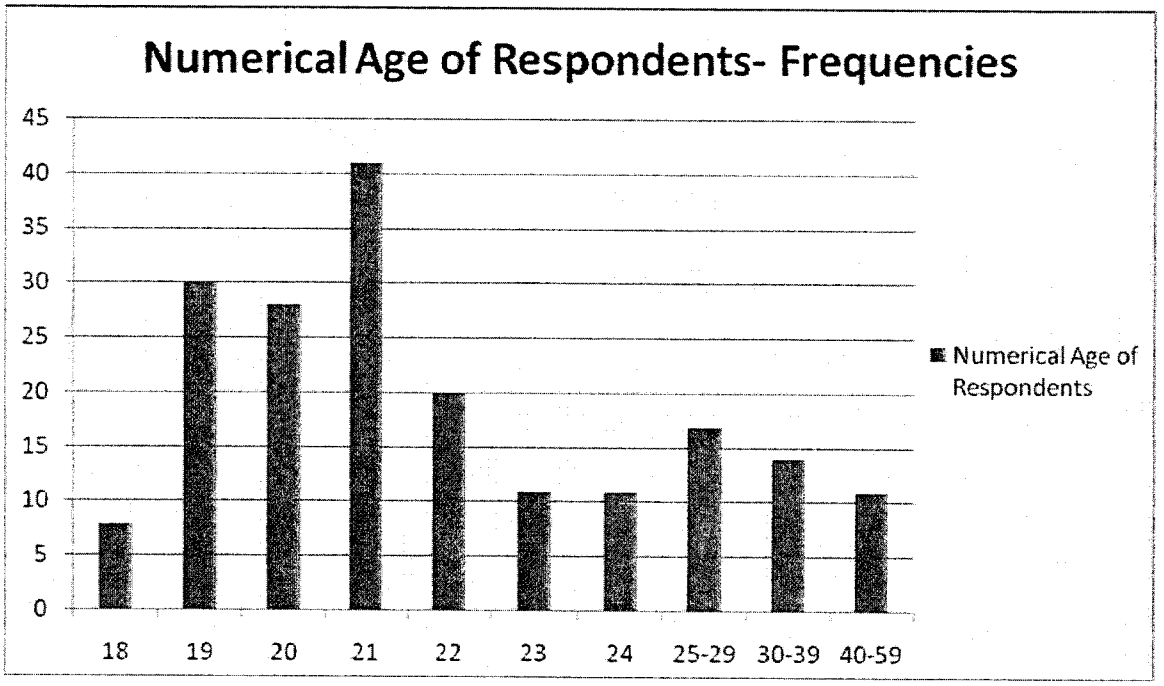


Figure 1. Age

Of the 191 participants, the majority reported a grade classification of Senior (n = 61, 31.9%), followed by Juniors (n = 52, 27.2%), Graduate students (n = 31, 16.2%), Sophomores (n = 29, 15.2%) and Freshmen (n = 18, 9.4%) (Figure 2).

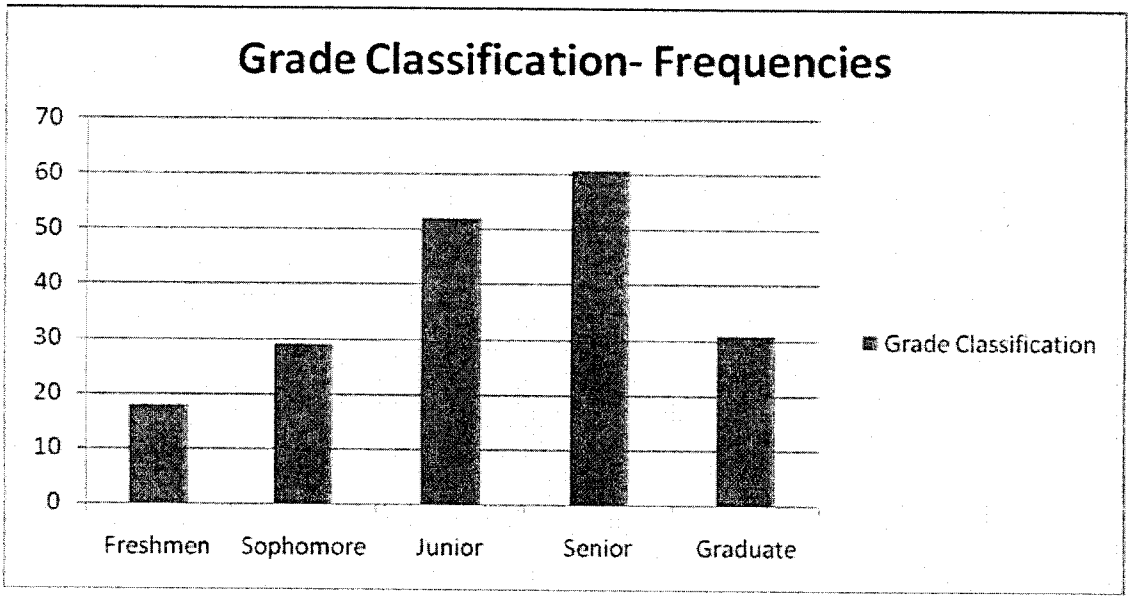


Figure 2. Grade Classification

The mean reported grade point average of the students within the sample was 3.44/ 4.00 scale. Only three (1.6%) participants reported a semester grade point average of less than 2.00, while five (2.6%) participants reported a semester grade point average of 2.00 to 2.49, twenty- six (13.6%) participants reported a semester grade point average of 2.50 to 2.99, forty- six (24.1%) participants reported a semester grade point average of 3.00 to 3.49, and an overwhelming 111 (58.1%) of the participants reported a semester grade point average of 3.50 to 4.00 (Figure 3).

