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Evaluating the Effect of Sleep Hygiene Education on Sleep Quality Among First-Year College Students

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By

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Abstract

Background: The American Academy of Sleep Medicine recommends college students should get seven to nine hours of sleep each night. Only one-third currently meet this recommendation. Poor sleep negatively affects academic performance, mood, and interpersonal relationships. Sleep hygiene is recommended to improve sleep quality and quantity.

Purpose: The purpose of this DNP project was to determine the effect of implementing a sleep hygiene educational intervention in classes intended for first-year college students at the University of Kentucky.

Methods: This quasi-experimental project utilized the Pittsburg Sleep Quality Index to assess participants' sleep before an in-person sleep hygiene education and after implementing an individualized sleep hygiene tip. Follow-up surveys were sent to participants at four and 12 weeks.

Results: A total of 51 participants completed the pre-test, and two participants completed the first of two post-tests. A majority were 18 years old, female, living on campus, and unemployed. On average, participants took 28 minutes to fall asleep and slept 6-7 hours of sleep each night. Ninety-two percent of pre-test scores indicated poor sleep quality.

Conclusions: An overwhelming majority of participants do not get adequate, quality sleep each night. When compared to the national average, first-year UK students experience a higher prevalence of short sleep duration. Sleep hygiene can help improve sleep quality and quantity for this population, but timeliness of implementation and follow-up is essential for better data collection and statistical analysis.

Keywords: sleep hygiene intervention, sleep hygiene education, college students

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Background and Significance

The average person spends at least one-third of life asleep. Sleep is the time for our bodies to grow, heal, and rest, so it should be no surprise that sleep is vital to good health. Conversely, lack of quality sleep leads to poor health outcomes both in the short-term and long-term. The National Sleep Foundation, the American Academy of Sleep Medicine, and the Sleep Research Society (Hirshkowitz et al., 2015; Watson et al., 2015) recommend seven to nine hours of sleep each night for young adults aged 18-25 years. However, adequate sleep is a problem for all adults nationwide. The Centers for Disease Control and Prevention ([CDC], 2022b) collected surveillance data and found that 29.7% of adults aged 18-24 years experience short sleep duration, defined as less than seven hours per night. Kentucky's prevalence is worse, at 40.5% of young adults not getting enough sleep (CDC, 2022b). Among college students, as many as 70% do not get a full eight hours of sleep each night (Hershner & Chervin, 2014). Through their research, Lund and colleagues (2010) were able to classify 60% of college students as poor sleepers.

A variety of factors, including change in circadian rhythm, academic transition from high school to college, and evolving social goals influence how much sleep a first-year college student gets each night (Hershner & Chervin, 2014). Alcohol, energy drinks, stimulants, and technology also affect sleep quality. There are physical, mental, emotional, and psychological benefits to getting adequate quality sleep, and these benefits are both short-term and long-term. Conversely, a night of inadequate sleep negatively impacts a student's ability to learn, remember, and perform in class (Hershner & Chervin, 2014). There is a positive association between sleep patterns and GPA (Hershner & Chervin, 2014). Poor sleep worsens mood and leads to depressive symptoms (Hershner & Chervin, 2014; Dinis & Bragança, 2018). Daytime sleepiness in class is

often due to sleep deprivation (Hershner & Chervin, 2014). Beyond the classroom, drowsy driving puts young adults at increased risk for motor vehicle accidents (National Highway Traffic Safety Administration, n.d.).

In the long-term, prolonged sleep deprivation can result in a chronic sleep disorder (Liu et al., 2016). Chronic sleep deprivation increases a person's risk of developing cardiovascular disease, diabetes, obesity, and mood disorders (CDC, 2022a). For college students, chronic disease may still seem like a problem for the future, but research is drawing the connection between sleep habits today and morbidity and mortality later in life (Liu et al., 2016). Adequate sleep is such a key health behavior in preventing chronic disease that researchers have included it as a Healthy People 2030 topic with multiple prevalence goals (U.S. Department of Health and Human Services, n.d.). Sleep hygiene education is one approach to improving sleep quality and decreasing sleep deprivation, although there is little research available on the short- and long-term effects of educational intervention in this age group (Hershner & Chervin, 2014).

Purpose and Objectives

The purpose of this DNP project was to determine the effect of implementing a sleep hygiene educational intervention in classes intended for first-year college students at the University of Kentucky (UK).

The objectives for this project were as follows:

1. Evaluate first-year UK students' sleep quality compared to the national average for young adults.
2. Implement a sleep hygiene educational intervention.
3. Evaluate sleep quality scores before and after intervention.
4. Evaluate number of hours slept before and after intervention.

