A SURVEY OF SLEEP DISORDERS IN COLLEGE STUDENTS:
A STUDY OF PREVALENCE AND OUTCOMES

by

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ABSTRACT

Sleep complaints are prevalent among college students and are associated with a number of negative outcomes. It is known that college students frequently report difficulties falling asleep, daytime hypersomnolence, and fatigue. However, specific data regarding the presentation of sleep disordered symptoms and exact diagnostic prevalence are lacking. College students (n = 143) were recruited to complete sleep questionnaires and, if indicated, a brief clinical interview to determine the prevalence of sleep symptoms and resulting diagnoses. Additionally, these students also completed questionnaires assessing mental and physical health to determine any negative outcomes that may be associated with sleep complaints. Lastly, academic performance was assessed in all students with greater than 24 credit hours to determine the relation between sleep presentation and academic performance. It was found that sleep complaints were reported by 88% of students, based on a self-report questionnaire, but only 34% of students, based on clinical interview. Furthermore, a diagnosable sleep disorder was found in 24% of students. Insufficient Sleep Syndrome and Delayed Sleep Phase Disorder were the two most prevalent sleep disorders, both occurring in 8% of the sample. Insomnia was the next most prevalent sleep disorder, occurring in 6% of the sample. Students with a sleep disorder reported more physical and mental health complaints but not worse academic performance than students without a sleep disorder. These results suggest that sleep complaints and disorders are prevalent among college students. Furthermore, sleep problems are associated with increased mental and physical health complaints. However, it does not appear that sleep problems affect academic performance. These results suggest that sleep complaints are not only prevalent among college students but are
associated with negative mental/physical health outcomes. Therefore, sleep symptoms should be considered in the management of students’ health. Additionally, sleep education and, when necessary, sleep disorder treatment may improve college students’ overall quality of life.
DEDICATION

This dissertation is dedicated to my family: Stephen and Nancy Thomas, Deborah and David Wright, Lee Thomas, Keith Thomas, Ashley Thomas, Luke Thomas, and “Baby Thomas.” I would also like to dedicate this dissertation to Dr. Kenneth Lichstein, my mentor, who over the years has become an extended family member.
LIST OF ABBREVIATIONS AND SYMBOLS

$M$ Mean

$n$ Total number in a sample

$p$ Probability associated with the occurrence under the null hypothesis of a value as extreme as or more extreme than the observed value

$r$ Pearson product-moment correlation

$SD$ Standard deviation

$\Lambda$ Wilks’ lambda

$<$ Less than
ACKNOWLEDGMENTS

At this point in my graduate career, there are too many individuals who have been instrumental in my professional growth to be named in one page. All of the faculty, staff, and students in the Department of Psychology at the University of Alabama have played an integral role in the past five years of my life. Although largely unnamed in this document, I would not be where I am without their continuous support.

My committee chair and mentor, Dr. Kenneth L. Lichstein, has taught me more about being a scientist-practitioner and writer than I ever thought imaginable. He has been extremely supportive in all of my endeavors and I will always be deeply indebted to him.

I must also thank the rest of my dissertation committee. Drs. Natalie Dautovich, Philip Gable, James Geyer, and Beverly Thorn have been invaluable to the evolution of my dissertation. What began as a simple idea of investigating the prevalence of sleep disorders among college students, with a particular interest in Delayed Sleep Phase Disorder, quickly became a more comprehensive assessment of sleep complaints, sleep disorders, factors that affect sleep, and associated outcomes. My committee provided much needed direction and helped me form what I considered to be an exceptional database on the sleep habits of college students.
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INTRODUCTION

Sleep complaints are increasingly prevalent among college students, with the most commonly reported complaints being difficulty falling asleep, difficulty maintaining sleep, early morning awakenings, poor sleep quality, early morning fatigue/sleepiness, and daytime napping (Buboltz, Brown, & Soper, 2001; Lack, 1986; Lund, Reider, Whiting, & Prichard, 2010). The constellation of sleep complaints typically endorsed by college students is suggestive of a number of sleep disorders including narcolepsy and/or idiopathic hypersomnia, insomnia, delayed sleep phase disorder (DSPD), restless legs syndrome (RLS)/periodic limb movement disorder (PLMD), and obstructive sleep apnea (OSA) but the presence of specific diagnoses has never been confirmed. Additionally, sleep complaints in college students are frequently associated with poor academic performance, decreased class attendance, increased symptoms of depression, increased symptoms of anxiety, poor general health, and increased motor vehicle accidents (Gaultney, 2010; Lund, et al., 2010; Pilcher & Walters, 1997; Taylor & Bramoweth, 2010; Taylor et al., 2011).

College students frequently report both poor sleep hygiene and sleep complaints. Sleep hygiene was introduced by Hauri (1977) as a list of behaviors to improve sleep, particularly in individuals with symptoms of insomnia. Currently, sleep hygiene is defined as a list of behaviors, environmental factors, and other sleep-related variables that affect sleep quality (Stepanski & Wyatt, 2003). College students frequently report having poor sleep hygiene, such as maintaining variable bedtimes and waketimes, consuming caffeine late in the day, smoking
cigarettes, drinking alcohol before bedtime, and attempting to sleep in noisy environments (Brown, Buboltz, & Soper, 2002; Lund et al., 2010; Taylor & Bramoweth, 2010). Furthermore, college students appear to be unaware of good and poor sleep hygiene practices and how these behaviors may affect their sleep (Brown et al., 2002). However, sleep hygiene practices have not been associated with sleep quality, and sleep hygiene has not been evaluated as a stand-alone treatment for insomnia (Stepanski & Wyatt, 2003). Despite the lack of evidence suggesting sleep hygiene’s role in sleep disorder etiology and/or treatment, poor sleep hygiene in college students has been associated with poor sleep quality (Brown et al., 2002; Kang & Chen, 2009). Thus, poor sleep hygiene, in combination with other factors, may contribute to the development of sleep disorders and/or exacerbate any preexisting sleep disorders.

Beyond poor sleep hygiene, college students frequently report sleep complaints such as insufficient sleep, difficulties falling asleep, poor quality sleep, and morning sleepiness/fatigue. Lund et al. (2010) found that college students’ mean total sleep time (TST) was 7.02 hours. Other studies have found that between 7.4% and 70% of college students, depending upon the sample, consistently sleep less than six hours per night (Kelly, Kelly, & Clanton, 2001; Lund et al., 2010; Taylor & Bramoweth, 2010). Furthermore, students consistently report sleeping less than they would like (Buboltz et al., 2001; Taylor & Bramoweth, 2010). In light of the National Sleep Foundation’s (2009) recommendation that adolescents receive 8.5 – 9.25 hours of sleep and adults receive 7 – 9 hours of sleep, college students are a sleep-deprived population, getting less sleep than they would like or need.

College students typically report both difficulties initiating and maintaining sleep; however, a complaint of difficulties initiating sleep is usually more common than difficulties maintaining sleep. Research has found that between 10.9% and 19.3% of college students report
difficulties initiating sleep, and between 5.6% and 10.9% of college students report difficulties maintaining sleep (Brown et al., 2001; Lund et al., 2010; Taylor et al., 2011). The variability in these figures likely reflects different measures used to assess difficulties initiating and maintaining sleep. Furthermore, these sleep complaints may be characteristic of a number of sleep disorders, such as insomnia, DSPD, and OSA.

College students also tend to report daytime sleepiness and/or fatigue, albeit not as frequently as other symptoms (e.g., insufficient sleep and difficulties initiating/maintaining sleep). College students, in general, report mild sleepiness and mild fatigue (Kang & Chen, 2009; Lund et al., 2010). However, between 14.4% and 25% of college students experience significant daytime sleepiness, and between 37.5% and 54.5% experience significant fatigue (Buboltz et al., 2001; Kang & Chen, 2009). In fact, insufficient sleep has been found to be the strongest predictor of excessive sleepiness (Liu et al., 2000). Daytime sleepiness has consistently been found to be more prevalent in children, adolescents, and young adults than middle-age adults and older adults (Hublin, Kaprio, Partinen, Heikkila, & Koskenvuo, 1996; Ohayon, Caulet, Philip, Guilleminault, & Priest, 1997). Again, variability in these reports likely reflects different measures used to assess these symptoms.

The overall risk for the presence of at least one sleep disorder in college students has been found to be 27% (Gaultney, 2010). As a comparison, the prevalence of sleep disorders in the general population varies widely (6% to 52.1%) depending upon the study and methodology (Bixler, Kales, Soldatos, Kales, & Healey, 1979; Hossain & Shapiro, 2002; Karacan et al., 1976; Lichstein, Durrence, Reidel, Taylor, & Bush, 2004; Ohayon & Roberts, 2001; Partinen & Hublin, 2005). The prevalence of sleep disorders found in the general population is affected by the sample used to determine prevalence, the inclusion of transient sleep disorders, and the rigor
of diagnostic criteria. Given the prevalence of individual sleep disorders, it is likely that the prevalence of sleep disorders in the general population is approximately 15% to 20% (Ohayon & Roberts, 2001). It is difficult to ascertain the prevalence of specific sleep disorders that occur in college students based on questionnaires alone. There is significant overlap in symptoms across sleep disorders, requiring a thorough assessment, typically with a clinical interview, to determine differential diagnoses. For example, a college student with sleep-onset insomnia will likely report difficulties falling asleep. However, a college student with DSPD may also report difficulties falling asleep. These difficulties in making diagnostic distinctions are magnified through the use of retrospective questionnaires, which may inflate sleep complaints (Gorin & Stone, 2001). Therefore, careful clinical assessment through multiple diagnostic modalities is typically necessary to make accurate diagnoses. Furthermore, despite the high prevalence of sleep complaints in college students, it is difficult to determine which symptoms actually translate into sleep disorders. Therefore, little data exist on the prevalence of sleep disorders in college populations. Yet, commonly reported sleep complaints suggest a wide variety of sleep disorders including insomnia, circadian rhythm sleep disorders, narcolepsy and/or idiopathic hypersomnia, RLS/PLMD, and OSA.

Insomnia is broadly characterized by difficulties falling asleep and/or maintaining sleep with associated daytime impairment (American Academy of Sleep Medicine, 2005; American Psychiatric Association, 2000). Lichstein, Durrence, Taylor, Bush, and Riedel (2003) have further defined insomnia as reported sleep-onset latency (SOL) and/or wake time after sleep onset (WASO) greater than 30 minutes, occurring at least three times per week for a minimum of six months. Insomnia symptoms occur in 9.4% to 12% of college students and 16% to 23% of young adults (Bixler, Vgontzas, Lin, Vela-Bueno, & Kales, 2002; Cukrowitz et al., 2006;
Gaultney, 2010; Hardison, Neimeyer, & Lichstein, 2005; Karakan et al., 1976; Taylor et al., 2011). As a comparison, insomnia symptoms have been found to occur in 9% to 15% of the population (Ohayon & Roth, 2003). Furthermore, insomnia symptoms in college students have been associated with increased symptoms of depression and anxiety, increased physical health complaints, and decreased academic performance (Lund et al., 2010; Taylor et al., 2011).

Circadian rhythm sleep disorders are generally characterized by a misalignment between an individual’s sleep pattern and their desired sleep pattern. Circadian rhythm sleep disorders include DSPD, advanced sleep phase disorder, and shift-work sleep disorder. The most common circadian rhythm sleep disorder found in college student populations is DSPD, which is characterized by sleep-onset and wake times that are later than desired, little to no difficulty maintaining sleep after sleep-onset, and difficulties waking up in the morning. A delay in the sleep period has been found to be developmentally normal in adolescence and typically persists into the third decade of life (Carskadon & Davis, 1989; Roenneberg et al., 2004). In fact, Roenneberg et al. (2004) suggest that sleep phase changes (i.e., an end to the delay in sleep phase) may serve as a marker for the end of adolescence. Based upon retrospective sleep complaints, previous research has estimated a prevalence of DSPD in college students between 11.5% and 17%, a figure that is higher than that found in other populations (Barion & Zee, 2007; Brown et al., 2001; Lack, 1986). Gaultney (2010) found the prevalence of risk of circadian rhythm disorders in college students to be 7%, a majority of whom likely experience symptoms of DSPD. Individuals with DSPD typically report difficulties initiating sleep, thus making sleep-onset insomnia an important differential diagnosis. Therefore, a careful assessment is required to differentiate college students with insomnia from those with DSPD. Furthermore, “evening types,” as measured by the Morningness Evennessness Questionnaire (MEQ), are correlated to
peak body temperature and may exhibit symptoms of DSPD, making the MEQ a possible tool in differentiating sleep-onset insomnia from DSPD (Horne & Ostberg, 1976).