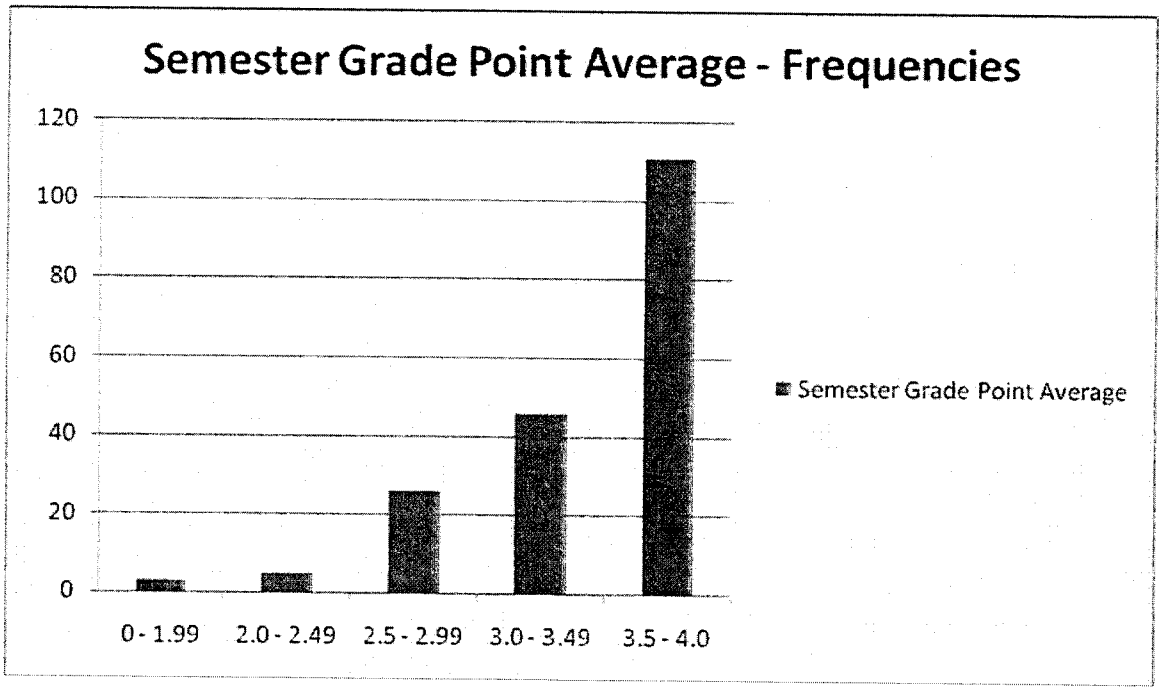


Figure 3. Semester Grade Point Average

The average sleep length was solely based on the participants' self reported average amount of sleep per night. The majority of respondents (n = 71, 37.2%) reported sleeping an average of eight to nine hours each night, while fifty- eight (30.3%) reported sleeping seven to eight hours, twenty- five (13.1%) reported sleeping nine to ten hours, sixteen (8.4%) reported sleeping six to seven hours, eight (4.2%) reported sleeping ten to eleven hours, seven (3.7%) reported sleeping five or less hours, five (2.6%) reported sleeping five to six hours, and one (0.5%) respondent reported sleeping an average of fifteen or more hours per night (Figure 4).

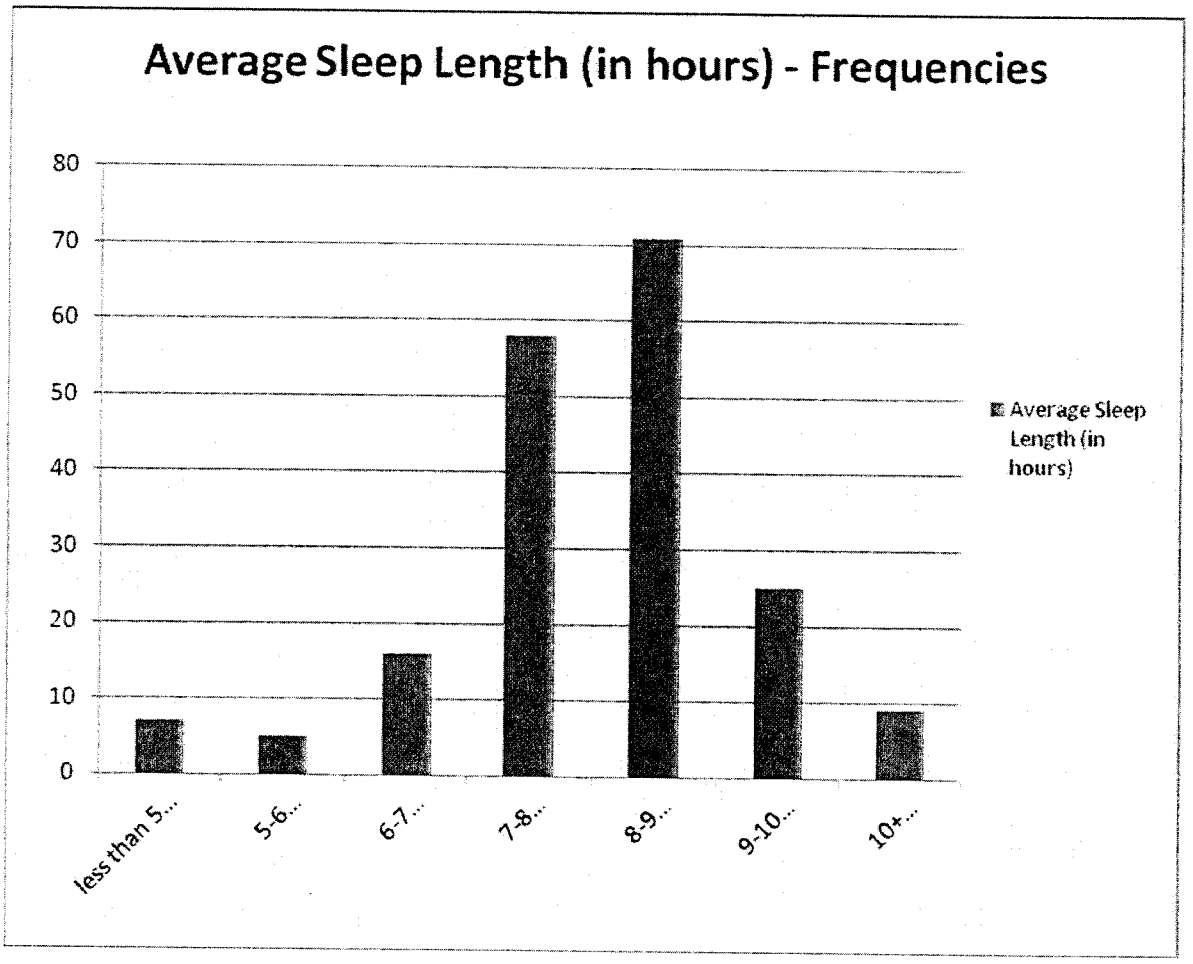


Figure 4. Average Sleep Length (in hours)

The Pittsburgh Sleep Quality Index (PSQI), developed by Buysse, Reynolds III, Monk, Berman, and Kupfer (1989), was used to measure sleep quality. The PSQI is a 19-item self-rated questionnaire designed to measure sleep quality over a one-month period. The nineteen items are grouped into seven component scores, each weighted equally on a 0-3 scale, where zero represents no difficulty and three represents severe difficulty. The seven component scores are standardized measures of the areas that are typically examined in patients with sleep complaints and include sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and

daytime dysfunction. The components are then summed to yield a global PSQI score, which has a range of 0-21; a score greater than five generally indicates poor sleep quality and higher scores indicate progressively worsening sleep quality. The mean PSQI global sleep quality score for this sample was 10.74. Using a cutoff score of five to indicate good sleep quality, none of the participants would be considered to have good sleep quality and 191 (100%) of the participants would be considered to have poor sleep quality. The score earned most frequently was nine (n = 42, 22%), followed by ten (n = 30, 15.7%), eight (n = 25, 13.1%), eleven (n = 20, 10.5%), twelve (n = 20, 10.5%), thirteen (n = 12, 5.9%), and seven (n = 11, 5.8%) (Figure 5).