Review of Literature

Sleep hygiene, defined as healthy sleep habits to fall asleep and stay asleep, has long been a practice to address inadequate sleep (American Academy of Sleep Medicine, 2021; Gigli & Valente, 2012). Search strategies started with the CDC for national and statewide statistics on sleep quality and prevalence of sleep disorders, followed by a review of sleep statistics from the most recent National College Health Assessment, produced by the American College Health Association (2022). Databases used for article retrieval were PubMed and CINAHL; search terms included sleep hygiene intervention, sleep hygiene education, sleep quality, college, and undergraduate. This yielded over 30 articles.

After excluding for articles with only the abstract available, that included ages beyond young adults, and that were published before the year 2000, a total of seven articles were included in the literature review. Six were randomized controlled trials (RCTs), and one was a systematic review. All articles focused on college/university or young adult participants. Among the RCTs, sample size ranged from 78 participants to 551 participants; all reported one or more statistically significant result with future study recommendations. Of the seven articles reviewed, three incorporated health belief theories (Gispon et al., 2021; Kor & Mullan, 2011; Mead & Irish, 2020). Five of the RCTs utilized some form of sleep hygiene education as their intervention (Barber & Cucalon, 2017; Brown et al., 2006; Gipson et al., 2021; Hershner & O'Brien, 2018; Lillehei et al., 2015), while the sixth used a self-regulation response inhibition intervention in addition to sleep and behavioral questionnaires to elicit results (Kor & Mullan, 2011).

This literature review showed low awareness and knowledge of sleep hygiene among young adults. Effective interventions to address this include an educational intervention

grounded in behavioral theory. Future research must determine the best intervention format and behavioral theory to utilize when addressing the unique environment, expectations, and practices of this age group. The proposed practice change was to incorporate theory-based, individualized sleep hygiene education into the course materials of two classes, UK 101 and NUR 101.

Theoretical Model

The health belief model (HBM) guided this intervention. The HBM focuses on health motivation to change health behaviors. The goal of the model is to examine the reasons why individuals either accept or reject beneficial health behaviors, by way of six concepts: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Glanz et al., 2018). This model served as the framework for the development of the sleep hygiene educational intervention. Tailoring to the developmental stage of young adults, the intervention highlighted susceptibility (e.g., academic performance), short-term and long-term severity of inadequate sleep, benefits beyond the classroom, situation-specific barriers (e.g., social goals, circadian rhythm, class start time, and screen time), and self-efficacy by providing a variety of easy-to-implement and easy-to-individualize sleep hygiene tips. The intervention served as the cue to action.

Methods

Design

This quality improvement project used a quasi-experimental pre-test/post-test design. Follow-up occurred at four weeks and 12 weeks post-intervention. There was no control group and thus no randomization.

Setting

Agency Description

This DNP project was conducted at a large university with 6,437 "first time in college" students enrolled in the 2023 fall semester (UK, n.d.-a). "First time in college" included all students seeking a degree at the undergraduate level for the first time. UK 101 is a course designed to help first-year students adjust to college life. Course material includes history of the university, tips to be successful in the classroom, and a thorough introduction to campus resources. NUR 101 is very similar in course content with the addition of presenting nursing as a profession; it is designed for pre-nursing students.

Congruence of Project to Selected Agency's Mission

The mission of both the Office for Student Success and the College of Nursing is to "support students" and "promote health and well-being" through education, collaboration, and "national best practice" (UK, n.d.-b; UK College of Nursing, n.d.). To help achieve this mission, UK 101 courses dedicate one week to self-care practices. Similarly, NUR 101 courses include sleep as a pillar in their student success model. It was here that the sleep hygiene education was implemented into these courses. This project focused on students during the first few months of their college experience on campus to equip them with foundational tools for quality sleep.

Description of Stakeholders

The main stakeholders of this DNP project were the Office of Student Success and the College of Nursing. Specifically, stakeholders included the faculty and staff involved in developing course content for UK 101 and NUR 101 courses. These stakeholders reviewed and approved the project design before initiation and were able to provide feedback during the intervention and after implementation. At the conclusion of the project, they were given the

option to incorporate the presentation into course curriculum long-term. Student participants in these courses also served as major stakeholders.

Site-Specific Facilitators and Barriers to Implementation

Facilitators for this project included professors and instructors who teach UK 101 and NUR 101. The professors and instructors were supportive of the project and implementation of the education in the courses. They were easy to work with and reviewed content prior to implementation. A potential barrier was participant willingness to engage. To address this, an introductory video of the DNP student facilitator was sent out with the pre-test to personalize the invitation to participate. The hope was, that by putting a face with the name, students would develop interest in joining a graduate student's project.