Narcolepsy is characterized by excessive sleepiness, cataplexy, sleep paralysis, and hypnogogic hallucinations. Additionally, sleep-onset rapid eye movement (REM) sleep is common in individuals with narcolepsy. Idiopathic hypersomnia is a related diagnosis that shares the symptom of excessive sleepiness, yet typically does not have the other related features of narcolepsy (i.e., cataplexy and sleep-onset REM periods). The prevalence of narcolepsy among sleep disorder center patients is approximately 5%, but the prevalence in the general population ranges from 0.013% to 0.067% (Dauvilliers, Billiard, & Montplaisir, 2003; Hublin, Kaprio, Partinen, Heikkila, & Koskenvuo, 1996; Hublin, Partinen, Kaprio, Koskenvuo, & Guilleminault, 1994). The prevalence of narcolepsy symptoms without cataplexy among adolescents (16%) has been found to be higher than adults (1% - 3%) (Carskadon, Wolfson, Acebo, Tzischinsky, & Seifer, 1998; Geisler, Croeleun, Tracik, & Zulley, 1998). However, the higher prevalence of narcolepsy symptoms is largely attributed to voluntary sleep deprivation in young adults that results in hypsomnolence (Carskadon, Wolfson, Acebo, Tzischinsky, & Seifer, 1998). The prevalence of narcolepsy among college students is unknown; however, it would be expected that since narcolepsy symptoms first appear in adolescence, the prevalence of narcolepsy in adolescent populations would be comparable to that in adults. The presence of excessive sleepiness is much more common than a formal diagnosis of narcolepsy, as 14.4% to 25% of college students experience significant daytime sleepiness (Buboltz et al., 2001; Kang & Chen, 2009). Gaultney (2010) found a 16% prevalence of risk for narcolepsy and a 4% prevalence of risk for hypersomnia. These elevated figures may reflect excessive sleepiness that is secondary to physical and/or mental illness or insufficient sleep. In fact, insufficient sleep has been found to
be the strongest predictor of excessive sleepiness (Liu et al., 2000). Additionally, many questionnaires that assess symptoms of narcolepsy include two symptoms, sleep paralysis and hypnogogic hallucinations, that are not uncommon in the general population (Ohayon, Priest, Caucet, Guilleminault, & Priest, 1996). Therefore, a careful assessment of symptoms related to narcolepsy is essential to accurately determining its prevalence.

Restless legs syndrome (RLS) and periodic limb movement disorder (PLMD) are frequently treated as one sleep disorder in many questionnaires and prevalence studies. For example, Gaultney (2010) found that the prevalence of risk for RLS/PLMD is 8% in college students. However, the features of these two sleep disorders are different. RLS is characterized by an uncomfortable sensation in the legs, frequently worsening before bedtime, and accompanied by a strong desire to move the legs. The prevalence of RLS in adults has been found to be between 5% and 10% and increases with advancing age (Allen & Earley, 2001; Ohayon & Roth, 2002). PLMD is the occurrence of frequent episodes of leg movements during sleep. PLMD is relatively uncommon in younger adults and significantly more common in older adults (Ancoli-Israel, Kripke, Mason, & Kaplan, 1985).

Obstructive sleep apnea (OSA) is characterized by repetitive episodes of airway collapse resulting in a cessation of breathing for a minimum of 10 seconds during sleep. Risk factors for the presence of OSA include obesity, neck circumference, and family history of OSA (Young, Skatrud, & Peppard, 2004). As the prevalence of obesity increases, particularly in children and young adults, the prevalence of OSA is likely to increase (James, 2008). Research suggests that OSA is found in 2% to 8% of women and 4% to 13% of men (Kripke et al., 1997; Young et al., 1993). Age and gender effects have been found for OSA such that OSA is worse in men and increases with age (Young et al., 2004). Few studies assess the prevalence of OSA in
adolescents; however, Hui et al. (1999) found that approximately 0.1% of young adults have a respiratory disturbance index greater than 5 and daytime sleepiness. Gaultney (2010) found a 4% prevalence of risk of OSA in college students. However, it is difficult to accurately assess the prevalence of OSA based on a questionnaire.

It has been demonstrated that sleep complaints and sleep disorders are prevalent in college students, typically at rates comparable to adults. However, the rates of sleep disorders in college students, as compared to the general population, likely vary with the specific sleep disorder. Assessment of sleep disorders in college students is made difficult by previous use of retrospective questionnaires, single questionnaire use, frequent symptom overlap, a lack of prospective sleep analysis, and a lack of clinical interviews. Furthermore, research examining the relationship between sleep complaints/disorders and negative outcomes is rarely causal. Thus, relationships between sleep pathology and mental/physical pathologies may be bi-directional.

The presence of sleep complaints, poor quality sleep, and sleep disorders appears to negatively impact academic performance, as measured by cognitive testing and/or grade point average (GPA) (Gaultney, 2010; Kelly et al., 2001; Pilcher & Walters, 1997; Taylor & McFatter, 2003). However, Taylor, Bramoweth, Grieser, Tatum, and Roane (2012) did not find that students with insomnia had lower GPAs than those with out insomnia, suggesting that poor sleep may impact general cognitive function but may not necessarily result in a lower GPA. Taylor and Bramoweth (2010) found that college students frequently report insufficient sleep, which is associated with an increase in motor vehicle accidents. Sleep complaints and/or poor quality sleep have been associated with an increase in mental health symptoms (i.e., somatization, obsessive-compulsive traits, depression, anxiety, and psychic distress), increased incidence of illness, and more time away from work and/or school due to illness (Lund et al., 2010; Pilcher,
DSPD is specifically associated with an increase in tardiness and absenteeism, early morning hypersomnolence and/or fatigue, and a decrease in academic performance (Buboltz et al., 2001; Lack, 1986; Lund et al., 2010). Furthermore, evidence suggests that circadian misalignment may be associated with decreased academic performance, increased mental and physical health complaints, and self-reported poor sleep quality (Emens, Lewy, Kinzie, Arntz, & Rough, 2009; Medeiros, Mendes, Lima, & Araujo, 2001; Scheer, Hilton, Mantzoros, & Shea, 2009; Wright, Hull, Hughes, Ronda, & Czeisler, 2006). Sleep quality may have a greater impact on negative outcomes than does sleep quantity (Pilcher et al., 1997). In these studies, sleep quantity typically refers to either objective or subjective total sleep time (TST); whereas sleep quality is typically a subjective report of a sleeper’s perceived sleep quality. College students appear to frequently suffer from both poor sleep quality and quantity, making negative outcomes likely in this population.

The purpose of this study was to extend previous research into college students’ sleep complaints to determine specific diagnoses of the most prevalent sleep disorders in this population. Sleep diaries were used to obtain prospective sleep patterns in college students. Disorder-specific symptoms were assessed via self-report questionnaires (i.e., SLEEP-50 and Morningness Eveningness Questionnaire). Lastly, symptoms of sleep disorders were verified using a brief clinical interview over the telephone to determine the presence of sleep disorders in college students, to clarify diagnoses, and help to exclude differential diagnoses. These assessments were anticipated to provide a more accurate prevalence of sleep disorders in a college population, with the exception of OSA, which requires a PSG to definitively confirm this diagnosis. Negative mental and physical health and academic performance outcomes were
assessed via self-report to determine associations between the prevalence of sleep disorders and negative outcomes in health and academic performance.

There were four main hypotheses. First, it was anticipated that college students would demonstrate an overall prevalence of sleep complaints and sleep disorders similar to that found in adult populations, based on previous research on the epidemiology of sleep disorders in both college and adult populations. Second, although the overall prevalence of sleep disorders was expected to be comparable to adult populations, some variability in the prevalence of individual sleep disorders would exist. Specifically, it was anticipated that college students would display a higher prevalence of DSPD and a lower prevalence of OSA and RLS. Third, students with sleep disorders would demonstrate greater symptoms of depression and anxiety and would display more health complaints. Fourth, students with sleep disorders would demonstrate poorer academic performance than students without sleep disorders.
METHOD

Participants

Undergraduate college students were recruited from the University of Alabama Department of Psychology subject pool, hereafter referred to as the subject pool. Inclusion criteria consisted of being between the ages of 18 – 25 at the time of the study. In order to obtain a maximally broad and generalizable sample, there were no exclusion criteria besides age.

A total of 185 students were enrolled between June 1, 2012 and September 30, 2012. A total of 42 students failed to complete the study: twenty-four students formally withdrew from the study prior to completing any questionnaires; ten students were lost to contact; nine students withdrew from the study after completing the demographic questionnaire; and one student enrolled but was ineligible due to age. Thus, 143 students completed all phases of the study.

Participants’ age ranged from 18 – 24, with a majority of participants (66%) being 18-years-old. 85 females (59%) and 58 males (41%) participated. A majority of the sample, 115 (80%), identified themselves as white. Full demographic descriptive statistics are given in Table 1.

Fourteen students indicated depressive and/or anxiety symptoms of sufficient severity to warrant referral, three of which expressed both suicidal ideation and anxiety. Of these 14 students, none indicated severe depressive symptoms (BDI > 28), and seven indicated severe symptoms of anxiety (STAI > 59). In addition, ten students indicated current suicidal ideation, but only one student expressed intent to carry out suicidal ideation. Two of the ten students with
current suicidal ideation did not have high BDI scores and the other eight students had mild to moderate BDI scores. All of the 14 students were allowed to continue their participation.

Materials and Procedure

Demographic Questionnaire. A demographic questionnaire (Appendix A) was used to obtain information for the purposes of screening participants and providing data for a descriptive analysis of the sample. This questionnaire included basic demographic information, such as age, gender, ethnicity, height, weight, medication use, current psychiatric illness, current medical illness, treatment, class attendance, credit hours completed, and class standing. Major area of study or anticipated area of study and grade point average was collected via self-report for all participants beyond their first year of college (> 24 credit hours). Questions pertaining to psychosis or suicide were included from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV) (American Psychiatric Association, 2000).

The Expanded Consensus Sleep Diary for Morning. The Expanded Consensus Sleep Diary for Morning (CSD-M, Carney et al., 2012; Appendix B) was used to gather self-report sleep data each morning. The diary provides a record of the time the participant entered bed and the final morning exit, sleep onset latency (SOL), number of awakenings (NWAK), wake time after sleep onset (WASO), terminal wake time before the final morning arising (TWAK), and sleep quality rating (SQR) on a 1 = very poor to 5 = very good scale. The core CSD was slightly modified to include nap time (NAP). A comment section permits collecting additional information such as illness or substances taken at bedtime that are sleep active, e.g. medications and alcohol. Total sleep time (TST, time in bed [TIB] minus SOL, WASO, and TWAK) and sleep efficiency percent (SE, TST + TIB × 100) are derived from the above variables. These
variables and their definitions conform to the recommendations of the Pittsburgh Consensus Conference on evaluating insomnia (Buysse, Ancoli-Israel, Edinger, Lichstein, & Morin 2006).

**SLEEP-50.** The SLEEP-50 is a 50-item self-report questionnaire to assist in diagnosing sleep disorders (Spoormaker, Verbeek, van den Bout, & Klip, 2005; Appendix C). The SLEEP-50 consists of nine sections that correspond to seven different sleep disorders: obstructive sleep apnea (OSA), insomnia (I), narcolepsy (N), restless legs syndrome/periodic limb movement disorder (RP), circadian rhythm sleep disorders (CSD), sleepwalking (SW), and nightmares (N). The final two sections assess sleep hygiene (SH) and sleep impact (SI). The SLEEP-50 focuses on symptom intensity, rather than frequency, to improve diagnostic specificity. The 50 items are scored on a four-point scale: 1 (not at all), 2 (somewhat), 3 (rather much), and 4 (very much). A total SLEEP-50 score may be calculated; however, the scale is best used by considering individual sections. A minimum score of three or four is necessary for an item to be considered a sleep complaint, and each section requires at least one item scored as three or four to be considered a possible sleep disorder. Additionally, it is recommended that cut-off scores for each section be used in determining possible sleep disorders (Spoormaker et al., 2005). The SLEEP-50 was validated on a college student sample, which makes this questionnaire ideal for the current study. The SLEEP-50 demonstrates high internal consistency (Cronbach’s $\alpha = .85$). Test-retest reliability fell between .65 and .89. The SLEEP-50 demonstrated good sensitivity and specificity as well as agreement with clinical diagnoses ($\kappa = .77$) for all seven of the sleep disorders assessed (Spoormaker et al., 2005). The SLEEP-50 was used, in conjunction with other sleep questionnaires and a clinical interview, to determine sleep disorder prevalence in this sample of college students.
**Morningness-Eveningness Questionnaire (MEQ).** The MEQ (Appendix D) is a 19-item self-report questionnaire that assesses an individual’s preference for either “morningness” or “eveningness,” a concept originally described by O’Shea (1900), Freeman and Hovland (1934) and Kleitman (1939). “Morningness” may be defined as a preference for relatively early waketimes, peak alertness early in the morning and afternoon, and a preference for relatively early bedtimes. “Eveningness” may be defined as a preference for later waketimes, peak alertness later in the afternoon and evening, and a preference for relatively late bedtimes. The MEQ typically measures behavioral preferences, but these behavioral preferences are thought to be the result of one’s chronotype. Scores on the MEQ range from 16 – 86, with lower scores indicative of greater “eveningness” and higher scores indicative of greater “morningness.” Scores are broken into a five-point scale, ranging from definitely evening type (16 – 30) to definitely morning type (70-86). Scores on the MEQ demonstrated a high correlation to bedtime, arising time, and peak oral temperature. The scale was validated on individuals aged 18 - 32 (Horne & Ostberg, 1976). This scale was used in conjunction with sleep diaries, the SLEEP-50, and a clinical interview to determine the prevalence of DSPD.