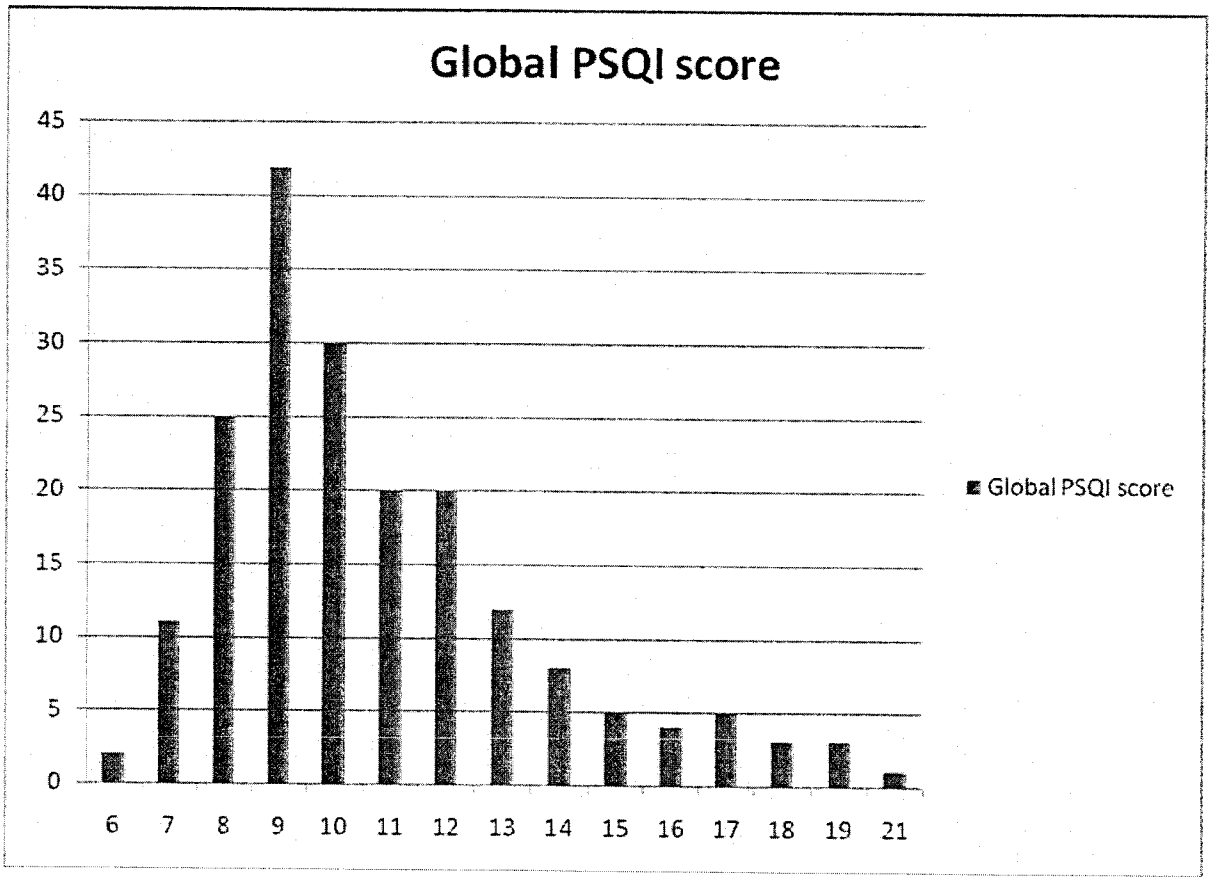


Figure 5. Global PSQI Scores

Participants were asked to estimate the number of days they napped the final month of the fall semester 2010. The majority of the respondents (n = 45, 23.6%) reported not napping at all. The second most common response given was napped five days (n = 22, 11.5%) in the given month, followed by napped three days (n = 16, 8.4%), napped two days (n = 15, 7.9%), napped ten days (n = 15, 7.9%), napped fifteen days (n = 11, 5.8%), napped twenty days (n = 11, 5.8%), napped one day (n = 8, 4.2%), napped four days (n = 8, 4.2%), napped twenty-five days (n = 7, 3.7%), napped all thirty-one days (n = 7, 3.7%), napped six days (n = 5, 2.6%), napped twelve days (n = 4, 2.1%), napped seven days (n = 3, 1.6%), napped eight days (n = 3, 1.6%), napped thirteen days (n = 3, 1.6%), napped seventeen days (n = 3, 1.6%), napped nine days (n = 2, 1.0%), napped thirty days (n = 2, 1.0%), and napped twenty-three day (n = 1, 0.5%) (Figure 6).