Sample

The project population consisted of first-year college students at UK enrolled in one of 14 two-credit hour UK 101 sections or one of six participating NUR 101 sections. Inclusion criteria required participants to be in their first semester of college, aged 18-26 years, and enrolled in either a UK 101 or NUR 101 course that met on campus. Sampling was not randomized within these criteria because it was externally influenced by the professors and instructors whose sections were approved for project incorporation. Exclusion criteria included upperclassmen, teacher assistants, peer mentors, first-year students not enrolled in a UK 101 or NUR 101 course, and students enrolled in a UK 101 or NUR 101 course in an exclusively online format.

Procedure

IRB Approval

This project was submitted to UK's medical Institutional Review Board (IRB) for expedited review to ensure the safety of human subjects. IRB approval was issued on September 27, 2023.

Evidence-Based Intervention

The literature review conducted for this project demonstrated that the Pittsburg Sleep Quality Index (PSQI)—an evidence-based tool, can be used to measure improvements in sleep quality following sleep hygiene intervention. The pre-test included demographic data and the PSQI to measure baseline sleep quality. One week after students received the pre-test, the DNP student facilitator gave an in-person sleep hygiene presentation. Education included a definition of sleep hygiene, national and state data on sleep quality, sleep recommendations for this age group, benefits of quality sleep, and basic sleep hygiene tips. The presentation averaged 11 minutes and included digital media as well as a paper handout summarizing the presentation for participants to take home. Participants chose one or two sleep hygiene tips to incorporate into their nighttime routines. They recorded what tips they incorporated and how many hours of sleep they got every night for four weeks. The first post-test was made available on UK's online learning management system, Canvas, four weeks after the presentation. Participants were asked which tips they incorporated into their nighttime routines, what they learned or enjoyed from the presentation, and what suggestions they had for future projects, and then they were asked to complete the PSQI again. The second post-test was made available on Canvas 12 weeks after the presentation. Participants were asked if they were able to form better sleep habits with their chosen sleep hygiene tips and to complete the PSQI for a third and final time.

Measures and Instruments

As part of the pre-test, students answered basic demographic questions for enhanced data analysis. These questions covered age, gender, course and section (i.e., UK 101 or NUR 101), major, housing status, and work status. This DNP project measured sleep quality using the PSQI (see Appendix C). The PSQI is an evidence-based tool comprised of nine questions to assess adults' sleep quality (Buysse et al., 1989). This questionnaire asks participants to assess their sleep over the past month. A score of five or more indicates poor sleep quality. The higher the score, the worse the sleep quality. This instrument has an internal reliability of α=0.83, a test-retest reliability of 0.85, a sensitivity of 89.6%, and a specificity of 86.5% (Shahid et al., 2012).

Data Collection

Data collection was electronic. Pre-tests and post-tests were formatted through the online survey system Qualtrics. The DNP student shared the pre-test link with professor and instructor stakeholders one week prior to their section's in-person educational intervention; these professors/instructors shared the link via a Canvas announcement. In the same manner, the post-tests were shared at the four-week and 12-week marks for each section. Because the DNP student facilitator presented in person, participation was confidential but not anonymous. Each participant was referenced by their unique identifier during data collection and data analysis; student names were not used. All data collected was kept confidential and stored on an encrypted and password-protected personal laptop.

Data Analysis

The survey results were collected and analyzed using IBM SPSS version 29. Because only two participants completed the first post-test and there were no responses to the second

post-test, descriptive statistics were calculated for forecasting first-year UK students' sleep quality (see Tables 2 and 3).

Results

Of the 322 potential participants the DNP student facilitator presented to, 51 agreed to participate by completing the pre-test survey. Response rate was 15.84%. Most participants were 18 years old (82%) and female (82%). Over 80% lived on-campus, and of this group, 45% shared a bedroom with a roommate and 39% had a private bedroom. Three quarters of participants were not employed (see Table 1).

Over three-quarters of participants (76.0%) went to bed between 10:00PM and midnight. The group averaged 28 minutes to fall asleep and slept 6-7 hours of sleep each night. Typical wake time was 8:00AM. When asked how often they "cannot get to sleep within 30 minutes," 23 (45.1%) of participants answered once or more than once a week (see Appendix C). Forty participants (78.5%) endorsed waking up in the middle of the night or early morning at least once in the past month. Over half (56.9%) of participants had gotten up to use the bathroom in the middle of the night. A majority denied trouble sleeping related to inability to breathe comfortably (80.4%) or coughing or snoring loudly (74.5%). Forty-two participants (82.4%) reported trouble sleeping because they felt too hot.