**Duke Health Profile (DUKE).** The DUKE (Appendix E) is a 17-item self-report questionnaire that assesses mental and physical health. Individual items were derived from the 63-item Duke-UNC Health Profile, based on face validity and item-remainder correlations. The DUKE was validated on primary care adult patients and demonstrated acceptable reliability and validity (Cronbach’s α = .78) (Parkerson, Broadhead, & Tse, 1990). Scores on the DUKE range from 0 to 100, with higher scores reflecting better overall health. The DUKE is divided into two domains, health and dysfunction. The health domain consists of six subscales: physical health, mental health, social health, general health, perceived health, and self-esteem. The dysfunction
subscales consists of five subscales: anxiety, depression, anxiety-depression, pain, and disability. It should be noted that there is content overlap between a number of subscales in both domains. Furthermore, several subscales are composed of individual items. During validation, it was found that patients who had mild health problems, typically health maintenance, had a DUKE physical health mean score of 83.9. Patients who experience chronic pain had a DUKE physical health mean score of 58.1. Patients with mental health problems had a DUKE mental health mean score of 49.2. Patients with physical health problems had DUKE mental health mean scores ranging from 75.7 to 79.2 (Parkerson et al., 1990).

**Beck Depression Inventory – Second Edition (BDI-II).** The BDI-II (Appendix F) is a 21-item self-report questionnaire that measures a variety of somatic, cognitive, and behavioral symptoms consistent with depression. Each item is scored from 0-3, with increasing scores reflective of increasing severity. Individual items are summed to create a total score, ranging from 0 – 63, with higher scores indicative of greater depressive symptoms (Beck, Steer, & Brown, 1996). One item assesses suicidal thoughts in the past two weeks, with response options ranging from “I don’t have any thoughts of killing myself” to “I would kill myself if I had the chance” (Item 9, Appendix F). The BDI-II is reported to have good reliability and validity (Beck et al., 1996; Beck, Steer, Ball, & Ranieri, 1996).

**State-Trait Anxiety Inventory, Trait Scale, Form Y (STAI).** The STAI (Appendix G) is a 20-item self-report questionnaire that assesses symptoms of nervousness, worry, and tension. Individual items (or statements) are rated on a 4-point scale ranging from “almost never” to “almost always.” Scores range from 20 – 80, with higher scores indicative of increased anxiety. The STAI has demonstrated good test-retest reliability and adequate specificity (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983).
Procedure

The University of Alabama Institutional Review Board approved this study on April 20, 2012 (Appendix H). Students’ recruitment and data collection were completed online through the use of Google Documents, with the exception of a brief phone call to follow-up on symptoms of sleep disorders and/or psychopathology. All participants were provided with a Participant Information Sheet prior to completing any questionnaires. Once students had enrolled, they were provided a participant identification number for future use with all questionnaires. No identifying information was maintained in the dataset. Participant’s names and contact information were obtained upon enrolling. This information was kept in hardcopy and stored in a locked cabinet in the primary investigator’s laboratory. This information was used only to provide hyperlinks to questionnaires and to contact participants who endorsed sleep disorder symptoms and/or symptoms of psychopathology.

Participants first completed the demographic questionnaire to determine eligibility and to provide basic demographic information for descriptive analyses. Screening responses for all volunteers was retained for the purpose of reporting data about participants (e.g., percentage of volunteers enrolled in the study).

After completing the demographic questionnaire, participants received an email containing hyperlinks to the sleep questionnaires. The first hyperlink directed participants to an online form containing the SLEEP-50, MEQ, DUKE, BDI-II, and STAI. After completing these initial questionnaires, participants were then emailed a hyperlink to complete the CSD-M each morning over the next 14 days. Participants who did not complete the SLEEP-50, MEQ, DUKE, BDI-II, STAI, or did not complete 8 days (greater than 50%) of the CSD-M were disqualified.
from the study and received class credit based on the portion of questionnaires that were completed. Once all questionnaires were completed, students were given research credit.

If a participant endorsed sleep complaints, either on the CSD-M or SLEEP-50, consistent with a sleep disorder and/or symptoms of psychopathology, either on the BDI-II or STAI, they were contacted via telephone to assess these symptoms through a brief (15-minute) clinical interview (Appendix I). The clinical interview was conducted by a fifth-year graduate student and supervised by a licensed clinical psychologist. The clinical interview assisted in the diagnosis of sleep disorders and/or psychopathology and allowed for proper referrals. Sleep disorder diagnoses were based on ICSD-2 criteria and were determined by using data from the CSD-M, SLEEP-50, MEQ, and the clinical interview.
RESULTS

Students had a mean age of 18.6 years ($SD = 1.16$), were largely female (59%), and Caucasian (80%). A majority of students (66%) were freshmen. The sample represented eight different academic colleges or schools (e.g., Arts and Sciences, Engineering, Nursing, etc.) and had completed a mean of 25.5 course credits ($SD = 33.25$). Descriptive data for the full sample, students with a sleep disorder, and students without a sleep disorder are presented in Table 1.
## Table 1

Demographic Data

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Full Sample (n = 143)</th>
<th>No Sleep Disorder (n = 108)</th>
<th>Sleep Disorder (n = 35)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in Years</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>18</td>
<td>94 (66%)</td>
<td>72 (67%)</td>
<td>22 (63%)</td>
</tr>
<tr>
<td>19</td>
<td>22 (15%)</td>
<td>15 (14%)</td>
<td>7 (20%)</td>
</tr>
<tr>
<td>20</td>
<td>17 (12%)</td>
<td>12 (11%)</td>
<td>5 (14%)</td>
</tr>
<tr>
<td>21</td>
<td>5 (4%)</td>
<td>4 (4%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>22</td>
<td>3 (2%)</td>
<td>3 (3%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>23</td>
<td>1 (1%)</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>24</td>
<td>1 (1%)</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
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<tr>
<td>Male</td>
<td>58 (41%)</td>
<td>45 (42%)</td>
<td>13 (37%)</td>
</tr>
<tr>
<td>Female</td>
<td>85 (59%)</td>
<td>63 (58%)</td>
<td>22 (63%)</td>
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<tr>
<td>Ethnicity</td>
<td></td>
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</tr>
<tr>
<td>Black</td>
<td>19 (13%)</td>
<td>16 (15%)</td>
<td>3 (9%)</td>
</tr>
<tr>
<td>White</td>
<td>115 (80%)</td>
<td>86 (80%)</td>
<td>29 (83%)</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>3 (2%)</td>
<td>2 (2%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Asian</td>
<td>1 (1%)</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Middle Eastern</td>
<td>2 (1%)</td>
<td>2 (2%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Native American</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Pacific Islander</td>
<td>1 (1%)</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (1%)</td>
<td>0 (0%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>Class Standing</td>
<td></td>
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<tr>
<td>Freshman</td>
<td>94 (66%)</td>
<td>69 (64%)</td>
<td>25 (71%)</td>
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<tr>
<td>Sophomore</td>
<td>25 (18%)</td>
<td>20 (19%)</td>
<td>5 (14%)</td>
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<tr>
<td>Junior</td>
<td>14 (10%)</td>
<td>10 (9%)</td>
<td>4 (11%)</td>
</tr>
<tr>
<td>Senior</td>
<td>10 (7%)</td>
<td>9 (8%)</td>
<td>1 (3%)</td>
</tr>
<tr>
<td>M (SD)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Age</td>
<td>18.63 (1.16)</td>
<td>18.7 (1.24)</td>
<td>18.54 (0.89)</td>
</tr>
<tr>
<td>BMI</td>
<td>23.8 (5.03)</td>
<td>24.0 (5.05)</td>
<td>23.2 (5.00)</td>
</tr>
<tr>
<td>Course Credits</td>
<td>25.5 (33.25)</td>
<td>27.4 (34.59)</td>
<td>19.9 (28.61)</td>
</tr>
<tr>
<td>GPA</td>
<td>3.42 (0.52)</td>
<td>3.42 (0.56)</td>
<td>3.43 (0.38)</td>
</tr>
</tbody>
</table>

Demographic variables (i.e., age, gender, and ethnicity) and all primary outcome variables were entered in a correlation matrix to determine relations between these variables and identify possible covariates for inclusion in multivariate analyses. There were no significant
relations between age, gender, or ethnicity and any primary outcome variables. Therefore, all analyses were collapsed across age, gender, and ethnicity.

Factors Influencing Sleep

Students reported relatively few factors influencing sleep on the SLEEP-50: 25% reported maintaining variable bedtimes (variance in bedtimes greater than two hours), 24% reported frequent use of a substance that might affect sleep (e.g., caffeine, alcohol, or medications), 6% reported having a bedroom that was too light, and 6% reported having a bedroom that was too noisy. Students spent 2.4 days ($SD = 2.0$) exercising for 24 minutes per day ($SD = 29.9$) each week. Exercise was not associated with sleep characteristics, mental/physical health complaints, or academic performance. Nearly all students (99%) reported having a cell phone in their bedroom. A subset of this sample ($n = 63$) was further questioned regarding specific use of their cell phone in the bedroom. Of these students, 18% set their cell phone to silent or off, 48% set their cell phone to vibrate, and 35% left their cell phone on at night. Approximately half of students (48%) indicated that their cell phone wakes them up at night with an average of 0.89 awakenings per week ($SD = 1.36$). Students who reported cell phone awakenings also reported spending less time in bed, ($r = -.27, p < .05$) and more time napping during the day ($r = .30, p < .05$). No other relations were found between cell phone awakenings and sleep characteristics, mental/physical health complaints, and academic performance.

Sleep Complaints

Sleep complaints were found to be prevalent among college students, as 88% reported a sleep complaint that occurred “rather much” or “very much” on the SLEEP-50. The most commonly reported sleep complaints were variable bedtimes (26%), difficulty falling asleep
(25%), insufficient sleep (25%), waking up early and being unable to fall back asleep (22%), and being told they kick their legs at night (20%). Common sleep complaints reported on the SLEEP-50 are presented in Table 2.

Table 2
Prevalence of specific sleep complaints

<table>
<thead>
<tr>
<th>Sleep complaint</th>
<th>Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observed snoring</td>
<td>10 (7%)</td>
</tr>
<tr>
<td>Observed apnea</td>
<td>4 (3%)</td>
</tr>
<tr>
<td>Observed waking and gasping</td>
<td>4 (3%)</td>
</tr>
<tr>
<td>Wake self gasping</td>
<td>6 (4%)</td>
</tr>
<tr>
<td>Morning headache</td>
<td>8 (6%)</td>
</tr>
<tr>
<td>Difficulty falling asleep</td>
<td>35 (25%)</td>
</tr>
<tr>
<td>Difficulty maintaining sleep</td>
<td>26 (18%)</td>
</tr>
<tr>
<td>Waking up early and being unable to return to sleep</td>
<td>32 (22%)</td>
</tr>
<tr>
<td>Sleep lightly</td>
<td>28 (20%)</td>
</tr>
<tr>
<td>Insufficient sleep</td>
<td>35 (25%)</td>
</tr>
<tr>
<td>Restless legs</td>
<td>11 (8%)</td>
</tr>
<tr>
<td>Observed leg movements</td>
<td>29 (20%)</td>
</tr>
<tr>
<td>Prefer different bedtime</td>
<td>23 (16%)</td>
</tr>
<tr>
<td>Variable bedtimes</td>
<td>37 (26%)</td>
</tr>
<tr>
<td>Sleepwalking</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Nightmares</td>
<td>19 (13%)</td>
</tr>
<tr>
<td>Physical symptoms with nightmares</td>
<td>9 (6%)</td>
</tr>
</tbody>
</table>