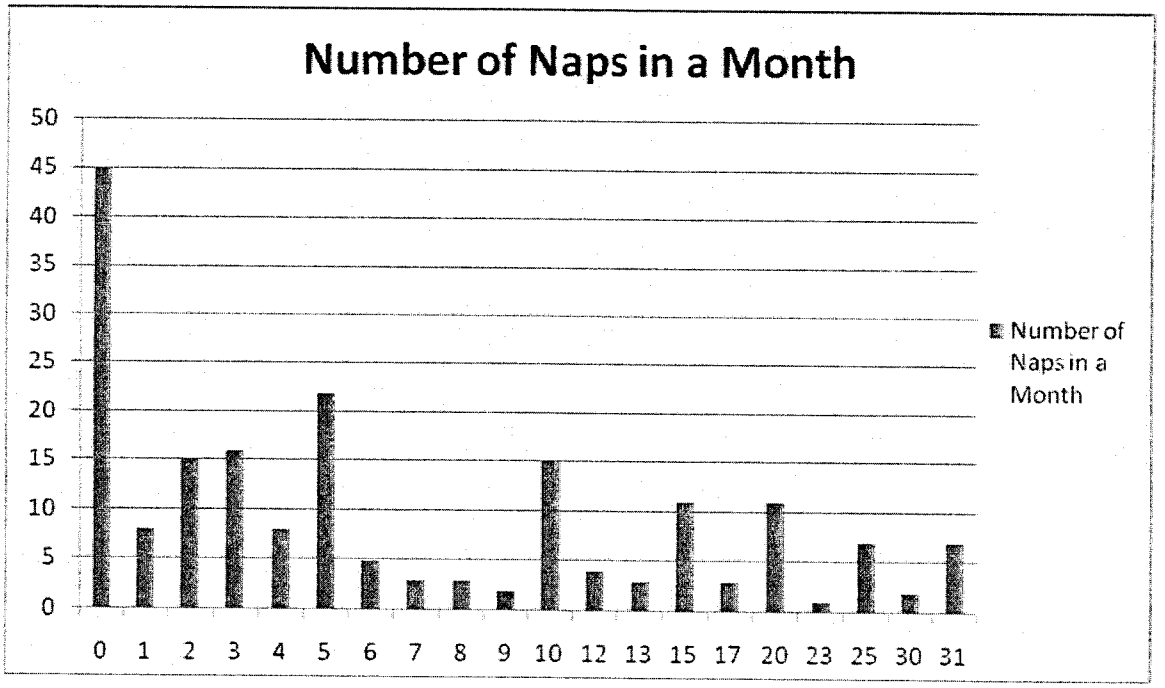


Figure 6. Number of Days Napped in a Month

Table 1

Demographic Profile

Gender	male (n = 45)	female (n = 146)		
Numerical age (in years)	18 (n = 8)	19 (n = 30)	20 (n = 28)	21 (n = 41)
	22 (n = 20)	23 (n = 11)	24 (n = 11)	25 (n = 4)
	26 (n = 4)	27 (n = 3)	28 (n = 5)	29 (n = 1)
	30 (n = 2)	31 (n = 3)	32 (n = 2)	33 (n = 2)
	34 (n = 1)	35 (n = 1)	37 (n = 1)	39 (n = 2)
	40 (n = 1)	42 (n = 2)	43 (n = 3)	46 (n = 3)
	55 (n = 1)	56 (n = 1)		
Grade class	Freshmen (n = 18)	Sophomore (n = 29)	Junior (n = 52)	
	Senior (n = 61)	Graduate (n = 31)		
Grade Point Average	1.5 (n = 1)	1.6 (n = 1)	1.7 (n = 1)	2.0 (n = 2)
	2.3 (n = 1)	2.4 (n = 2)	2.5 (n = 8)	2.6 (n = 4)
	2.7 (n = 7)	2.8 (n = 3)	2.9 (n = 4)	3.0 (n = 13)
	3.1 (n = 8)	3.2 (n = 9)	3.3 (n = 7)	3.4 (n = 9)
	3.5 (n = 10)	3.6 (n = 20)	3.7 (n = 8)	3.8 (n = 13
	3.9 (n = 4)	4.0 (n = 56)		

Table 1 (Continued)

Demographic Profile

Average sleep length	less than 5 hours/ night (n= 7)			
	5-6 hours/ night (n = 5)			
	6-7 hours/ night (n = 16)			
	7-8 hours/ night (n = 58)			
	8-9 hours/ night (n = 71)			
	9-10 hours/ night (n = 25)			
	10-11 hours/ night (n = 8)			
	15+ hours/ night (n = 1)			
Global PSQI score	6 (n = 2)	7 (n = 11)	8 (n = 25)	9 (n = 42)
	10 (n = 30)	11 (n = 20)	12 (n = 20)	13 (n = 12)
	14 (n = 8)	15 (n = 5)	16 (n = 4)	17 (n = 5)
	18 (n = 3)	19 (n = 3)	21 (n = 1)	
Days napping/ month	0 (n = 45)	1 (n = 8)	2 (n =15)	3 (n = 16)
	4 (n = 8)	5 (n = 22)	6 (n = 5)	7 (n = 3)
	8 (n = 3)	9 (n = 2)	10 (n = 15)	12 (n = 4)
	13 (n = 3)	15 (n = 11)	17 (n = 3)	20 (n = 11)
	23 (n = 1)	25 (n = 7)	30 (n = 2)	31 (n = 7)

Research Question 1.

A one-way analysis of variance was conducted to determine if grade point average differences existed between short, average, and long sleepers. The one-way analysis of variance indicated statistically significant differences in grade point average (F (2,18) = 4.094, p = .018) (Table 2). A Bonferroni Post Hoc test was conducted to determine significant differences among the three variables. Average sleepers reported a statistically higher grade point average than shorter sleepers (M = 3.55, SD = .552 vs. M = 3.19, SD = 6.10). Long sleepers reported a statistically higher grade point average than shorter sleepers (M = 3.50, SD = .520 vs. M = 3.19, SD = .610)

Table 2

One-Way Analysis of Variance of Sleep Length and Grade Point Average

Source	SS	df	MS	F	p
Between groups	2.404	2	1.202	4.094	.018 *
Within groups	52.842	180	.294		
Total	55.246	182			

*p ≤ .05

The relationship between short, average, and long sleep length and failed courses was tested using Chi-square analysis. There was no significant relationship between sleep length and a failed course (X^2 (2, 197) = 3.419, p = .181). The distribution of students failing a course was independent of short, average, and long term sleepers (Table 3).

Table 3

Chi-square of Relationship Between Sleep Length and Failed Course

Failed course	short	average	long
	n = 30	n = 58	n = 109
0 = no	28	56	108
1= yes	2	2	1

The relationship between sleep length and dropped courses was tested using Chi-square analysis. The was no significant relationship between sleep length and number of reported dropped courses X^2 (2, 197) =1.229, p = .541. The distribution of students with dropped courses was independent of short, average, and long term sleepers (Table 4).

Table 4

Chi-square of Relationship Between Sleep Length and Dropped Course

Dropped course	short n = 30	average n = 58	long n =109
0 = no	30	56	108
1= yes	0	2	1

The relationship between sleep length and incomplete courses was tested using Chi-square analysis. There was no significant relationship between sleep length and failure to complete a course X^2 (2, 197) = .938, p = .626. The distribution of students with incomplete courses was independent of short, average, and long term sleepers (Table 5).

Table 5

Chi-square of Relationship Between Sleep Length and Incomplete Course

Incomplete course	short n = 30	average n = 58	long n =109
0 = no	29	57	108
1= yes	1	1	1

Research Question 2.

A Pearson Product Moment Correlation was conducted to determine if a statistically significant correlation existed between global sleep quality and grade point average. The two items were not significantly correlated. (r (178) = -.136, p = .069). Global sleep quality and grade point average were not related for this sample of student volunteers.

A t-test was used to determine if statistically significant differences in global sleep quality existed between those who reported failing a class and those who did not. No statistically significant results were found. (t (189) = -.363, p = .717). Similar global sleep quality scores were reported among those who failed a course and those who did not (Table 6).

Table 6

Global sleep quality differences between those who failed a course and those who did not

Failed course	n	M	SD	t - value	p
0 = no	186	10.726	2.884	- .363	.717
1 = yes	5	11.200	2.950		

A *t*-test was used to determine if statistically significant differences in global sleep quality existed between those who reported dropping a course and those who did not. No statistically significant results were found. (t (189) = .423, p = .673). Similar global sleep quality scores were reported among those who dropped a course and those who did not (Table 7).

Table 7

Global sleep quality differences between those who dropped a course and those who did not

Dropped course	n	M	SD	t – value	p
0 = no	186	10.753	2.912	.423	.673
1 = yes	5	10.200	1.095		

A *t*-test was used to determine if statistically significant differences in global sleep quality existed between those who reported an incomplete course and those who did not. No statistically significant results were found. (t (189) = .189, p = .966). Similar global sleep quality scores were reported among those who reported having incomplete courses and those who did not (Table 8).

Table 8

Global sleep quality differences between those who completed all courses and those who did not

Incomplete course	n	M	SD	*t* – value	*p*
0 = no	188	10.739	2.900	.189	.966
1 = yes	3	10.667	1.155		

Research Question 3.

A one-way analysis of variance was conducted to determine if statistically significant differences existed in sleep length between grade classifications. The one-way analysis of variance indicated that there were not statistically significant differences. (F (4.177) = .636, p = .637). There were no differences in sleep length reported among Freshmen, Sophomores, Juniors, Seniors, or Graduate students (Table 9).

Table 9

One-Way Analysis of Variance of Sleep Length and Grade Classifications

Source	SS	df	MS	*F*	*p*
Between groups	94316187.345	4	23579046.836	.636	.637
Within groups	6.561	177	37065526.602		
Total	6.655	181			

A *t*-test was used to determine if statistically significant differences in sleep length existed between male and female respondents. No statistically significant results were found. (t (189) = .113, p = .910). There were no differences in sleep length reported between male and female participants (Table 10).