When asked to provide reasons for trouble sleeping not already covered by the PSQI tool, participants listed loud noises and roommates, other medical diagnoses, anxiety about schoolwork, and staying out late with friends. In the past month, 12 participants (23.5%) had taken prescribed and/or over-the-counter medicine at least once to help aid their sleep. Over half (56.9%) endorsed having "trouble staying awake while driving, eating meals, or engaging in social activity" (see Appendix C). An overwhelming majority (90.3%) reported struggling "to

keep up enthusiasm to get things done" (see Appendix C). Only 3.9% of participants rated their sleep as very good. Most participants rated their sleep as fairly good (64.7%) or fairly bad (27.5). The minimum PSQI score from the pre-tests was 3.0, and the maximum score was 17.0. Out of the 51 participants, 47 (92.2%) scored a five or greater, indicating poor sleep quality. The mean PSQI score from the pre-tests was 7.7 (SD+/-2.85). The mean PSQI score from the first post-test was 7.0 (SD+/-2.83).

Discussion

This project aimed to evaluate first-year UK students' sleep quality compared to the national average for young adults and to evaluate sleep quality scores and number of hours slept before and after a sleep hygiene educational intervention. It is evident from the pre-test results that quality sleep is a big problem for first-year UK students. The number of PSQI scores indicating poor sleep quality was more than one-and-a-half times higher than previously reported among college students (Lund et al., 2010). The average number of hours slept each night was less than the minimum nightly sleep hours recommended for this age group. For the two participants who completed the first post-test, there was a downward trend in PSQI scores when comparing pre-test to post-test, both as a whole and when matching individuals' pre-tests to post-tests.

Pre-test PSQI scores were higher than expected. Almost as high as the poor sleep quality score was the number of students responding yes to "struggling to keep enthusiasm to get things done" at least once in the past month. However, the majority rated their overall sleep as fairly to very good. This difference suggests that there are factors beyond sleep that impact a student's enthusiasm. Participant answers are likely influenced by mental health, as there is a connection between depressive symptoms and sleep (Hershner & Chervin, 2014; Dinis & Bragança, 2018).

It is also noted that lack of enthusiasm could be related to academic stress. Sleep deteriorates as the semester progresses (Brown et al., 2006; Hershner & O'Brien, 2018). A more surprising finding for this age group was the number of participants who got up to use the bathroom during the night. Primary nocturia is not a common disorder in this age group, which leads the DNP student facilitator to believe that this finding is likely related to oral intake close to bedtime. Caffeine, energy drinks, and alcohol are drinks consumed at this age. Stopping caffeine intake by two o'clock in the afternoon and cutting back on all fluid intake 30-60 minutes before bedtime were two tips discussed during the sleep hygiene presentation.

In evaluating project impact, the topic was well received both in the process of approval as well as implementation, and sleep hygiene education flowed nicely with content already in place in UK 101 and NUR 101. Facilitators had the option to continue using the PowerPoint presentation in future semesters. The simplicity of sleep hygiene education allows for repeated and cyclical implementation of sleep hygiene interventions in both academic and primary care settings. If repeated by future DNP students, this project could take on more of a Plan, Do, Study, Act approach. The next cycle should continue implementation of sleep hygiene education in these courses but start earlier in the semester and include follow-up in person. If continued, there is strong potential to positively impact students' health and wellbeing through repeated intervention and follow-up.

Implications for Practice, Education, Policy, and Research

This DNP project had few cost implications for implementation; the main cost was personal time spent presenting (for the DNP student facilitator) and completing the pre-test and post-tests (for participants). If future DNP students build on this project by incorporating technological components, costs will increase. Additionally, University Health Services may

choose to add the PSQI to their arsenal of screening tools to assess college students. The annual cost of the PSQI tool begins at $5,000 for licensing fee. As previously mentioned, there is a positive association between sleep patterns and GPA; thus, when sleep patterns are poor, a student's GPA can suffer. In severe cases, this could mean failing and having to repeat one or more courses. According to UK's Student Account Services, one semester of tuition and fees for a full-time undergraduate resident student is $6,606.00; per credit hour, this equates to $541.00 (UK, n.d.-c). For most students, this would be a significant financial burden and could extend their college course beyond the typical four years.

While this DNP project focused on first-year college students, findings can be translated into the primary care setting. Most young adults in college either utilize student health services or are in the process of switching from their pediatrician to an adult primary care provider. Likewise, for a patient in their 20s, many of their annual physical exams focus on and are coded as disease prevention and health promotion. This is the ideal time to ask and assess patients' sleep habits and to highlight the important role quality sleep plays in future health. The PSQI is a validated tool that is quick and simple for students and patients to complete. While scoring takes a few minutes, it is straightforward in identifying persons who have poor sleep quality. More detailed scoring can give healthcare providers an idea of the potential medical cause(s) for poor sleep, thus helping to differentiate between poor sleep habits and diagnosable sleep disorders. When analyzing costs, Huyett & Bhattacharyya (2021) calculated that sleep disorders cost the U.S. healthcare system roughly 94.9 billion dollars annually, and it is assumed that this number is an underestimation. While not all chronic sleep disorders are preventable with good sleep behaviors, a good portion can be, or, at least improved.