*Sleep complaints based on SLEEP-50 scores*
Furthermore, 50% reported significant sleep complaints indicative of a sleep disorder, 36% reported significant sleep complaints with impairments in daytime functioning, and 16% reported sleep complaints consistent with two or more sleep disorders combined with impairments in daytime functioning. The prevalence of significant sleep complaints on the SLEEP-50, defined by meeting a minimum cutoff score and having two items endorsed as “rather much” or “very much,” are as follows: 4% presented with symptoms consistent with OSA, 22% presented with some form of an insomnia complaint, 7% exhibited symptoms consistent with narcolepsy, 7% had complaints of RLS, 8% had symptoms of a circadian rhythm disorder, 1% endorsed sleepwalking, and 17% had symptoms consistent with nightmare disorder (Table 3).
Table 3

Prevalence of sleep disorder symptoms

<table>
<thead>
<tr>
<th>Sleep complaint</th>
<th>SLEEP-50*</th>
<th>Clinical Interview**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstructive sleep apnea</td>
<td>6 (4%)</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Insomnia</td>
<td>32 (22%)</td>
<td>12 (8%)</td>
</tr>
<tr>
<td>Circadian Rhythm Disorder</td>
<td>12 (8%)</td>
<td>N/A</td>
</tr>
<tr>
<td>Restless Legs Syndrome</td>
<td>10 (7%)</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Narcolepsy</td>
<td>10 (7%)</td>
<td>0</td>
</tr>
<tr>
<td>Sleepwalking</td>
<td>1 (1%)</td>
<td>0</td>
</tr>
<tr>
<td>Nightmare</td>
<td>24 (17%)</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Hypersomnia</td>
<td>11 (8%)</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Delayed Sleep Phase</td>
<td>N/A</td>
<td>15 (11%)</td>
</tr>
<tr>
<td>Insufficient Sleep</td>
<td>N/A</td>
<td>21 (15%)</td>
</tr>
<tr>
<td>Poor Sleep Quality</td>
<td>N/A</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Environmental Sleep Complaints</td>
<td>N/A</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Variable Sleep Schedule</td>
<td>N/A</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Nighttime Asthma</td>
<td>N/A</td>
<td>1 (1%)</td>
</tr>
</tbody>
</table>

*Sleep complaints meeting minimum cutoff score and severity criteria on the SLEEP-50
**Primary sleep complaint(s) reported during the clinical interview

Over half (52%) of all students were contacted for a clinical interview. After conducting a clinical interview, it was determined that 34% of all students had a significant sleep complaint. Primary sleep complaints are as follows: 15% reported insufficient sleep, 10% indicated symptoms consistent with DSPD, 8% indicated some type of insomnia complaint without evidence of other sleep disorders (i.e., DSPD), 1% reported nightmares, 1% reported RLS
symptoms, 1% presented with a vague complaint of poor sleep quality, 1% indicated OSA complaints, 1% indicated sleep environment complaints, 1% indicated hypersomnia complaints, 1% indicated a highly variable sleep schedule, and 1% reported nighttime asthma symptoms (Table 3).

**Sleep Disorders**

Based on the SLEEP-50, 36% of students were at risk for a sleep disorder. Specific risks of sleep disorders are as follows: 17% for insomnia, 4% for RLS, 3% for OSA, 7% for narcolepsy, 6% for a CRD, 1% for sleepwalking, 12% for a nightmare disorder, and 8% for hypersomnia. After conducting a clinical interview, 24% of students met diagnostic criteria for a sleep disorder. ISS and DSPD were the two most prevalent sleep disorders, each diagnosis occurring in 8% of students. Insomnia was the next most prevalent sleep disorder at 6%. RLS occurred in 1% of the sample. One student (1%) met criteria for a disorder of excessive sleepiness. One student met clinical criteria for OSA but a recent PSG was negative. No students met diagnostic criteria for narcolepsy, sleepwalking, or nightmare disorder (Table 4).
Table 4
Prevalence of sleep disorders

<table>
<thead>
<tr>
<th>Sleep Disorder</th>
<th>Risk of Sleep Disorder* (n = 143)</th>
<th>Clinical Diagnosis** (n = 143)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient Sleep Syndrome</td>
<td>N/A</td>
<td>12 (8%)</td>
</tr>
<tr>
<td>Delayed Sleep Phase</td>
<td>N/A</td>
<td>12 (8%)</td>
</tr>
<tr>
<td>Insomnia</td>
<td>24 (17%)</td>
<td>8 (6%)</td>
</tr>
<tr>
<td>Restless Legs Syndrome</td>
<td>6 (4%)</td>
<td>2 (1%)</td>
</tr>
<tr>
<td>Obstructive Sleep Apnea</td>
<td>5 (3%)</td>
<td>0</td>
</tr>
<tr>
<td>Narcolepsy</td>
<td>10 (7%)</td>
<td>0</td>
</tr>
<tr>
<td>Circadian Rhythm Disorder</td>
<td>9 (6%)</td>
<td>N/A</td>
</tr>
<tr>
<td>Sleepwalking</td>
<td>1 (1%)</td>
<td>0</td>
</tr>
<tr>
<td>Nightmare</td>
<td>17 (12%)</td>
<td>0</td>
</tr>
<tr>
<td>Hypersomnia</td>
<td>11 (8%)</td>
<td>1 (1%)</td>
</tr>
</tbody>
</table>

*Risk based on SLEEP-50 scores
**Diagnosis based on ICSD-2 criteria

A Multivariate Analysis of Variance (MANOVA) was used to compare sleep characteristics between students with a sleep disorder and those without. MANOVA was chosen to address experiment-wise Type 1 error that occurs with multiple pairwise comparisons and because it is robust to violations of normality. Students with a sleep disorder reported worse sleep than those without a sleep disorder, Wilks’ Λ = .862, $F(5, 135) = 4.34, p < .01$.

Specifically, students with a sleep disorder reported worse SE, $F(1, 139) = 9.45, p < .01$; greater SOL, $F(1, 139) = 7.52, p < .01$; and more WASO, $F(1, 139) = 18.14, p < .001$ (Table 5).
Table 5
Self-reported sleep characteristics

<table>
<thead>
<tr>
<th></th>
<th>No Sleep Disorder</th>
<th>Sleep Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 108</td>
<td>N = 35</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>TIB</td>
<td>479.7</td>
<td>47.31</td>
</tr>
<tr>
<td>TST</td>
<td>443.7</td>
<td>50.3</td>
</tr>
<tr>
<td>SE*</td>
<td>92.3</td>
<td>4.99</td>
</tr>
<tr>
<td>SOL*</td>
<td>17.5</td>
<td>12.42</td>
</tr>
<tr>
<td>WASO**</td>
<td>8.75</td>
<td>8.97</td>
</tr>
</tbody>
</table>

*p < .01; **p < .001

Note. TIB = Time in bed; TST = Total sleep time; SE = Sleep efficiency; SOL = Sleep onset latency; WASO = Wake after sleep onset. Sleep disorders were determined by ICSD-2 criteria.

Mental and Physical Health

The BDI-II, STAI-II, and DUKE were used to assess mental and physical health. Only the DUKE primary health domains are reported. BDI-II scores ranged from 0 to 27 with a mean of 8 (SD = 6.8). STAI scores ranged from 20 to 69 with a mean of 38 (SD = 11.4). DUKE mental health scores ranged from 20 to 90 with a mean of 59.0 (SD = 15.37).

DUKE physical health scores ranged from 10 to 100 with a mean of 73.5 (SD = 16.8). DUKE general health scores ranged from 26.7 to 86.7 with a mean of 65.6 (SD = 11.57). DUKE perceived health scores ranged from 0 to 100 with a mean of 65.4 (SD = 29.81). DUKE self-esteem scores ranged from 40 to 100 with a mean of 81.3 (SD = 16.73).
Mental and physical health variables were entered into a correlation matrix with sleep variables (Table 6). BDI and STAI scores were positively associated with increased WASO, decreased sleep efficiency, and increased numbers of self-reported sleep complaints. However, BDI and STAI scores were not associated with other subjective sleep problems (e.g., SOL, NWAK, etc.). Students’ physical health was associated with greater TST, less SOL, less WASO, and fewer sleep complaints. Increased BDI and STAI scores were strongly associated with worse physical health.

Table 6

Pearson correlations for mental/physical health and sleep

<table>
<thead>
<tr>
<th></th>
<th>STAI</th>
<th>DUKE</th>
<th>TIB</th>
<th>TWAK</th>
<th>TST</th>
<th>SE</th>
<th>SQR</th>
<th>Nap</th>
<th>SOL</th>
<th>WASO</th>
<th>MEQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>BDI</td>
<td></td>
<td></td>
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<tr>
<td>STAI</td>
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</tr>
</tbody>
</table>

* p < .05; † p < .01; ‡ p < .001

A MANOVA was used to compare mental/physical health characteristics between students with and without a sleep disorder, Wilks’ $\Lambda = .733$, $F (13, 129) = 3.61, p < .001$.

Individuals with a sleep disorder reported more depressive symptoms, $F (1, 141) = 34.99, p < .001$; more symptoms of anxiety, $F (1, 141) = 16.11, p < .001$; worse physical health, $F (1, 141) = 28.75, p < .001$; worse mental health, $F (1, 141) = 7.63, p < .01$; worse general health, $F (1, 141) = 22.26, p < .001$; worse perceived health, $F (1, 141) = 5.02, p < .05$; and lower self-esteem, $F (1, 141) = 6.43, p < .05$ (Table 7).
### Table 7

**Health and sleep**

<table>
<thead>
<tr>
<th></th>
<th>No Sleep Disorder</th>
<th>Sleep Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 108</td>
<td>N = 35</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td><strong>BDI</strong>*</td>
<td>6.4</td>
<td>5.20</td>
</tr>
<tr>
<td><strong>STAI</strong>*</td>
<td>36.2</td>
<td>10.33</td>
</tr>
<tr>
<td><strong>DUKE Physical Health</strong>*</td>
<td>77.4</td>
<td>15.79</td>
</tr>
<tr>
<td><strong>DUKE Mental Health</strong></td>
<td>60.9</td>
<td>14.11</td>
</tr>
<tr>
<td><strong>DUKE Social Health</strong></td>
<td>65.7</td>
<td>15.06</td>
</tr>
<tr>
<td><strong>DUKE General Health</strong>*</td>
<td>68.0</td>
<td>10.69</td>
</tr>
<tr>
<td><strong>DUKE Perceived Health</strong>*</td>
<td>68.5</td>
<td>27.85</td>
</tr>
<tr>
<td><strong>DUKE Self-Esteem</strong>*</td>
<td>83.2</td>
<td>16.05</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01; ***p < .001

**Academic Performance**

Students reported their grade point average (GPA) and class attendance. Students’ GPA (n = 70) ranged from 1.86 to 4.07 with a mean GPA of 3.42 (SD = 0.52). Students with a sleep disorder (n = 16) ranged from 2.75 to 3.98 with a mean GPA of 3.43 (SD = 0.38). Students without a sleep disorder (n = 54) ranged from 1.86 to 4.07 with a mean of 3.42 (SD = 0.56).

Students (n = 143) missed 0 to 9 classes per month due to oversleeping (M = 0.46; SD = 1.24), 0 to 4 classes per month due to illness (M = .57; SD = 0.93), and fell asleep in class 0 to 9 times per week (M = .45; SD = 1.07). Students with a sleep disorder (n = 35) missed 0 to 8
classes per month due to oversleeping (M = .66, SD 1.51), missed 0 to 4 classes per month due to illness (M = .86, 1.17), and fell asleep in class 0 to 3 times per week (M = .51, SD = .78). Students without a sleep disorder (n = 108) missed 0 to 9 classes per month due to oversleeping (M = .40, SD = 1.14), missed 0 to 4 classes per month due to illness (M = .47, SD = 0.83), and fell asleep in class 0 to 9 times per week (M = .44, SD = 1.14).

Students’ GPA was associated with the number of classes missed each month due to oversleeping ($r = -.55, p < .001$), TIB ($r = -.31, p < .05$) and MEQ scores ($r = .30, p = .05$). The number of classes students missed due to oversleeping was associated with the number of times the fell asleep in class each week ($r = .43, p = .001$), and MEQ scores ($r = -.24, p < .01$). Also, the number of classes students missed each month due to illness was associated with WASO ($r = .17, p < .05$).