Table 10

Sleep length differences between male and female respondents

Gender	n	M	SD	*t* – value	*p*
Female	146	483.233	83.726	.113	.910
Male	45	481.467	115.005		

A one-way analysis of variance was conducted to determine if statistically significant differences existed in sleep length and low, average, and high cumulative grade point averages between male and female respondents. The one-way analysis of variance indicated that there were not statistically significant differences. (F (2.179) = 1.20, p = .304). There were no gender differences in sleep length reported among those with low, average, and high cumulative grade point averages (Table 11).

Table 11

One-Way Analysis of Variance of Sleep Length and Low, Average and High Cumulative GPA

Source	SS	df	MS	F	p
Between groups	67161986.710	2	33580993.355	1.20	.304
Within groups	5.009	179	27985536.477		
Total	5.077	181			

Research Question 4.

A one-way analysis of variance was conducted to determine if sleep quality differences existed among the different grade classifications. The one way analysis of variance indicated that no statistically significant differences existed. (F (2.175) = 1.155, p = .317). Similar global sleep quality scores were reported among Freshmen, Sophomores, Juniors, Seniors, and Graduate students (Table 12).

Table 12

One-Way Analysis of Variance of Sleep Quality and Grade Classification

Source	SS	df	MS	*F*	*p*
Between groups	34.540	4	8.635	1.096	.360
Within groups	1362.971	173	7.878		
Total	1397.511	177			

A *t*-test was used to determine if statistically significant differences in global sleep quality existed between male and female respondents. No statistically significant results were found. (t (184) = 1.858, p = .966). Male and female participants reported similar global sleep quality scores (Table 13).

Table 13

Global sleep quality differences between male and female respondents

Gender	n	M	SD	*t* – value	*p*
Female	142	10.937	2.966	1.858	.966
Male	44	10.023	2.435		

A one-way analysis of variance was conducted to determine if statistically significant differences existed in global sleep quality scores among students with low, average and high grade point averages. The one-way analysis of variance indicated that no statistically significant differences existed. (F (2.175) = 1.155, p = .317). No differences in global sleep quality scores were reported among students with low, average, and high grade point averages (Table 14).

Table 14

One-Way Analysis of Variance of Sleep Quality and Low, Average and High Cumulative GPA's

Source	SS	df	MS	F	p
Between groups	19.038	2	9.519	1.155	.317
Within groups	1441.771	175	8.239		
Total	1460.809	177			

Research Question 5.

The relationship between grade point average and low, medium and high napping scores was tested using Chi-square analysis. The relationship between grade point average and napping was statistically insignificant. X^2 (4, N = 188) = 3.387, p = .495.

The distribution of students with a low, average, and high grade point average were independent of low, medium, and high napping scores (Table 15).

Table 15

Chi-square of Relationship Between Napping Score and Grade Point Average

Grade Point Average	Low n = 137	Medium n = 34	High n = 17	X^2	*p*
low	2	1	0	3.387	.495
average	20	7	5		
high	115	26	12		

The relationship between low, medium and high napping scores and whether students had failed a course was tested using Chi-square analysis. The relationship between napping and failed courses was statistically insignificant (X^2 (2, N = 202) = .510, p = .775). The distribution of students failing a course was independent of low, medium, and high napping scores (Table 16).

Table 16

Chi-square of Relationship Between Napping Score and Failed Course

Failed Course	Low	Medium	High
	n = 150	n = 34	n = 18
0 = no	146	33	18
1 = yes	4	1	0

The relationship between low, medium and high napping scores and whether students had dropped a course was tested using Chi-square analysis. The relationship between napping and dropped courses was statistically insignificant (X^2 (2, N = 202) = 3.153, p = .207). The distribution of students with dropped courses was independent of low, medium, and high napping scores (Table 17).

Table 17

Chi-square of Relationship Between Napping Score and Dropped Course

Failed Course	Low	Medium	High
	n = 150	n = 34	n = 18
0 = no	148	32	17
1 = yes	2	2	1

The relationship between low, medium and high napping scores and whether students had an incomplete course was tested using Chi-square analysis. The relationship between napping and incomplete courses was statistically insignificant (X^2 (2, N = 202) = 5.451, p = .065). The distribution of students with incomplete courses was independent of low, medium, and high napping scores (Table 18).

Table 18

Chi-square of Relationship Between Napping Score and Incomplete Course

Failed Course	Low	Medium	High
	n = 150	n = 34	n = 18
0 = no	149	32	18
1 = yes	1	2	0

Summary

The purpose of this chapter was to highlight the findings of this study using narrative and visual tables and displays to illustrate the results. A thorough explanation of the statistical analyses that were used was provided. An alpha level of .05 was used to determine statistical significance. Although the findings of the present study did not show a great deal of statistical significance, it should be noted that statistically significant differences were found in grade point average among the short, average and long sleepers. One other notable finding was in regards to sleep quality among the participants. Of the 191 students who completed the survey, none of the participants met the criteria for good sleep quality per the Pittsburgh Sleep Quality Index.

Chapter V
Summary, Discussion and Recommendations

Summary

The present study was framed on a descriptive research design that surveyed undergraduate and graduate college students. Research questions used to assess the relationship between sleep quantity, sleep quality, and traditional measures of academic success included the following:

1) Does a statistically significant relationship exist among sleep length and traditional measures of academic success (semester grade point average, failed course, dropped or incomplete course)?
2) Does a statistically significant relationship exist among sleep quality and traditional measures of academic success (semester grade point average, failed course, dropped or incomplete course)?
3) Do statistically significant differences exist among demographic variables (gender, grade class, grade point average) and self-reported sleep length?
4) Do statistically significant differences exist among demographic variables (gender, grade class, grade point average) and self-reported sleep quality?
5) Does napping significantly impact academic performance as measured by traditional measures of academic success (semester grade point average, failed course, dropped or incomplete course)?

Electronic surveys were distributed to two thousand undergraduate students at a mid-sized, four-year state university in east-central Illinois in January 2011. The students were randomly selected from the Spring 2011 enrollment roster and were sent an email to

their university email account providing a brief description of the study, informed consent, and the survey materials. Of those randomly selected potential participants, 191 students completed all of the survey materials. The survey materials included the Pittsburgh Sleep Quality Index, a limited section of the Pittsburgh Sleep Diary, questions relating to academic performance, information about the student's personal napping habits and some basic demographic questions. In order to measure academic performance, students were asked to report their semester Grade Point Average for the preceding semester (Fall 2010) and were asked to answer a question inquiring about impediments to academic performance as a result of sleep in the preceding month (December 2010) (failed courses, dropped courses or incomplete courses). Demographic questions included sex, age, and grade class.

The mean reported grade point average of the students within the sample was 3.44/ 4.00 scale. The majority of respondents (n = 71, 37.2%) reported sleeping an average of eight to nine hours each night, while 30.3% (n = 58) reported sleeping seven to eight hours, 13.1% (n = 25) reported sleeping nine to ten hours, 8.4% (n = 16) reported sleeping six to seven hours, 4.2% (n = 8) reported sleeping ten to eleven hours, 3.7% (n = 7) reported sleeping five or less hours, 2.6% (n = 5) reported sleeping five to six hours, 0.5% (n = 1) respondent reported sleeping an average of fifteen or more hours per night. The average PSQI global sleep quality score for this sample was 10.74. Using a cutoff score of five to indicate good sleep quality, none of the participants would be considered to have good sleep quality and 100% (n = 191) of the participants would be considered to have poor sleep quality.