Even though it is unlikely that sleep hygiene will have a place in health policy, adjacent topics such as drowsy driving have implications for the legal system. Over half of participants endorsed feeling sleepy behind the wheel at least once in the past month. Future sleep hygiene research could focus on this avenue in hopes of bringing increased awareness to drowsy driving as a safety risk for college students in their communities. More research is needed to determine which educational and interventional formats work best for college students as well as if certain sleep hygiene tips appear to be more applicable to this age group.

Limitations

There were a few limitations identified in this DNP project. Firstly, the design utilized a self-reporting tool. Because answers were subjective, there was potential for overreporting or underreporting responses. Secondly, sample size and response rate were insufficient for completing statistical analysis, which limits both translation and generalizability of findings. Low response rate was likely due to multiple factors. If this project is replicated in the future, incentives to participate should be considered.

Thirdly, to ensure confidentiality and to avoid additional review board permission, the DNP student facilitator did not have access to participant information such as student IDs and email addresses. This led to the DNP student facilitator relying on faculty to pass along all announcements and information including links to the introduction video and links to pre-test and post-tests. All participating faculty agreed to this communication format ahead of time; however, it still left room for variation in how and when information was presented to participants. Because the DNP student facilitator was only present for the actual in-person presentation, she was unaware if class time was provided to fill out pre-test and post-tests.

Lastly, perhaps the biggest limitation of this project was timing. Most of the in-person presentations occurred during weeks eight and 11 of the semester. While this worked for the semester calendar, it was not ideal for project purposes, as a majority of first post-test follow-up occurred during Thanksgiving break or final exams and all second post-test follow-up occurred after the conclusion of the semester. If there had been more time to receive IRB approval, the education could have occurred at a different time in the semester. This may have resulted in a larger sample.

Conclusion

In summary, sleep deprivation can lead to poor academic performance and chronic health conditions. Sleep hygiene education is an evidence-based practice used to increase both the quality and number of hours slept. To date, this is the first known project at UK to incorporate sleep hygiene into course materials. Pre-test PSQI scores demonstrate that poor sleep quality is very prevalent among first-year students at UK. Improving the sleep quality of students during their first year on campus can positively impact their academic performance throughout undergraduate school. Therefore, sleep hygiene education should be incorporated into standard curriculum. Similarly, providers in both primary care settings and student health services should continue to promote health by asking about sleep habits and utilizing sleep hygiene to equip students and patients alike with a key health behavior known to improve wellbeing and protect against chronic disorders.

References

American Academy of Sleep Medicine. (2021, April 2). *Healthy sleep habits.* Sleep Education. https://sleepeducation.org/healthy-sleep/healthy-sleep-habits/

American College Health Association. (2022). National college health assessment III: Undergraduate student reference group executive summary spring 2022. Silver Spring, MD: American College Health Association; 2022. Retrieved on February 18, 2023, from https://www.acha.org/documents/ncha/NCHA-III_SPRING_2022_UNDERGRAD_REFERENCE_GROUP_EXECUTIVE_SUMMARY.pdf

Barber, L. K., & Cucalon, M. S. (2017). Modifying the sleep treatment education program for students to include technology use (STEPS-TECH): Intervention effects on objective and subjective sleep outcomes. *Stress and Health*, *33*, 684–690. https://doi.org/10.1002/smi.2746

Brown, F. C., Buboltz, W. C., & Soper, B. (2006). Development and evaluation of the sleep treatment and education program for students (steps). *Journal of American College Health*, *54*(4), 231–237. https://doi.org/10.3200/jach.54.4.231-237

Buysse, D. J., Reynolds, C. F., 3rd, Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry research*, *28*(2), 193–213. https://doi.org/10.1016/0165-1781(89)90047-4

Centers for Disease Control and Prevention. (2022a, September 13). *Sleep and chronic disease*. Centers for Disease Control and Prevention. https://www.cdc.gov/sleep/about_sleep/chronic_disease.html

Centers for Disease Control and Prevention. (2022b, November 2). *Adults - sleep and sleep disorders*. Centers for Disease Control and Prevention. https://www.cdc.gov/sleep/data-and-statistics/adults.html

Dinis, J., & Bragança, M. (2018). Quality of sleep and depression in college students: A systematic review. *Sleep Science, 11*(4), 290-301. https://doi.org/10.5935/1984-0063.20180045

Gigli, G. L., & Valente, M. (2012). Should the definition of "sleep hygiene" be antedated of a century? A historical note based on an old book by Paolo Mantegazza, rediscovered. *Neurological Sciences*, *34*(5), 755–760. https://doi.org/10.1007/s10072-012-1140-8

Gipson, C. S., Chilton, J. M., & Stocks, E. (2021). Refinement and psychometric properties of the self-efficacy for sleep hygiene inventory. *Western Journal of Nursing Research*, *43*(2), 156–162. https://doi.org/10.1177/0193945920940977

Glanz, K., Burke, L. E., & Rimer, B. K. (2018). Chapter 11: Health Behavior Theories. In *Philosophies and theories for Advanced Nursing Practice* (pp. 241–266). essay, Jones & Bartlett Learning.