A MANOVA was used to compare academic performance between these two groups, Wilks’ $\Lambda = .715$, $F (5, 45) = 3.59, p < .01$. Individuals with a sleep disorder reported being sick more frequently each semester, $F (1, 49) = 7.02, p < .05$, and missing more class due to illness, $F (1, 49) = 11.97, p < .01$ (Table 8).
Table 8

Academics and sleep

<table>
<thead>
<tr>
<th></th>
<th>No Sleep Disorder</th>
<th>Sleep Disorder</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N = 108</td>
<td>N = 35</td>
</tr>
<tr>
<td></td>
<td>M</td>
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<tr>
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<td>0.54</td>
</tr>
<tr>
<td>Missed Class – Oversleeping</td>
<td>.67</td>
<td>1.57</td>
</tr>
<tr>
<td>Missed Class – Illness**</td>
<td>.36</td>
<td>0.73</td>
</tr>
<tr>
<td>Sleeping in class</td>
<td>.48</td>
<td>1.49</td>
</tr>
<tr>
<td>Illness per semester*</td>
<td>1.7</td>
<td>1.82</td>
</tr>
</tbody>
</table>

*p < .05; **p < .01; ***p < .001
DISCUSSION

Overall, sleep complaints were found to be prevalent among this sample of college students. A majority of students (88%) reported some type of sleep complaint and 36% reported a sleep complaint indicative of a sleep disorder. After conducting a brief clinical interview, it was determined that 34% of students presented with a significant sleep complaint and 25% of students met ICSD-2 criteria for a sleep disorder. The most common sleep disorders found were ISS (8%), DSPD (8%), and Insomnia (6%). Using multivariate analyses to compare students with a sleep disorder and those without, it was found that students with a sleep disorder reported more mental and physical health complaints and missed class more frequently due to illness. However, students with a sleep disorder did not report worse academic performance, as measured by GPA.

Sleep Complaints

Sleep complaints, in general, were prevalent based on a self-report questionnaire. Students most frequently reported difficulties falling asleep, insufficient sleep, variable bedtimes, waking up early and being unable to return to sleep, and experiencing restless legs symptoms when attempting to sleep. These sleep complaints, based upon a self-report questionnaire, are similar in type and frequency to those found in other studies (Buboltz, Brown, & Soper, 2001; Lack, 1986; Lund, Reider, Whiting, & Prichard, 2010).

Interestingly, only 34% of students reported a significant sleep complaint via clinical interview, which agrees with the assertion that self-report questionnaires may significantly inflate sleep complaints (Gorin & Stone, 2001). A majority of these students continued to cite insufficient sleep as their primary sleep complaint, which was typically voluntary and due to both social and academic demands. These results suggest that a relatively large number of
students are aware they do not receive sufficient sleep, yet actively choose to limit their sleep in the face of competing demands on their time. Sleep onset insomnia was another highly prevalent sleep complaint and, based upon clinical interview, was usually a result of DSPD and/or academic stress.

This sample reported spending approximately eight hours in bed and sleeping for approximately seven hours per night with a sleep efficiency of 91%. This finding is similar to TST for college students found in other studies (Kelly, Kelly, & Clanton, 2001; Lund et al., 2010; Taylor & Bramoweth, 2010). However, only 9% reported consistently sleeping six hours or less, which is a smaller number of students than reported in other studies (Kelly, Kelly, & Clanton, 2001; Lund et al., 2010; Taylor & Bramoweth, 2010). Regardless, these data lend further support to the idea that college students are, in general, sleep deprived, particularly in light of the recommended 8.5 – 9.25 hours for adolescents and 7 – 9 hours for adults (National Sleep Foundation, 2009).

Sleep Disorders

Twenty-four percent of students (35) met criteria for a sleep disorder. This figure agrees with Gaultney (2010), who found that 27% of college students have a sleep disorder. Furthermore, this figure is slightly higher than a prevalence estimate of 15% to 20% for the general population (Ohayon & Roberts, 2001). These data support sleep disorder prevalence estimates in college students that are on par with estimates for adults in the general population and suggest that sleep disorder screening should be included in the overall evaluation of student health.

It is important to note that a large number of students suffer from a self-imposed sleep disorder. Specifically, 8% met diagnostic criteria for ISS and 9% reported consistently sleeping
six hours or less. In this sense, a large percentage of sleep disorders in college students may be addressed through sleep education.

DSPD was found in 8% of students and another 3% of students reported DSPD symptoms but did not meet diagnostic criteria. These figures agree with an estimated prevalence between 11% and 17%. Furthermore, a prevalence of 8% is higher than that typically found in the general population (Brown et al., 2001; Lack, 1986). It is likely that college students experience higher rates of DSPD due to endogenous mechanisms that encourage a delayed phase (Carskadon & Davis, 1989) that is exacerbated by exogenous demands, both academic and social, which support this delay in sleep phase.

Insomnia was found in 6% of students. This figure is lower than the 9% - 23% prevalence found in other studies (Bixler, Vgontzas, Lin, Vela-Bueno, & Kales, 2002; Cukrowitz et al., 2006; Gaultney, 2010; Hardison, Neimeyer, & Lichstein, 2005; Karakan et al., 1976; Taylor et al., 2011), as well as being lower than insomnia prevalence estimates (9% - 15%) found in adult populations (Ohayon & Roth, 2003). It is possible that the higher insomnia prevalence rates found in other studies reflect both students with insomnia and those who presented with sleep-onset insomnia complaints secondary to DSPD.

Other sleep disorders were remarkably absent in this sample. Only 1% of students met diagnostic criteria for RLS. The prevalence of RLS in adults has been found to be between 5% and 10% and increases with advancing age (Allen & Earley, 2001; Ancoli-Israel, Kripke, Mason, & Kaplan, 1985; Ohayon & Roth, 2002). This figure (1%) is lower than the 5% found by Gaultney (2010). A majority of students who initially reported RLS symptoms on the SLEEP-50, when interviewed, did not meet full ICSD-2 criteria.
No students in this sample met criteria for narcolepsy and only one student met criteria for idiopathic hypersomnia. Past research has found rates of narcolepsy and hypersomnia between 16% and 4%, respectively, in a sample of college students (Gaultney, 2010). These data support the suggestion by Carskadon et al. (1998) that a higher rate of narcolepsy and/or idiopathic hypersomnia may be secondary to voluntary sleep deprivation. Additionally, these rates may be inflated based on a normative prevalence of narcolepsy symptoms (e.g., sleep paralysis) reported by students on a self-report questionnaire. Indeed, the prevalence of narcolepsy in this sample, after conducting a clinical interview, more closely resembles prevalence estimates of narcolepsy (0.013% to 0.067%) in the general population (Dauvilliers, Billiard, & Montplaisir, 2003; Hublin, Kaprio, Partinen, Heikkila, & Koskenvuo, 1996; Hublin, Partinen, Kaprio, Koskenvuo, & Guilleminault, 1994).

One student in this sample reported a number of symptoms and risk factors for obstructive sleep apnea (OSA), which would have resulted in an OSA prevalence of 1% of the sample. However, this student reported a negative PSG within the past year. A prevalence of 1% is similar to the prevalence of OSA in young adults (0.1% with a respiratory disturbance index greater than 5 and daytime sleepiness) found by Hui et al. (1999) but lower than the 4% prevalence found by Gaultney (2010).

**Sleep and Mental/Physical Health**

Students who met criteria for a diagnosis of a sleep disorder reported more physical and mental health complaints than those without sleep disorders. This finding supports other research suggesting that poor or insufficient sleep are associated with increased symptoms of depression, anxiety, and general poor health (Lund, et al., 2010; Pilcher, Ginter, & Sadowsky, 1997; Taylor et al., 2011). Particularly in the case of DSPD, circadian misalignment may be implicated in the
increased mental and physical health complaints (Emens, Lewy, Kinzie, Arntz, & Rough, 2009; Scheer, Hilton, Mantzoros, & Shea, 2009). Aggressively identifying and treating sleep disorders in college students may improve their mental and physical health.

**Sleep and Academic Performance**

It is generally accepted that poor or insufficient sleep results in impairments in cognitive function (Pilcher & Walters, 1997; Taylor & McFatter, 2003). Furthermore, studies have found that sleep complaints in college students are associated with poor academic performance and decreased class attendance (Gaultney, 2010; Kelly et al., 2001). Similar to mental/physical health, circadian misalignment has been implicated in poor academic performance (Medeiros, Mendes, Lima, & Araujo, 2001; Wright, Hull, Hughes, Ronda, & Czeisler, 2006).

In light of the evidence that sleep and academic performance are related, we cannot explain why students with sleep disorders did not report worse academic performance. However, this finding supports a recent study by Taylor et al. (2012) that found no difference in academic performance, as measured by GPA, between students with and without an insomnia diagnosis.

The lack of an effect of poor sleep on academic performance may reflect a number of possibilities: although poor sleep has been found to be associated with a decrease in cognitive functioning, this result may not translate to significantly poorer academic performance, particularly for students with greater cognitive reserve; GPA may not be the best measure of academic performance, even though GPA is an important outcome measure; students with chronic sleep complaints/disorders may have learned to compensate; and decreased class attendance may be a result of poor health, rather than directly a result of sleep complaints/disorders. Indeed, this sample indicated that they missed class more often as a result of illness than due to oversleeping.
Strengths/Limitations

The current study relied on self-report data, which is subject to a number of biases and inflation of sleep complaints. It is hoped that inclusion of a clinical interview may have mitigated limitations imposed by using self-report data collected online. Additionally, this study is both descriptive and correlational in nature and, therefore, causal relationships may not be inferred. Future research may wish to incorporate research methodologies (i.e., longitudinal data collection and analyses) that would allow for causal mechanisms between sleep, mood, and academics to be uncovered. Furthermore, a longitudinal analysis would allow for interesting analyses of the development of sleep habits across time. This sample is composed of college students in the Department of Psychology Subject Pool, therefore it is overrepresented by females and younger students in their first year of college. Future research should attempt to collect a sample more representative of the entire campus. Lastly, although the sample size (n = 143) is sufficient to provide a preliminary picture of sleep complaints and disorders in college students, while also allowing for comparing academic and health outcomes between students with and without a sleep disorder, the sample size is not sufficient to compare individual sleep disorders. Therefore, a larger sample size is being collected in order to provide more certainty to the prevalence of individual sleep disorders (i.e., narcolepsy, OSA, and RLS) and associated outcomes.

Conclusions

Overall, these findings suggest that sleep disorders, particularly ISS, DSPD, and insomnia, are prevalent in college students. Furthermore, college students may be at a higher risk for behaviorally induced sleep disorders. Other sleep disorders, particularly those with increasing prevalence associated with increasing age, are less prevalent in college students. In addition to
the data on sleep complaints and disorders among college students, these results also identified relationships between academic performance, mental health, and physical health in students with and without a sleep disorder. College students with a sleep disorder report more mental and physical health complaints, suggesting a relationship that should be considered in clinical practice. The treatment of mental and physical health complaints should include assessment and treatment of sleep disorders.

This study adds to existing research on the prevalence of sleep complaints and sleep disorders by incorporating a clinical interview to self-report questionnaires. As a result, the prevalence of sleep complaints and sleep disorders may be more accurate. Furthermore, most research on college students’ sleep complaints and disorders has focused on a specific sleep disorder, rather than completing a more comprehensive assessment of sleep disorders. Therefore, this study adds breadth to past research on sleep disorders in college students. Most importantly, these results underscore the importance of even a brief clinical interview, both in clinical practice and research, when attempting to determine the presence of sleep disorders. The overlap of symptoms, as highlighted by Insomnia and DSPD, may be high and omitting a clinical interview or reliance on a self-report questionnaire may not provide a clear diagnostic picture.
REFERENCES


APPENDICES

Appendix A

Demographic Questionnaire

This questionnaire will be used to determine if you qualify for this study. Please answer all questions truthfully. You may contact the investigator if you have any questions about this survey.

1) Please enter your participant ID number.

2) Please enter your date of birth (e.g., 01/01/2001).

3) Please provide your gender (male or female).

4) Please describe your ethnicity (Asian, Black, Hispanic/Latino, White, Middle Eastern, Other – Describe).

5) How many credit hours have you completed at the University of Alabama?

6) What is your cumulative grade point average (GPA)?

7) What is your class standing (Freshman, Sophomore, Junior, Senior)?

8) What is your major area of study?

9) Please enter your height (inches).

10) Please enter your weight (pounds).

11) Please enter your neck circumference/size (inches).

12) Are you able to access the internet at the place where you sleep (e.g., home, dorm)?

13) Do you sleep with your cell phone in your bedroom?

14) If yes, what is your phone ringer setting at night (on, vibrate, silent, off)?

15) Are you ever awakened by your cell phone at night?
16) If yes, how many nights per week are you awakened by your cell phone (on average)?

17) Have you heard voices talking to you that no one else hears?

18) Have you seen things that you are not sure exist or others do not see?

19) Do you frequently feel that others are out to harm you?

20) Have you ever attempted suicide or formed a plan to commit suicide?

21) If yes to any of the above questions (10 - 13) please explain in detail below:

22) On average, how many classes do you miss each month due to oversleeping?

23) On average, how many classes do you miss each month due to illness?

24) On average, how often do you fall asleep in class each week?