There were statistically significant differences in grade point average among short, average and long sleepers. A Bonferroni Post Hoc test was conducted to determine significant differences among the three variables. Average sleepers reported a statistically higher grade point average than shorter sleepers. Long sleepers reported a statistically higher grade point average than shorter sleepers. No other statistically significant results were found.

Conclusions

1. College students are generally poor sleepers. It is extremely difficult to generalize findings for sleep quality and academic success when there are not an adequate number of good quality sleepers in the sample for comparison purposes.
2. Students did not seem to perceive that their sleeping habits had a negative impact on their academic work. Very few students reported dropped courses, incomplete courses, and failed courses as a result of poor sleep.
3. Napping is common among college students and seems to have very little impact on academic success, when considering student's self-reported measures of academic performance, such as grade point average, failed, dropped, and incomplete courses.
4. Sleep length varies greatly among college students and seems to have the largest impact on academic performance. Students who sleep an average of less than seven hours per night earn significantly lower grades than students who sleep seven or more hours per night.

Discussion

There are several other studies that have examined the sleeping habits of college students; however, sleep is such a complex topic that very few researchers have examined the exact combination of variables as the present study. One of the most important factors to note with this study is that none of the participants met the criteria for good sleep quality using a cutoff score of five with the Pittsburgh Sleep Quality Index. While other researchers noted overwhelming percentages of their sample were poor sleepers, the present study is the only one that found 100% of the participants to have poor sleep quality. Buboltz, Brown, and Soper (2001) used a different survey tool, but had similar findings. Only 11% of the students in their sample were considered to have good sleep quality. Carney, Edinger, Meyer, Lindman, and Istre (2006) reported that 42% of their sample of college students had poor sleep quality. Contrary to the present study results, Pallos, Gergely, Yamada, Miyazaki, and Okawa (2007) administered the Pittsburgh Sleep Quality Index to Japanese college students and noted that only 25.6% of the students were poor sleepers. This difference may suggest that poor sleep quality is culturally dependent. American students generally seem to experience poor sleep quality and it seems that students do not perceive their sleep to be a problem affecting their academic performance as measured by prior semester grade point average.

Students were asked to report their semester grade point average for Fall 2010 for the purposes of the present study. The mean GPA was 3.44 and very few students reported failing courses, dropping courses, or receiving an incomplete grade as a result of sleep deficiency. When comparing the reported grade point average for that particular semester to those published by the Planning and Institutional Studies office, the reported

GPA was much higher than the overall institutional average. The overall institutional average was 3.06, with the mean for undergraduate students at 2.94 and the mean for graduate students at 3.76. Perhaps the respondents were generally more motivated students who receive higher grades, than the students who chose not to respond that may generally receive lower grades. It is also possible that students overestimated their grade point average when asked to report this information, intentionally or unintentionally. Either way, the discrepancies in grade point average should be considered a limitation when examining the results of this study. Lust, Ehlinger, and Golden (2007) found that 50.3% of the students in their sample experienced sleep difficulties, which seemed to have a consistently negative impact on their GPA's. Students who did not report sleep difficulties had a mean GPA of 3.27, whereas students who did experience sleep difficulty had a mean GPA of 3.08. Since all students in the present study are considered poor sleepers, this type of comparison cannot be done.

When looking at sleep length, the present study found statistical significance in grade point averages among short, average, and long sleepers. Kelly, Kelly, and Clanton (2001) had very similar results using the same definitions of short, average, and long sleep. In both studies, long sleepers had significantly higher GPA's than short sleepers and average sleepers had significantly higher GPA's than short sleepers.

It is important to note that the majority (37.2%) of respondents reported sleeping an average of eight to nine hours each night. This average is much higher than that of other studies. Yeung, Chung, and Chan (2008) reported that the average nighttime sleep duration of their sample was 5.9 hours. Howell, Jahrig, and Powell (2004) reported a mean number of hours slept per night as 6.9. Yeung, Chung, and Chan's (2008) studied

medical students in Hong Kong, China, which could explain the huge difference in sleep length; however, Howell, Jahrig, and Powell (2004) surveyed American undergraduate students, which was practically the same population as the present study.

When asked about napping, 76.4% of the participants reported napping at least one time per month, although most (54.5%) reported napping at least once weekly. This is fairly consistent with other studies. Vela-Bueno et al. (2008) found that 44% of their sample napped at least weekly and Yeung, Chung, and Chan (2008) reported that 63.9% of their sample napped at least weekly. With this many students napping, it is imperative that student affairs professionals understand how napping is impacting the academic performance of their students.

Limitations

1. The study sample was very small and taken from one university, thus making it difficult to generalize the findings to all college students.
2. A low response rate indicated that the students were not solicited in an effective manner or at a time conducive to their scheduling needs.
3. Since students were asked to self report their grade point averages and sleeping habits, the accuracy of their reporting is unknown.
4. Since none of the students studied are "good" sleepers per the Pittsburgh Sleep Quality Index, it is difficult to assess the academic differences.

Recommendations for Future Research

1. Future researchers should consider soliciting participants in-person by offering them an incentive for participation at locations throughout campus for a potentially higher response rate. The present study did not offer any incentives for participation and only communicated with students via email. The response rate was very low, so face-to-face efforts should be made to increase the rate of response in future research.
2. Due to the nature of self-reporting, results could be inaccurate. It is recommended that future researchers obtain permission from students and the university to access hard copies of academic records versus relying on self reporting of academic information.
3. It is recommended that future researchers consider other methods for assessment of sleep scheduling/ sleep length as students may not be able to accurately recall this information. Having the students keep a sleep diary over a set range of time could be better suited for a study of this nature.
4. The napping scale used in this study was self - created by the researcher and should be re-examined by future researchers. The majority of students reported napping, so this is an important topic that could use additional research.

Recommendations for Student Affairs Professionals

1. Due to an overwhelming majority of students having poor sleep quality across various studies, this should be a huge consideration for student affairs

professionals. Perhaps the university could create a more "sleep friendly" environment. Eliminating some of the late hours at university operated facilities (library, recreation center, student union), more effectively enforcing quiet hours in residence halls, and assigning roommates with sleep commonalities as an extremely high priority are some items to consider.

2. University professionals should consider implementing a sleep hygiene awareness program. This could be offered as part of a new student orientation program as a prevention effort or could be incorporated into the academic warning educational programming to target the students who may be most in need of the programming.
3. Finally, it is essential that all student affairs professionals are educated about the importance of sleep and how it impacts their students. University professionals have varied contact with students and likely have numerous opportunities to detect a student who may be struggling with sleep. If all professionals were more knowledgeable, encouragement, guidance, and appropriate referrals could be made to best meet the needs of students.
4. Student affairs professionals should consider their personal sleep habits and role model positive sleep behaviors.