Hershner, S., & Chervin, R. (2014). Causes and consequences of sleepiness among college students. *Nature and Science of Sleep*, 73–84. https://doi.org/10.2147/nss.s62907

Hershner, S., & O'Brien, L. M. (2018). The impact of a randomized sleep education intervention for college students. *Journal of Clinical Sleep Medicine*, *14*(03), 337–347. https://doi.org/10.5664/jcsm.6974

Hirshkowitz, M., Whiton, K., Albert, S. M., Alessi, C., Bruni, O., DonCarlos, L., Hazen, N., Herman, J., Katz, E. S., Kheirandish-Gozal, L., Neubauer, D. N., O'Donnell, A. E., Ohayon, M., Peever, J., Rawding, R., Sachdeva, R. C., Setters, B., Vitiello, M. V., Ware, J. C., & Adams Hillard, P. J. (2015). National Sleep Foundation's sleep time duration recommendations: Methodology and results summary. *Sleep Health*, *1*(1), 40–43. https://doi.org/10.1016/j.sleh.2014.12.010

Huyett, P., & Bhattacharyya, N. (2021). Incremental health care utilization and expenditures for sleep disorders in the United States. *Journal of Clinical Sleep Medicine*, *17*(10), 1981–1986. https://doi.org/10.5664/jcsm.9392

Kor, K., & Mullan, B. A. (2011). Sleep hygiene behaviours: An application of the theory of planned behaviour and the investigation of perceived autonomy support, past behaviour and response inhibition. *Psychology and Health*, *26*(9), 1208–1224. https://doi.org/10.1080/08870446.2010.551210

Lillehei, A. S., Halcón, L. L., Savik, K., & Reis, R. (2015). Effect of inhaled lavender and sleep hygiene on self-reported sleep issues: A randomized controlled trial. *The Journal of Alternative and Complementary Medicine*, *21*(7), 430–438. https://doi.org/10.1089/acm.2014.0327

Liu, Y., Croft, J. B., Wheaton, A. G., Kanny, D., Cunningham, T. J., Lu, H., Onufrak, S., Malarcher, A. M., Greenlund, K. J., & Giles, W. H. (2016). Clustering of five health-related behaviors for
chronic disease prevention among adults, United States, 2013. *Preventing Chronic Disease*, *13*. https://doi.org/10.5888/pcd13.160054

Lund, H. G., Reider, B. D., Whiting, A. B., & Prichard, J. R. (2010). Sleep patterns and predictors of disturbed sleep in a large population of college students. *Journal of Adolescent Health*, *46*(2), 124 132. https://doi.org/10.1016/j.jadohealth.2009.06.016

Mead, M. P., & Irish, L. A. (2020). Application of health behaviour theory to sleep health improvement. *Journal of Sleep Research*, *29*(5). https://doi.org/10.1111/jsr.12950

National Highway Traffic Safety Administration. (n.d.). *Teen driving.* NHTSA. Retrieved September 28, 2023, from https://www.nhtsa.gov/road-safety/teen-driving

Shahid, A., Wilkinson, K., Marcu, S., & Shapiro, C. M. (2012). 67: Pittsburg Sleep Quality Index (PSQI). In *STOP, THAT, and one hundred other sleep scales* (pp. 279–283). essay, Springer.

UK College of Nursing. (n.d.). *Mission and vision*. Mission and Vision | College of Nursing. Retrieved March 11, 2024, from https://nursing.uky.edu/about-us/mission-vision-values

University of Kentucky. (n.d.-a). *Enrollment & demographics*. UK Institutional Research, Analytics, and Decision Support. Retrieved March 11, 2024, from https://www.uky.edu/irads/enrollment-demographics

University of Kentucky. (n.d.-b). *Office of the vice president*. Office of the Vice President | Student Success. Retrieved March 11, 2024, from https://studentsuccess.uky.edu/office-vice-president

University of Kentucky. (n.d.-c). *Tuition and fees 2023-2024.* Student Account Services. Retrieved March 12, 2024, from https://www.uky.edu/studentaccount/tuition

U.S. Department of Health and Human Services. (n.d.). *Sleep*. Sleep - Healthy People 2030. https://health.gov/healthypeople/objectives-and-data/browse-objectives/sleep