25) On average, how often are you sick each semester?
Appendix B

Consensus Sleep Diary for Morning (CSD-M)

General Instructions

**What is a Sleep Diary?** A sleep diary is designed to gather information about your daily sleep pattern.

**How often and when do I fill out the sleep diary?** It is necessary for you to complete your sleep diary every day. If possible, *the sleep diary should be completed within one hour of getting out of bed in the morning.*

**What should I do if I miss a day?** If you forget to fill in the diary or are unable to finish it, leave the diary blank for that day.

**What if something unusual affects my sleep or how I feel in the daytime?** If your sleep or daytime functioning is affected by some unusual event (such as an illness, or an emergency) you may make brief notes on your diary.

**What do the words “bed” and “day” mean on the diary?** This diary can be used for people who are awake or asleep at unusual times. In the sleep diary, the word “day” is the time when you choose or are required to be awake. The term “bed” means the place where you usually sleep.

**Will answering these questions about my sleep keep me awake?** This is not usually a problem. *You should not worry about giving exact times, and you should not watch the clock.* Just give your best estimate.

1. What time did you get into bed? Write the time that you got into bed. This may not be the time you began “trying” to fall asleep.

2. What time did you try to go to sleep? Record the time that you began “trying” to fall asleep.

3. How long did it take you to fall asleep? Beginning at the time you wrote in question 2, how long did it take you to fall asleep?

4. How many times did you wake up, not counting your final awakening? How many times did you wake up between the time you first fell asleep and your final awakening?
5. In total, how long did these awakenings last? What was the total time you were awake between the time you first fell asleep and your final awakening? For example, if you woke 3 times for 20 minutes, 35 minutes, and 15 minutes, add them all up (20+35+15=70 min or 1 hr and 10 min).

6a. What time was your final awakening? Record the last time you woke up in the morning.

6b. After your final awakening, how long did you spend in bed trying to sleep? After the last time you woke-up (Item #6a), how many minutes did you spend in bed trying to sleep? For example, if you woke up at 8 am but continued to try and sleep until 9 am, record 1 hour.

6c. Did you wake up earlier than you planned? If you woke up or were awakened earlier than you planned, check yes. If you woke up at your planned time, check no.  
   __Yes  __No

6d. If yes, how much earlier? If you answered “yes” to question 6c, write the number of minutes you woke up earlier than you had planned on waking up. For example, if you woke up 15 minutes before the alarm went off, record 15 minutes here.

7. What time did you get out of bed for the day? What time did you get out of bed with no further attempt at sleeping? This may be different from your final awakening time (e.g. you may have woken up at 6:35 a.m. but did not get out of bed to start your day until 7:20 a.m.)

8. In total, how long did you sleep? This should just be your best estimate, based on when you went to bed and woke up, how long it took you to fall asleep, and how long you were awake. You do not need to calculate this by adding and subtracting; just give your best estimate.

9. How would you rate the quality of your sleep? “Sleep Quality” is your sense of whether your sleep was good or poor.  
   __Very poor  __Poor  __Fair  __Good  __Very good

10. How restful or refreshed did you feel when you woke up for the day? This refers to how you felt after you were done sleeping for the night, during the first few minutes that you were awake.  
   __Not at all rested  __Slightly rested  __Somewhat rested  __Well-rested  __Very well-rested

11a. How many times did you nap or doze? A nap is a time you decided to sleep during the day, whether in bed or not in bed. “Dozing” is a time you may have nodded off for a few minutes, without meaning to, such as while watching TV. Count all the times you napped or dozed at any time from when you first got out of bed in the morning until you got into bed again at night.

11b. In total, how long did you nap or doze? Estimate the total amount of time you spent napping or dozing, in hours and minutes. For instance, if you napped twice, once for 30 minutes and once for 60 minutes, and dozed for 10 minutes, you would answer “1 hour 40 minutes.” If you did not nap or doze, write “N/A” (not applicable).
12a. How many drinks containing alcohol did you have? Enter the number of alcoholic drinks you had where 1 drink is defined as one 12 oz beer (can), 5 oz wine, or 1.5 oz liquor (one shot).

12b. What time was your last drink? If you had an alcoholic drink yesterday, enter the time of day in hours and minutes of your last drink. If you did not have a drink, write “N/A” (not applicable).

13a. How many caffeinated drinks (coffee, tea, soda, energy drinks) did you have? Enter the number of caffeinated drinks (coffee, tea, soda, energy drinks) you had where for coffee and tea, one drink = 6-8 oz; while for caffeinated soda one drink = 12 oz.

13b. What time was your last caffeinated drink? If you had a caffeinated drink, enter the time of day in hours and minutes of your last drink. If you did not have a caffeinated drink, write “N/A” (not applicable).

14a. Did you take any over-the-counter or prescription medication(s) to help you sleep? __YES    __NO

14 b. If so, list medication(s), dose, and time taken: List the medication name, how much and when you took EACH different medication you took tonight to help you sleep. Include medication available over the counter, prescription medications, and herbals (example: "Sleepwell 50 mg 11 pm"). If every night is the same, write “same” after the first day.

15. Did you exercise yesterday (yes or no)?

16. If yes, how much time did you spend exercising?

17. How would you describe yesterday’s exercise (a higher amount than usual, the usual amount of daily exercise, or less exercise than I normally receive)?

18. Comments: If you have anything that you would like to say that is relevant to your sleep feel free to write it here. For example, significant stressors (e.g., exams) or illness.
## Appendix C

**SLEEP-50**

Please respond to what extent a statement (item) has been applicable to you during the past 4 weeks. Score each item on a 4-point scale:

1 (not at all)            2 (somewhat)            3 (rather much)            4 (very much)

### Section 1: ______________

1. I am told that I snore.  
2. I sweat during the night.  
3. I am told that I hold my breath when sleeping.  
4. I am told that I wake up gasping for air.  
5. I wake up with a dry mouth.  
6. I wake up during the night while coughing or being short of breath.  
7. I wake up with a sour taste in my mouth.  
8. I wake up with a headache.

### Section 2: ______________

9. I have difficulty in falling asleep.  
10. Thoughts go through my head and keep me awake.  
11. I worry and find it hard to relax.  
12. I wake up during the night.  
13. After waking up during the night, I fall asleep slowly.  
14. I wake up early and cannot get back to sleep.  
15. I sleep lightly.  
16. I sleep too little.
Section 3: _______________

17. I see dreamlike images when falling asleep or waking up. 1 2 3 4
18. I sometimes fall asleep on a social occasion. 1 2 3 4
19. I have sleep attacks during the day. 1 2 3 4
20. With intense emotions, my muscles sometimes collapse during the day. 1 2 3 4
21. I sometimes cannot move when falling asleep or waking up 1 2 3 4

Section 4: _______________

22. I am told that I kick my legs when I sleep. 1 2 3 4
23. I have cramps or pain in my legs during the night. 1 2 3 4
24. I feel little shocks in my legs during the night. 1 2 3 4
25. I cannot keep my legs at rest when falling asleep. 1 2 3 4

Section 5: _______________

26. I would rather go to bed at a different time. 1 2 3 4
27. I go to bed at very different times (more than 2 hour difference). 1 2 3 4
28. I do shift work. 1 2 3 4

Section 6: _______________

29. I sometimes walk when I am sleeping. 1 2 3 4
30. I sometimes wake up in a different place than where I fell asleep. 1 2 3 4
31. I sometimes find evidence of having performed an action during the night I do not remember. 1 2 3 4

Section 7: _______________

32. I have frightening dreams (if not, go to Item 37). 1 2 3 4
33. I wake up from these dreams. 1 2 3 4
34. I remember the content of these dreams. 1 2 3 4
35. I can orientate quickly after these dreams. 1 2 3 4
36. I have physical symptoms during or after these dreams (e.g., movements, sweating, heart palpitations, shortness of breath). 1 2 3 4
Section 8: ______________

37. It is too light in my bedroom during the night. 1 2 3 4
38. It is too noisy in my bedroom during the night. 1 2 3 4
39. I drink alcoholic beverages during the evening. 1 2 3 4
40. I smoke during the evening. 1 2 3 4
41. I use other substances during the evening (e.g., sleeping pills or other medication). 1 2 3 4
42. I feel sad. 1 2 3 4
43. I have no pleasure or interest in daily occupations. 1 2 3 4

Section 9: ______________

44. I feel tired at getting up. 1 2 3 4
45. I feel sleepy during the day and struggle to remain awake. 1 2 3 4
46. I would like to have more energy during the day. 1 2 3 4
47. I am told that I am easily irritated. 1 2 3 4
48. I have difficulty in concentrating at work or school. 1 2 3 4
49. I worry whether I sleep enough. 1 2 3 4
50. Generally, I sleep badly. 1 2 3 4
Appendix D

MORNINGNESS-EVENINGNESS QUESTIONNAIRE (MEQ)

Instructions:
• Please read each question very carefully before answering.
• Please answer each question as honestly as possible.
• Answer ALL questions.
• Each question should be answered independently of others. Do NOT go back and check your answers.

1. What time would you get up if you were entirely free to plan your day?

<table>
<thead>
<tr>
<th>Time</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>5:00 – 6:30 AM</td>
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</tr>
<tr>
<td>6:30 – 7:45 AM</td>
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</tr>
<tr>
<td>7:45 – 9:45 AM</td>
<td>3</td>
</tr>
<tr>
<td>9:45 – 11:00 AM</td>
<td>2</td>
</tr>
<tr>
<td>11:00 AM – 12 NOON</td>
<td>1</td>
</tr>
<tr>
<td>12 NOON – 5:00 AM</td>
<td>0</td>
</tr>
</tbody>
</table>

2. What time would you go to bed if you were entirely free to plan your evening?

<table>
<thead>
<tr>
<th>Time</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 – 9:00 PM</td>
<td>5</td>
</tr>
<tr>
<td>9:00 – 10:15 PM</td>
<td>4</td>
</tr>
<tr>
<td>10:15 PM – 12:30 AM</td>
<td>3</td>
</tr>
<tr>
<td>12:30 – 1:45 AM</td>
<td>2</td>
</tr>
<tr>
<td>1:45 – 3:00 AM</td>
<td>1</td>
</tr>
<tr>
<td>3:00 AM – 8:00 PM</td>
<td>0</td>
</tr>
</tbody>
</table>
3. If there is a specific time at which you have to get up in the morning, to what extent do you depend on being woken up by an alarm clock?

<table>
<thead>
<tr>
<th>Dependence level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all dependent</td>
<td>4</td>
</tr>
<tr>
<td>Slightly dependent</td>
<td>3</td>
</tr>
<tr>
<td>Fairly dependent</td>
<td>2</td>
</tr>
<tr>
<td>Very dependent</td>
<td>1</td>
</tr>
</tbody>
</table>

4. How easy do you find it to get up in the morning (when you are not woken up unexpectedly)?

<table>
<thead>
<tr>
<th>Difficulty level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Not very easy</td>
<td>2</td>
</tr>
<tr>
<td>Fairly easy</td>
<td>3</td>
</tr>
<tr>
<td>Very easy</td>
<td>4</td>
</tr>
</tbody>
</table>

5. How alert do you feel during the first half hour after you wake up in the morning?

<table>
<thead>
<tr>
<th>Alertness level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all alert</td>
<td>1</td>
</tr>
<tr>
<td>Slightly alert</td>
<td>2</td>
</tr>
<tr>
<td>Fairly alert</td>
<td>3</td>
</tr>
<tr>
<td>Very alert</td>
<td>4</td>
</tr>
</tbody>
</table>

6. How hungry do you feel during the first half-hour after you wake up in the morning?

<table>
<thead>
<tr>
<th>Hunger level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all hungry</td>
<td>1</td>
</tr>
<tr>
<td>Slightly hungry</td>
<td>2</td>
</tr>
<tr>
<td>Fairly hungry</td>
<td>3</td>
</tr>
<tr>
<td>Very hungry</td>
<td>4</td>
</tr>
</tbody>
</table>

7. During the first half-hour after you wake up in the morning, how tired do you feel?

<table>
<thead>
<tr>
<th>Tiredness level</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very tired</td>
<td>1</td>
</tr>
<tr>
<td>Fairly tired</td>
<td>2</td>
</tr>
<tr>
<td>Fairly refreshed</td>
<td>3</td>
</tr>
<tr>
<td>Very refreshed</td>
<td>4</td>
</tr>
</tbody>
</table>
8. If you have no commitments the next day, what time would you go to bed compared to your usual bedtime?

<table>
<thead>
<tr>
<th>Option</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seldom or never later</td>
<td>4</td>
</tr>
<tr>
<td>Less than one hour later</td>
<td>3</td>
</tr>
<tr>
<td>1-2 hours later</td>
<td>2</td>
</tr>
<tr>
<td>More than two hours later</td>
<td>1</td>
</tr>
</tbody>
</table>

9. You have decided to engage in some physical exercise. A friend suggests that you do this for one hour twice a week and the best time for him is between 7:00 – 8:00 am. Bearing in mind nothing but your own internal “clock”, how do you think you would perform?