Summary

This study sought to examine the relationship between sleep patterns and academic characteristics of college students in a mid-size state university setting in east-central Illinois. Through a quantitative study, the student's sleep quantity and sleep quality were examined in relation to their academic performance, measured by prior

semester grade point average and other self-reported factors that are considered crucial for academic success, such as attending class. Although the findings of the present study did not show a great deal of statistical significance, it should be noted that statistically significant differences were found in grade point average among the short, average and long sleepers. These findings could serve as a guide for additional research on the target population. Findings could also potentially equip student affairs professionals with valuable information to assist them in the development and implementation of a sleep hygiene education program for students in an effort to improve their overall health and academic performance.

References

American College Health Association. (2010b). ACHA-NCHA. Retrieved from http://www.achancha.org.

American Sleep Association. (2007). *What is sleep?*. Retrieved from http://www.sleepassociation.orgn/index.php?pwhatissleep

Breslau, N., Roth, T., Rosenthal, L., & Andreski, P. (1997). Daytime sleepiness: An epidemiological study of young adults. *American Journal of Public Health, 87*(10), 1649-1653.

Brown, F.C. & Buboltz, W.C. (2002). Applying sleep research to university students: Recommendations for developing a student sleep education program. *Journal of College Student Development, 43*(3), 411- 416.

Brown, F.C., Buboltz, W.C., & Soper, B. (2002). Relationship of sleep hygiene awareness, sleep hygiene practices, and sleep quality in university students. *Behavioral Medicine, 28,* 33-38.

Brown, F.C., Buboltz, W.C., & Soper, B. (2006). Development and evaluation of the sleep treatment and education program for students (STEPS). *Journal of American College Health, 54*(4), 231-237.

Buboltz, W.C., Brown, F., & Soper, B. (2001). Sleep habits and patterns of college students: A preliminary study. *Journal of American College Health, 50*(3), 131-135.

Campos-Morales, R. M., Valencia-Flores, M., Castano-Meneses, A., Castaneda-Figueiras, S., & Martinez-Guerrero, J. (2005). Sleepiness, performance and mood

state in a group of Mexican undergraduate students. *Biological Rhythm Research, 36*(1/2) 9-13.

Carney, C.E., Edinger, J.D., Meyer, B., Lindman, L., & Istre, T. (2006). Daily activities and sleep quality in college students. *Chronobiology International, 23*(3), 623-637.

Chickering, A.W. & Reisser, L. (1993). *Education and identidy (2nd edition).* San Francisco: Jossey-Bass.

Chokroverty, S. (2010). Overview of sleep and sleep disorders. *Indian Journal of Medical Research, 131*, 126-140.

Cockcroft, K., Grasko, D., & Fridjhon, P. (2006). On counting sheep: The self-medication and coping strategies of university students suffering from primary insomnia. *South African Journal of Higher Education, 20*(5), 627-638.

Curcio, G., Ferrara, M., & De Gennaro, L. (2006). Sleep loss, learning capacity, and academic performance. *Sleep Medicine Reviews, 10,* 323-337.

Dusselier, L., Dunn, B., Wang, Y., Shelley, M.C. & Whalen, D.F., (2005). Personal, health, academic and environmental predictors of stress for residence hall students. *Journal of American College Health, 54*(1) 15-24.

Edens, K.M. (2006). The relationship of university students' sleep habits and academic motivation. *NASPA Journal, 43*(3), 432-445.

Eliasson, A., Eliasson, A., King, J., Gould, B., & Eliasson, A. (2002). Association of sleep and academic performance. *Sleep and Breathing, 6*(1) 45-48.

Engle-Friedman, M. & Riela, S. (2004). Self-imposed sleep loss, sleepiness, effort and performance. *Sleep and Hypnosis, 6*(4), 155-162.

Forquer, L.M., Camden, A.E., Gabriau, K.M., & Johnson, C.M. (2008). Sleep patterns of college students at a public university. *Journal of American College Health, 56*(5), 563-565.

Hawkins, J. & Shaw, P. (1992). Self-reported sleep quality in college students: A repeated measures approach. *Sleep, 15*(6), 545-549.

Howell, A.J., Jahrig, J.C., & Powell, R.A. (2004). Sleep quality, sleep propensity and academic performance. *Perceptual and Motor Skills, 99*, 525-535.

Kelly, W.E., Kelly, K.E., & Clanton, R.C. (2001). The relationship between sleep length and grade-point average among college students. *College Student Journal, 35*(1), 84-86.

LeBourgeois, M.K., Giannotti, F., Cortesi, F., Wolfson, A.R., & Harsh, J. (2005). The relationship between reported sleep quality and sleep hygiene in Italian and American adolescents. *Pediatrics, 115* (1), 257-265.

Lust, K., Ehlinger, E.P., & Golden, D. (2007). Health and academic performance: Minnesota undergraduate students. *2007 College Student Health Survey Report,* 1-60.

Mann, P.S. (2005). *Introductory statistics: Using technology*. Hoboken, NJ: John Wiley & Sons, Inc.

Mastin, D.F., Bryson, J., & Corwyn, R. (2006). Assessment of sleep hygiene using the sleep hygiene index. *Journal of Behavioral Medicine, 29*(3), 223-227.

New York Sleep Institute (2006). Sleep hygiene. Retrieved from http://www.nysleepinstitute.com/sleep_hygiene_info.shtml

Noland, H., Price, J.H., Dake, J., & Telliohann, S.K. (2009) Adolescents' sleep

behaviors and perceptions of sleep. *Journal of School Health, 79* (5) 224-230.

Pallos, H., Gergely, V., Yamada, N., Miyazaki, S., & Okawa, M. (2007). The quality of sleep and factors associated with poor sleep in Japanese graduate students. *Sleep and Biological Rhythms, 5* 234-238.

Riedel, B.W. (2000). Sleep hygiene. In Lichstein, K.L., and Morin, C.M. (Eds.), *Treatment of Late-life Insomnia*, Thousand Oaks, CA, pp. 125-146.

Taub, J.M., Tanguay, P.E., & Clarkson, D. (1976). Effects of daytime naps on performance and mood in a college student population. *Journal of Abnormal Psychology, 85*(2), 210-217.

Thatcher, P.V. (2008). University students and "the all nighter": Correlates and patterns of students' engagement in a single night of total sleep deprivation. *Behavioral Sleep Medicine, 6*, 16-31.

Trockel, M.T., Barnes, M.D., & Egget, D.L. (2000). Health-related variables and academic performance among first-year college students: Implications for sleep and other behaviors. *Journal of American College Health, 49,* 125-131.

Tsai, L. & Li, S.P. (2004). Sleep patterns in college students: Gender and grade differences. *Journal of Psychosomatic Research, 56* 231-237.

Vela-Bueno, A., Fernandez-Mendoza, J., Olavarrieta-Bernardino, S., Vgontzas, A.N., Bixler, E.O., de la Cruz-Troca, J.J., Rodriguez-Munoz, A., & Olivan-Palacios, J. (2008). Sleep and behavioral correlates of napping among young adults: A survey of first-year university students in Madrid, Spain. *Journal of American College Health, 57*(2), 150-158.