Watson, N. F., Badr, M. S., Belenky, G., Bliwise, D. L., Buxton, O. M., Buysse, D., Dinges, D. F., Gangwisch, J., Grandner, M. A., Kushida, C., Malhotra, R. K., Martin, J. L., Patel, S. R., Quan, S. F., & Tasali, E. (2015). Recommended amount of sleep for a healthy adult: A joint consensus statement of the American Academy of Sleep Medicine and Sleep Research Society. *Journal of Clinical Sleep Medicine*, *11*(06), 591–592. https://doi.org/10.5664/jcsm.4758

Table 1. ***Demographics,*** **(*N*=51)**

	n (%)
Age	
18	42 (82.4%)
19	9 (17.6%)
Gender	
Male	8 (15.7%)
Female	42 (82.4%)
Other	1 (2.0%)
Housing Status	
On-campus with private bedroom	20 (39.2%)
On-campus with shared bedroom	23 (45.1%)
Off-campus with private bedroom	8 (15.7%)
Work Status	
Full-time employment	1 (2.0%)
Part-time employment	12 (23.5%)
Not currently employed	38 (74.5%)

Table 2. ***Bedtimes by hour,*** **(*n*=50)**

Time	*n* (%)
10:00PM	4 (8.0%)
11:00PM	18 (36.0%)
12:00AM	16 (32.0%)
1:00AM	4 (8.0%)
2:00AM	7 (14.0%)
3:00AM	1 (2.0%)

Note. One missing frequency due to lack of response from one participant.

Table 3. ***Descriptive statistics,*** **(*N*=51)**

	Mean (SD)
Time to fall asleep (minutes)	28.3 (30.5)
Waketime	7.9 (1.1)
Hours of sleep each night	6.8 (1.2)
PSQI pre-test score	7.7 (2.9)
PSQI first post-test score	7.0 (2.8)

Appendix A

IRB Approval Documentation

University of Kentucky | Office of Research Integrity
IRB, RDRC

Initial Review

At the IRBs request - ORI staff updated "Risks/Benefits" section from anonymous (X2) to confidential.

Approval Ends:	IRB Number:
9/27/2024	89685

TO:	Caroline Cunningham, BSN, RN College of Nursing PI phone #: 5024755495 PI email: clcu225@uky.edu
FROM:	Chairperson/Vice Chairperson Medical Institutional Review Board (IRB)
SUBJECT:	Approval of Protocol
DATE:	9/28/2023

On 9/28/2023, the Medical Institutional Review Board approved your protocol entitled:

Evaluating the Effect of Sleep Hygiene Education on Sleep Quality Among First-Year College Students

Approval is effective from 9/28/2023 until 9/27/2024 and extends to any consent/assent form, cover letter, and/or phone script. If applicable, the IRB approved consent/assent document(s) to be used when enrolling subjects can be found on the approved application's landing page in E-IRB. [Note, subjects can only be enrolled using consent/assent forms which have a valid "IRB Approval" stamp unless special waiver has been obtained from the IRB.] Prior to the end of this period, you will be sent a Continuation Review (CR)/Annual Administrative Review (AAR) request which must be completed and submitted to the Office of Research Integrity so that the protocol can be reviewed and approved for the next period.

In implementing the research activities, you are responsible for complying with IRB decisions, conditions and requirements. The research procedures should be implemented as approved in the IRB protocol. It is the principal investigator's responsibility to ensure any changes planned for the research are submitted for review and approval by the IRB prior to implementation. **Protocol changes made without prior IRB approval to eliminate apparent hazards to the subject(s) should be reported in writing immediately to the IRB. Furthermore, discontinuing a study or completion of a study is considered a change in the protocol's status and therefore the IRB should be promptly notified in writing.**

For information describing investigator responsibilities after obtaining IRB approval, download and read the document "PI Guidance to Responsibilities, Qualifications, Records and Documentation of Human Subjects Research" available in the online Office of Research Integrity's IRB Survival Handbook. Additional information regarding IRB review, federal regulations, and institutional policies may be found through ORI's web site. If you have questions, need additional information, or would like a paper copy of the above mentioned document, contact the Office of Research Integrity at 859-257-9428.

seeblue.
405 Kinkead Hall | Lexington, KY 40506-0057 | P: 859-257-9428 | F: 859-257-8995 | www.research.uky.edu/ori/
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Section 1 Page 1 of 1

Appendix B

Cover Letter

University of Kentucky Consent to Participate in Research

Research Title: Evaluating the Effect of Sleep Hygiene Education on Sleep Quality Among First-Year College Students
Protocol #: 89685

Researcher: Caroline Cunningham, BSN, RN, Doctor of Nursing Practice student at University of Kentucky

Contact Information: clcu225@uky.edu

Faculty Advisor: Angela Grubbs, DNP, APRN, NP-C, angela.grubbs@uky.edu

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Your professor allowed me to contact you because I will be presenting on sleep hygiene in your NUR 101 or UK 101 class, and you have the opportunity to be a study participant.