<table>
<thead>
<tr>
<th>Option</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would be in good form</td>
<td>4</td>
</tr>
<tr>
<td>Would be in reasonable form</td>
<td>3</td>
</tr>
<tr>
<td>Would find it difficult</td>
<td>2</td>
</tr>
<tr>
<td>Would find it very difficult</td>
<td>1</td>
</tr>
</tbody>
</table>

10. At what time of day do you feel you become tired as a result of need for sleep?

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 – 9:00 PM</td>
<td>5</td>
</tr>
<tr>
<td>9:00 – 10:15 PM</td>
<td>4</td>
</tr>
<tr>
<td>10:15 PM – 12:45 AM</td>
<td>3</td>
</tr>
<tr>
<td>12:45 – 2:00 AM</td>
<td>2</td>
</tr>
<tr>
<td>2:00 – 3:00 AM</td>
<td>1</td>
</tr>
</tbody>
</table>

11. You want to be at your peak performance for a test that you know is going to be mentally exhausting and will last for two hours. You are entirely free to plan your day. Considering only your own internal “clock”, which ONE of the four testing times would you choose?

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM – 10:00 AM</td>
<td>4</td>
</tr>
<tr>
<td>11:00 AM – 1:00 PM</td>
<td>3</td>
</tr>
<tr>
<td>3:00 PM – 5:00 PM</td>
<td>2</td>
</tr>
<tr>
<td>7:00 PM – 9:00 PM</td>
<td>1</td>
</tr>
</tbody>
</table>
12. If you got into bed at 11:00 PM, how tired would you be?

<table>
<thead>
<tr>
<th>Tiredness Level</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all tired</td>
<td>1</td>
</tr>
<tr>
<td>A little tired</td>
<td>2</td>
</tr>
<tr>
<td>Fairly tired</td>
<td>3</td>
</tr>
<tr>
<td>Very tired</td>
<td>4</td>
</tr>
</tbody>
</table>

13. For some reason you have gone to bed several hours later than usual, but there is no need to get up at any particular time the next morning. Which ONE of the following are you most likely to do?

<table>
<thead>
<tr>
<th>Action Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Will wake up at usual time, but will NOT fall back asleep</td>
<td>4</td>
</tr>
<tr>
<td>Will wake up at usual time and will doze thereafter</td>
<td>3</td>
</tr>
<tr>
<td>Will wake up at usual time but will fall asleep again</td>
<td>2</td>
</tr>
<tr>
<td>Will NOT wake up until later than usual</td>
<td>1</td>
</tr>
</tbody>
</table>

14. One night you have to remain awake between 4:00 – 6:00 AM in order to carry out a night watch. You have no commitments the next day. Which ONE of the alternatives will suite you best?

<table>
<thead>
<tr>
<th>Alternative Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would NOT go to bed until watch was over</td>
<td>1</td>
</tr>
<tr>
<td>Would take a nap before and sleep after</td>
<td>2</td>
</tr>
<tr>
<td>Would take a good sleep before and nap after</td>
<td>3</td>
</tr>
<tr>
<td>Would sleep only before watch</td>
<td>4</td>
</tr>
</tbody>
</table>

15. You have to do two hours of hard physical work. You are entirely free to plan your day and considering only your own internal “clock” which ONE of the following time would you choose?

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM – 10:00 AM</td>
<td>4</td>
</tr>
<tr>
<td>11:00 AM – 1:00 PM</td>
<td>3</td>
</tr>
<tr>
<td>3:00 PM – 5:00 PM</td>
<td>2</td>
</tr>
<tr>
<td>7:00 PM – 9:00 PM</td>
<td>1</td>
</tr>
</tbody>
</table>
16. You have decided to engage in hard physical exercise. A friend suggests that you do this for one hour twice a week and the best time for him is between 10:00 – 11:00 PM. Bearing in mind nothing else but your own internal “clock” how well do you think you would perform?

<table>
<thead>
<tr>
<th>Choice</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would be in good form</td>
<td>1</td>
</tr>
<tr>
<td>Would be in reasonable form</td>
<td>2</td>
</tr>
<tr>
<td>Would find it difficult</td>
<td>3</td>
</tr>
<tr>
<td>Would find it very difficult</td>
<td>4</td>
</tr>
</tbody>
</table>

17. Suppose that you can choose your own work hours. Assume that you worked a FIVE hour day (including breaks) and that your job was interesting and paid by results). Which FIVE CONSECUTIVE HOURS would you select?

<table>
<thead>
<tr>
<th>Hours</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 hours starting between 4:00 AM and 8:00 AM</td>
<td>5</td>
</tr>
<tr>
<td>5 hours starting between 8:00 AM and 9:00 AM</td>
<td>4</td>
</tr>
<tr>
<td>5 hours starting between 9:00 AM and 2:00 PM</td>
<td>3</td>
</tr>
<tr>
<td>5 hours starting between 2:00 PM and 5:00 PM</td>
<td>2</td>
</tr>
<tr>
<td>5 hours starting between 5:00 PM and 4:00 AM</td>
<td>1</td>
</tr>
</tbody>
</table>

18. At what time of the day do you think that you reach your “feeling best” peak?

<table>
<thead>
<tr>
<th>Time range</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>5:00 – 8:00 AM</td>
<td>5</td>
</tr>
<tr>
<td>8:00 – 10:00 AM</td>
<td>4</td>
</tr>
<tr>
<td>10:00 AM – 5:00 PM</td>
<td>3</td>
</tr>
<tr>
<td>5:00 – 10:00 PM</td>
<td>2</td>
</tr>
<tr>
<td>10:00 PM – 5:00 AM</td>
<td>1</td>
</tr>
</tbody>
</table>

19. One hears about “morning” and “evening” types of people. Which ONE of these types do you consider yourself to be?

<table>
<thead>
<tr>
<th>Choice</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definitely a “morning” type</td>
<td>6</td>
</tr>
<tr>
<td>Rather more a “morning” than an “evening” type</td>
<td>4</td>
</tr>
<tr>
<td>Rather more an “evening” than a “morning” type</td>
<td>2</td>
</tr>
<tr>
<td>Definitely an “evening” type</td>
<td>0</td>
</tr>
</tbody>
</table>
Appendix E

Duke Health Profile (DUKE)

Instructions: Here are some questions about your health and feelings. Please read each question carefully and check your best answer. You should answer the questions in your own way. There are no right or wrong answers.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>Yes, describes me exactly</th>
<th>Somewhat describes me</th>
<th>No, doesn't describe me at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>I like who I am.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>2.</td>
<td>I am not an easy person to get along with.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>3.</td>
<td>I am basically a healthy person.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>4.</td>
<td>I give up too easily.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>5.</td>
<td>I have difficulty concentrating.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>6.</td>
<td>I am happy with my family relationships.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>7.</td>
<td>I am comfortable being around people.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

**TODAY** would you have any physical trouble or difficulty:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>None</th>
<th>Some</th>
<th>A Lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>Walking up a flight of stairs.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>9.</td>
<td>Running the length of a football field.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

During the **PAST WEEK**: How much trouble have you had with:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>None</th>
<th>Some</th>
<th>A Lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.</td>
<td>Sleeping.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>11.</td>
<td>Hurting or aching in any part of your body.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>12.</td>
<td>Getting tired easily.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>13.</td>
<td>Feeling depressed or sad.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>14.</td>
<td>Nervousness.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

During the **PAST WEEK**: How often did you:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>None</th>
<th>Some</th>
<th>A Lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>15.</td>
<td>Socialize with other people (talk or visit with friends or relatives).</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
<tr>
<td>16.</td>
<td>Take part in social, religious, or recreation activities (meetings, church, movies, sports, parties).</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>

During the **PAST WEEK**: How often did you:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th>None</th>
<th>Some</th>
<th>A Lot</th>
</tr>
</thead>
<tbody>
<tr>
<td>17.</td>
<td>Stay in your home, a nursing home, or hospital because of sickness, injury, or other health problem.</td>
<td>_______</td>
<td>_______</td>
<td>_______</td>
</tr>
</tbody>
</table>
Appendix F

Beck Depression Inventory, Second Edition (BDI-II)

Instructions: This questionnaire consists of 21 groups of statements. Please read each group of statements carefully, and then pick out the **one statement** in each group that best describes the way you have been feeling during the **past 2 weeks, including today**. Circle the number beside the statement you have picked. If several statements in the group seem to apply equally well, circle the highest number for that group. Be sure that you do not choose more than one statement for any group, including Item 16 (Changes in Sleeping Patterns) or Item 18 (Changes in Appetite).

1. Sadness
   0 I do not feel sad.
   1 I feel sad much of the time.
   2 I am sad all the time.
   3 I am so sad or unhappy that I can't stand it.

2. Pessimism
   0 I am not discouraged about my future.
   1 I feel more discouraged about my future than I used to be.
   2 I do not expect things to work out for me.
   3 I feel my future is hopeless and will only get worse.

3. Past Failure
   0 I do not feel like a failure.
   1 I have failed more than I should have.
   2 As I look back, I see a lot of failures.
   3 I feel I am a total failure as a person.

4. Loss of Pleasure
   0 I get as much pleasure as I ever did from the things I enjoy.
   1 I don't enjoy things as much as I used to.
   2 I get very little pleasure from the things I used to enjoy.
   3 I can’t get any pleasure from the things I used to enjoy.

5. Guilty Feelings
   0 I don't feel particularly guilty.
   1 I feel guilty over many things I have done or should have done.
   2 I feel quite guilty most of the time.
   3 I feel guilty all of the time.
6. Punishment Feelings
   0  I don't feel I am being punished.
   1  I feel I may be punished.
   2  I expect to be punished.
   3  I feel I am being punished.

7. Self-Dislike
   0  I feel the same about myself as ever.
   1  I have lost confidence in myself.
   2  I am disappointed in myself.
   3  I dislike myself.

8. Self-Criticalness
   0  I don't criticize or blame myself more than usual.
   1  I am more critical of myself than I used to be.
   2  I criticize myself for all of my faults.
   3  I blame myself for everything bad that happens.

9. Suicidal Thoughts or Wishes
   0  I don't have any thoughts of killing myself.
   1  I have thoughts of killing myself, but I would not carry them out.
   2  I would like to kill myself.
   3  I would kill myself if I had the chance.

10. Crying
    0  I don't cry any more than I used to.
    1  I cry more than I used to.
    2  I cry over every little thing.
    3  I feel like crying, but I can't.

11. Agitation
    0  I am no more restless or wound up than usual.
    1  I feel more restless or wound up than usual.
    2  I am so restless or agitated that it's hard to stay still.
    3  I am so restless or agitated that I have to keep moving or doing something.

12. Loss of Interest
    0  I have not lost interest in other people or activities.
    1  I am less interested in other people or things than before.
    2  I have lost most of my interest in other people or things.
    3  It is hard to get interested in anything.
13. Indecisiveness
   0 I make decisions about as well as ever.
   1 I find it more difficult to make decisions than usual.
   2 I have much greater difficulty in making decisions than I used to.
   3 I have trouble making any decisions.

14. Worthlessness
   0 I do not feel I am worthless.
   1 I don’t consider myself as worthwhile and useful as I used to.
   2 I feel more worthless as compared to other people.
   3 I feel utterly worthless.

15. Loss of Energy
   0 I have as much energy as ever.
   1 I have less energy than I used to have.
   2 I don’t have enough energy to do very much.
   3 I don’t have enough energy to do anything.

16. Changes in Sleeping Pattern
   0 I have not experienced any change in my sleeping pattern.
   1a I sleep somewhat more than usual.
   1b I sleep somewhat less than usual.
   2a I sleep a lot more than usual.
   2b I sleep a lot less than usual.
   3a I sleep most of the day.
   3b I wake up 1-2 hours early and can’t get back to sleep.

17. Irritability
   0 I am no more irritable than usual.
   1 I am more irritable than usual.
   2 I am much more irritable than usual.
   3 I am irritable all the time.

18. Changes in Appetite
   0 I have not experienced any change in appetite.
   1a My appetite is somewhat less than usual.
   1b My appetite is somewhat greater than usual.
   2a My appetite is much less than usual.
   2b My appetite is much greater than usual.
   3a I have no appetite at all.
   3b I crave food all the time.
19. Concentration Difficulty
   0   I can concentrate as well as ever.
   1   I can’t concentrate as well as usual.
   2   It’s hard to keep my mind on anything for very long.
   3   I find I can’t concentrate on anything.

20. Tiredness or Fatigue
   0   I am no more tired or fatigued than usual.
   1   I get more tired or fatigued more easily than usual.
   2   I am too tired or fatigued to do a lot of the things I used to do.
   3   I am too tired or fatigued to do most of the things I used to do.