Yeung, W., Chung, K., & Chan, T.C. (2008). Sleep-wake habits, excessive daytime

sleepiness and academic performance among medical students in Hong Kong. *Biological Rhythm Research, 39*(4), 369-377.

Appendices

Appendix A: Student Participant Email Solicitation

Dear EIU Student,

You are invited to participate in a research study conducted by Jennifer Hedges, a college student affairs graduate student from the Department of Counseling and Student Development at Eastern Illinois University.

Your participation in this study is entirely voluntary. Please ask questions about anything you do not understand, before deciding whether or not to participate. The survey should take less than 15 minutes of your time to complete
and your participation is very much appreciated! To complete the survey, please click the following
link:

http://questionpro.com/t/ABLTpZIlfL

Jennifer Hedges, Principal Investigator
jmhedges@eiu.edu
Or
Dr. Charles Eberly, Thesis advisor
cgeberly@eiu.edu or 217-581-7235

Appendix B: Informed Consent

Informed Consent

* PURPOSE OF THE STUDY
The primary purpose of this study is to assess the relationship between sleep quantity, sleep quality and traditional measures of academic success among randomly selected college students at a mid-size state university in East-central Illinois.

* PROCEDURES
The Pittsburgh Sleep Quality Index (PSQI), developed by Buysse, Reynolds III, Monk, Berman, and Kupfer (1989), will be used to measure sleep quality. To measure sleep quantity, selected items from the Pittsburgh Sleep Diary will be strategically selected and administered to participants. These items will aim to assess participants' sleep-wake schedules for their typical weekly schedule during the last month of Fall 2010 semester. In order to measure academic performance, students will be asked to report their semester Grade Point Average and to answer a few brief questions inquiring about impediments to academic performance as a result of sleep (absenteeism from class, tardiness, dropped courses or lower grade than expected on project or exam). In addition, students will be asked for some basic demographic information used for the purpose of answering the research questions. All of the above mentioned items will be compiled into one document administered through electronic survey software.

* POTENTIAL RISKS AND DISCOMFORTS
There are no foreseeable risks to participants. There are no safety risks associated with this study. The most important thing is ensuring the confidentiality of all of the participants. This will be done by the use of the consent form, and answering any questions a participant may have. The findings of the present study could assist student affairs professionals in development and implementation of a sleep hygiene education program for students in an effort to improve their overall health and academic performance.

* CONFIDENTIALITY
Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission or as required by law. Confidentiality will be maintained by not asking, or having the participants write their name on any documents, including surveys. During the course of the study the data will be store on an online survey creation website that requires a username and password to retrieve the data. The only person that will have access to this username and password will be the principal investigator and the EIU Assessment office Graduate Assistant. The online survey creator will be able to receive multiple surveys from the same IP address, ensuring there is no way to find out who took the survey. For the participants that fill out a paper copy of the survey, the principal investigator will hand out and individually collect each survey. Once the principal investigator inputs the data, the surveys will be shredded.

* PARTICIPATION AND WITHDRAWAL

Participation in this research study is voluntary and not a requirement or a condition for being the recipient of benefits or services from Eastern Illinois University or any other organization sponsoring the research project. If you volunteer to participate in this study, you may withdraw at any time without consequences of any kind or loss of benefits or services to which you are otherwise entitled. There is no penalty if you withdraw from the study and you will not lose any benefits to which you are otherwise entitled. If you have any questions or concerns about this research, please contact:

Jennifer Hedges, Principal Investigator
jmhedges@eiu.edu
Or
Dr. Charles Eberly, Thesis advisor
cgeberly@eiu.edu or 217-581-7235

* RIGHTS OF RESEARCH SUBJECTS

If you have any questions or concerns about the treatment of human participants in this study, you may call or write:

Institutional Review Board
Eastern Illinois University
600 Lincoln Ave.
Charleston, IL 61920
Telephone: (217) 581-8576
E-mail: eiuirb@www.eiu.edu

Appendix C: Survey Materials (sent in electronic format)

During the past month, what time have you usually gone to bed at night?

_____

During the past month, how long (in minutes) has it usually taken you to fall asleep each night?

_____

During the past month, what time have you usually gotten up in the morning?

_____

During the past month, how many hours of acutal sleep did you get at night? (This may be different than the number of hours you spent in bed)

_____

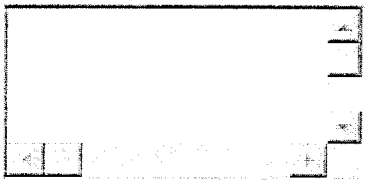
For each of the following questions, check the one best response. Please answer all questions.

During the past month, how often have you had trouble sleeping because you...

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
Cannot get to sleep within 30 minutes	○	○	○	○

Wake up in the middle of the night or early morning	○	○	○	○
Have to get up to use the bathroom	○	○	○	○
Cannot breathe comfortably	○	○	○	○
Cough or snore loudly	○	○	○	○
Fell too cold	○	○	○	○
Feel too hot	○	○	○	○
Had bad dreams	○	○	○	○
Have pain	○	○	○	○

Other reason(s), please descibe



How often during the past month have you had trouble sleeping because of this?

- ○ Not during the past month
- ○ Less than once a week
- ○ Once a twice a week

- Three or more times a week

During the past month, how would you rate your sleep quality overall?

- Very good
- Fairly good
- Fairly bad
- Very bad

During the past month, how often have you taken medicine to help you sleep (prescribed or "over the counter")?

- Not during the past month
- Less than once a week
- Once or twice a week
- Three or more times a week

During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?

- Not during the past month
- Less than once a week
- Once or twice a week
- Three or more times a week

During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?

- No problem at all

- ○ Only a very slight problem
- ○ Somewhat of a problem
- ○ A very big problem

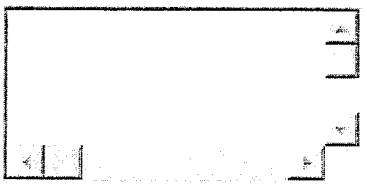
Do you have a bed partner or a room mate?

- ○ No bed partner or room mate
- ○ Partner/room mate in other room
- ○ Partner in same room, but not same bed
- ○ Partner in same bed

If you have a room mate or bed partner, ask him/her how often in the past month you have had...

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
Loud snoring	○	○	○	○
Long pauses between breaths while asleep	○	○	○	○
Legs twitching or jerking while you sleep	○	○	○	○
Episodes of disorientation or confusion during sleep	○	○	○	○

Other restlessness while you sleep; please describe



How often during the past month does this occur?

- Not during the past month
- Less than once a week
- Once or twice a week
- Three or more times a week

When thinking about your typical schedule for the Fall 2010 semester, what was your typical bedtime and wake time on each of the following days:

	Bedtime	Waketime
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		

Gender

Age

Grade Class

- Freshman
- Sophomore
- Junior
- Senior
- Graduate

Fall 2010 semester grade point average

Have you had any of the following situations occur as a result of sleep deficiency?

- Missed class
- Late to class
- Dropped course
- Lower course grade
- Failed course grade

☐ Incomplete course grade

During the last month of the Fall 2010 semester, how many days did you nap (intentionally or unintentionally)(for example: falling asleep at work or in class is considered napping)?