Purpose, Procedure, and Duration:
I am a DNP student from the University of Kentucky inviting you to participate in a survey. I want to learn more about the effect of sleep hygiene on sleep habits of college Freshmen. The DNP project is a requirement for graduation from my program.

All students in participating classes will receive the sleep hygiene education as part of standard course curriculum. If you agree to participate in my study, you will be asked to complete a pre-test before my presentation and then, following the presentation, keep a sleep log for four weeks. There will be a post-test survey at 4 weeks and 12 weeks. The surveys will each take about 7 minutes to complete. I expect at least 100 students to respond.

Eligibility:
You must meet the following requirements to participate in this research study:

- First-year college student
- 18 years or older
- Enrolled in a participating NUR 101 or UK 101 course section

Benefits:
You may not benefit personally from being in this study, but your answers could help me understand more about sleep habits among college students, which sleep hygiene tips are easiest to implement, and how successful/practical sleep hygiene education is for your age group.

Risks:
Participation is voluntary. You can also stop the survey at any time. Students who opt not to participate in the study will not be penalized; participation is not connected to your course grade in any way. Participant identity will be confidential, and data collection and analysis will be used solely for the purpose of research and education.

I will use UK's Qualtrics to collect your responses. They may have Terms of Service and Privacy policies outside of the control of the University of Kentucky that allows them to use your data for other purposes.

I will make every effort to safeguard your data. However, we cannot guarantee the security of data obtained via the internet.

Alternative Opportunities:
I know of no alternative except not to participate in my study.

Privacy and Future Use:
Your responses to the research surveys are confidential. That means I won't know which responses are yours. I won't collect names, internet addresses, email addresses, or any other identifiable information.

I will not use your responses in future research or share them with other researchers.

Complaints or Concerns:
If you have questions about the study, please contact the researcher using the contact information provided above.

If you have complaints or concerns about your rights as a research volunteer, you can contact the staff in the University of Kentucky Office of Research Integrity at 859-257-9428 or toll-free at 1-866-400-9428.

Thank you for taking the time to consider my study. You do not have to participate in my study, but I hope you will. To ensure your responses will be included in my study, please complete the pre-test before the sleep hygiene presentation in your course section and the post-tests by the allotted dates.

By completing the pre-test, you are agreeing to participate in my study.

ORI F1.0355
Rev 6/21/2023

Appendix C

Pittsburg Sleep Quality Index

Name_____ Date_____

Sleep Quality Assessment (PSQI)

What is PSQI, and what is it measuring?

The Pittsburgh Sleep Quality Index (PSQI) is an effective instrument used to measure the quality and patterns of sleep in adults. It differentiates "poor" from "good" sleep quality by measuring seven areas (components): subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction over the last month.

INSTRUCTIONS:

The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

During the past month,

1. When have you usually gone to bed? _____
2. How long (in minutes) has it taken you to fall asleep each night? _____
3. What time have you usually gotten up in the morning? _____
4. A. How many hours of actual sleep did you get at night? _____
   B. How many hours were you in bed? _____

5. During the past month, how often have you had trouble sleeping because you	Not during the past month (0)	Less than once a week (1)	Once or twice a week (2)	Three or more times a week (3)
A. Cannot get to sleep within 30 minutes				
B. Wake up in the middle of the night or early morning				
C. Have to get up to use the bathroom				
D. Cannot breathe comfortably				
E. Cough or snore loudly				
F. Feel too cold				
G. Feel too hot				
H. Have bad dreams				
I. Have pain				
J. Other reason (s), please describe, including how often you have had trouble sleeping because of this reason (s):				
6. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?				
7. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?				
8. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?				
9. During the past month, how would you rate your sleep quality overall?	Very good (0)	Fairly good (1)	Fairly bad (2)	Very bad (3)

Scoring

Component 1	#9 Score	C1 _____
Component 2	#2 Score (<15min (0), 16-30min (1), 31-60 min (2), >60min (3)) + #5a Score (if sum is equal 0=0; 1-2=1; 3-4=2; 5-6=3)	C2 _____
Component 3	#4 Score (>7(0), 6-7 (1), 5-6 (2), <5 (3)	C3 _____
Component 4	(total # of hours asleep) / (total # of hours in bed) x 100 >85%=0, 75%-84%=!, 65%-74%=2, <65%=3	C4 _____
Component 5	# sum of scores 5b to 5j (0=0; 1-9=1; 10-18=2; 19-27=3)	C5 _____
Component 6	#6 Score	C6 _____
Component 7	#7 Score + #8 score (0=0; 1-2=1; 3-4=2; 5-6=3)	C7 _____

Add the seven component scores together _____ ***Global PSQI*** _____

A total score of "5" or greater is indicative of poor sleep quality.
If you scored "5" or more it is suggested that you discuss your sleep habits with a healthcare provider