21. Loss of Interest in Sex
   0   I have not noticed any recent change in my interest in sex.
   1   I am less interested in sex than I used to be.
   2   I am much less interested in sex now.
   3   I have lost interest in sex completely.
Appendix G

State-Trait Anxiety Inventory (STAI), Trait Anxiety, Form Y

How do you generally feel?
1. Not at all; 2. Somewhat; 3. Moderate; 4. Very much

21. I feel pleasant. 1 2 3 4
22. I feel nervous and restless. 1 2 3 4
23. I feel satisfied with myself. 1 2 3 4
24. I wish I could be as happy as others seem to be. 1 2 3 4
25. I feel like a failure. 1 2 3 4
26. I feel rested. 1 2 3 4
27. I am “calm, cool, and collected.” 1 2 3 4
28. I feel difficulties are piling up so that I cannot overcome them. 1 2 3 4
29. I worry too much over something that really does not matter. 1 2 3 4
30. I am happy. 1 2 3 4
31. I have disturbing thoughts. 1 2 3 4
32. I lack self-confidence. 1 2 3 4
33. I feel secure. 1 2 3 4
34. I make decisions easily. 1 2 3 4
35. I feel inadequate. 1 2 3 4
36. I am content. 1 2 3 4
37. Some unimportant thought runs through my mind and bothers me. 1 2 3 4
38. I take disappointments so keenly that I can’t put them out of my mind. 1 2 3 4

39. I am a steady person. 1 2 3 4

40. I get in a state of tension or turmoil over my recent concerns and interests. 1 2 3 4
Appendix H

April 20, 2012

S. Justin Thomas
Department of Psychology
College of Arts & Sciences
The University of Alabama

Re: IRB # 12-OR-140 “A Comprehensive Survey of Sleep Disorders in
College Students: A Study of Prevalence and Outcomes”

Dear Mr. Thomas:

The University of Alabama Institutional Review Board has granted
approval for your proposed research.

Your application has been given expedited approval according to 45 CFR
part 46. You have also been granted the requested waiver of informed
consent. Approval has been given under expedited review category 7 as
outlined below:

(7) Research on individual or group characteristics or behavior
(including, but not limited to, research on perception, cognition,
motivation, identity, language, communication, cultural beliefs or
practices, and social behavior) or research employing survey, interview,
oral history, focus group, program evaluation, human factors evaluation,
or quality assurance methodologies.

Your application will expire on April 19, 2013. If your research will
continue beyond this date, complete the relevant portions of the IRB
Renewal Application. If you wish to modify the application, complete the
Modification of an Approved Protocol Form. Changes in this study
cannot be initiated without IRB approval, except when necessary to
eliminate apparent immediate hazards to participants. When the study
closes, complete the appropriate portions of the IRB Study Closure Form.

Should you need to submit any further correspondence regarding this
proposal, please include the above application number.

Good luck with your research.

Sincerely,

ficiar
UNIVERSITY OF ALABAMA
INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS
REQUEST FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS

I. Identifying Information

Principal Investigator: S. Justin Thomas
Second Investigator: Kenneth L. Lichstein
Third Investigator: Keonna Abdullah
Department: Psychology
College: Arts & Sciences
University: University of Alabama
Address: Box 870348
Tuscaloosa, AL 35487
Telephone: 348-5788
FAX: 348-8648
E-mail: lichstein@un.edu

Principal Investigator: S. Justin Thomas
Second Investigator: Kenneth L. Lichstein
Third Investigator: Keonna Abdullah
Department: Psychology
College: Arts & Sciences
University: University of Alabama
Address: Box 870348
Tuscaloosa, AL 35487
Telephone: 348-5788
FAX: 348-8648
E-mail: lichstein@un.edu

Title of Research Project: A Comprehensive Survey of Sleep Disorders in College Students: A Study of Prevalence and Outcomes

Date Submitted: March 15, 2012
Funding Source: None

Type of Proposal: [ ] New [ ] Revision [ ] Renewal [ ] Completed [ ] Exempt

Please attach a renewal

II. NOTIFICATION OF IRB ACTIONS TO BE COMPLETED BY IRB
Type of Review: [ ] Full board [x] Expedited
IRB Action:
[ ] Rejected
[ ] Tabled Pending Revisions
[ ] Approved Pending Revisions
[ ] Approved—this proposal complies with University and federal regulations for the protection of human subjects.

Approval is effective until the following date: 4/19/13.

Items approved:

Approval signature:

64
AAHRPP DOCUMENT #192
UNIVERSITY OF ALABAMA
HUMAN RESEARCH PROTECTION PROGRAM
PARTICIPANT INFORMATION SHEET

Study title: A Comprehensive Survey of Sleep Disorders in College Students: A Study of Prevalence and Outcomes

Investigator’s Name, Position, Faculty or Student Status: S. Justin Thomas,
Department of Psychology Clinical Health Graduate Student

Institution: University of Alabama

You are invited to participate in a research study. This study is called “Sleep in College Students.” The study is being conducted by S. Justin Thomas, who is a graduate student in the Department of Psychology at the University of Alabama. Justin Thomas is being supervised by Kenneth Lichstein, Ph.D. who is a professor of psychology at the University of Alabama. Justin Thomas is not being paid for this study. It is his doctoral dissertation. He is not developing a product to be sold, and he has no conflicts of interest.

What is this study about? What is the investigator trying to learn?
This study is being done to look at the prevalence and outcomes of sleep disorders in college students.

Why is this study important or useful?
There is little research on formal sleep disorders in college students and their outcomes. It has been documented that students exhibit sleep symptoms consistent with the general population. Additionally, these symptoms may significantly impact the mental and physical health and academic performance of college students.

Why have I been asked to be in this study?
You may have been asked to be in this study as part of the Psych 101 subject pool. If you are not receiving class credit, you have been asked to participate in this study because you meet some of the basic inclusion criteria.

How many people will be in this study?
Approximately 200 people will participate in this study.

What will I be asked to do in this study?
You will first fill out a demographic questionnaire. This questionnaire will determine whether you meet criteria for the study. If you do not meet criteria, you will not be able to take part in the study. Your name will be deleted from our database so that your information cannot be traced to you. However, you will still receive 1 credit for the

UA IRB Approved Document
Approval date: 4/19/12
Expiration date: 4/18/13
Subject Pool. This demographic information will be used to provide information about the total number of volunteers and to determine the main reasons any volunteers were excluded. If you do meet criteria for the study, you will receive an email within one week with instructions.

If you meet the criteria and agree to be in this study, you will be asked to do these things:
- Fill out a few initial questionnaires about your sleep, physical health, and mood.
- Fill out brief questionnaires each morning for 2 weeks about your sleep the previous night.

How much time will I spend being in this study? Completing this study will take you about 60 minutes over the course of 2 weeks.

Will being in this study cost me anything? No.

Will I be compensated for being in this study? If you are in the Psych 101 subject pool, you will be given 1 credit for completing the screening questionnaire. If you meet inclusion criteria, you will receive up to 2 more credits for participating in the main portion of study. A total of 3 credits are possible for completion of this study. You may not receive class credit for your participation in more than one class. Also, you may not participate in this study more than once.

Can the investigator take me out of this study? The investigator may take you out of the study if he feels that you no longer meet the study requirements. If you do not complete the questionnaires, you may be taken out of the study.

What are the risks (dangers or harms) to me if I am in this study? There are no known risks associated with participating in this study.

What are the benefits (good things) that may happen if I am in this study? There are no direct benefits to you.

What are the benefits to science or society? The results of this study will increase our knowledge about sleep problems in college students. It may also lead to additional research that could improve the treatment of sleep problems in college students.

How will my privacy be protected? You will be asked a number of questions about your contact information, your physical characteristics (e.g., height, weight, ethnicity), your sleep habits, and your physical and mental health history. Because the questionnaires are all online, you may answer the questions in the privacy of your own home. If you are uncomfortable answering these questions, you may choose to end your participation in the study.

UA IRB Approved Document
Approval date: 4-28-12
Expiration date: 4-19-13
If, during the course of this study, you express any intent to harm yourself or another person, the investigators are required to report this. Additionally, if you report severe symptoms of depression and/or anxiety, you will be referred for appropriate mental health care.

How will my confidentiality be protected?
For all the questionnaires you will use a participant ID number to identify yourself rather than your name. You should store your ID number in a safe place. When you submit your responses to the online questionnaires, they will be saved in Google Documents. Any correspondence that you have with the researchers will be through a Gmail account set up specifically for this study. Only the principle investigator, his supervisor, and research assistants approved by the Institutional Review Board will have access to this account.

What are the alternatives to being in this study? Do I have other choices?
If you are in the Psych 101 subject pool, the alternative to being in this study is to participate in a different study or to choose the designated alternative assignment for course credit.

What are my rights as a participant in this study?
Taking part in this study is voluntary; you can refuse to participate. If you start the study, you can stop at any time. There will be no effect on your relations with the University of Alabama. Please note that you must complete the study to receive class credit for PY 101.

The University of Alabama Institutional Review Board ("the IRB") is the committee that protects the rights of people in research studies. The IRB may review study records from time to time to make sure that people in research studies are being treated fairly and that the study is being carried out as planned.

Who do I call if I have questions or problems?
If you have questions about the study right now, please ask them before completing the consent. If you have questions, concerns, or complaints about the study later on, please call Justin Thomas at (205) 348-5788 or e-mail him at uasleepdissertation12@gmail.com.

If you have questions about your rights as a person in a research study, call Ms. Tanta Myles, the Research Compliance Officer of the University, at 205-348-8461 or toll-free at 1-877-820-3066.

You may also ask questions, make suggestions, or file complaints and concerns through the IRB Outreach website at http://osp.ua.edu/site/PRCO_Welcome.html or email us at participantoutreach@bama.ua.edu.
After you participate, you are encouraged to complete the survey for research participants that is online at the outreach website or you may ask the investigator for a copy of it and mail it to the University Office for Research Compliance, Box 870104, 152 Rose Administration Building, Tuscaloosa, AL 35487-0104.

**Will I be contacted to participate in future research?**
No, once your participation in this study is complete, you will not be contacted in the future.

**NOTES:**
Flesch Reading Ease – 58.1
Flesch-Kincaid Grade Level – 9.1
Appendix I

Clinical Interview Based On The International Classification of Sleep Disorders, 2nd Edition

Insomnia

1. Do you have trouble falling asleep, staying asleep, or both?
2. Do you have trouble waking up too early?
3. How long have you experienced difficulties sleeping?
4. How much time do you spend attempting to sleep? Do you feel this amount of time is sufficient?
5. If you have trouble falling asleep or staying asleep, how do you typically feel the next morning, day, and evening?
6. Do you worry about being able to sleep or how you might feel/perform the day after a poor night’s sleep?

Sleep Related Breathing Disorders

1. Do you wake yourself up snoring or gasping for breath?
2. Have others told you that you snore at night? If so, how loudly?
3. Have others told you that you have pauses in your breathing at night?
4. Do you wake up in the morning with a headache or dry mouth?
5. Do you feel excessive fatigue and/or sleepiness during the day?
6. Have you had a sleep study? If so, what was the result?
Hypersomnia of Central Origin…

1. Do you frequently experience excessive daytime sleepiness? If so, how long have you experienced these symptoms?

2. How much time do you spend attempting to sleep? Do you feel this amount of time is sufficient?

3. If insufficient sleep, how much time do you prefer to spend sleep? Specifically, if it were not for school (e.g., weekends or vacation), what would be your preferred bedtime, waketime, and total amount of sleep needed to feel rested?

4. What is the quality of your sleep?

5. Do you experience sleep paralysis (explain phenomenon)? If so, how often and how severe?

6. Do you experience hypnogogic/hypnopompic hallucinations (explain phenomenon)? If so, how often and how severe?

7. Do you experience cataplexy (explain phenomenon)?

Circadian Rhythm Sleep Disorders

1. Do you tend to sleep at your preferred sleep time? If not, what would be your preferred bedtime and waketime?

2. If you go to bed earlier than you prefer, do you find it difficult to fall asleep?

3. Do you also find it difficult to wake up in the mornings, particularly if you have an early class?

Parasomnias
1. Do experience any unusual behaviors during sleep (e.g., sleepwalking, sleep talking, etc.)?
2. If so, describe the event and when it typically occurs.
3. When did these behaviors begin and how long have you experienced them?

Sleep Related Movement Disorders
1. Do you experience any unpleasant sensations (e.g., a “creepy crawly” sensation) in your legs, particularly when you lie down to go to sleep?
2. If so, please describe the sensation, when it occurs, and how often you experience these sensations.
3. Do you feel the urge to move your legs when you are experiencing these sensations? If so, does movement alleviate the sensations?

Environmental Sleep Disorder
1. If you experience sleep complaints, are they primarily due to an environmental factor (e.g., dorm noise) that disturbs your sleep?