

# The effectiveness of sleep education programs in improving sleep hygiene knowledge, sleep behavior practices and/or sleep quality of college students: a systematic review protocol

Shellene K Dietrich<sup>1</sup>

Coleen M Francis-Jimenez<sup>1</sup>

Melida Delcina Knibbs<sup>1</sup>

Ismael L Umali<sup>1</sup>

Marie Truglio-Londrigan<sup>1,2</sup>

1. College of Health Professions, Pace University, New York, NY, USA
2. The Northeast Institute for Evidence Synthesis and Translation (NEST): a Collaborating Center of the Joanna Briggs Institute

## Corresponding author:

Marie Truglio-Londrigan

mlondrigan@pace.edu

## Review question/objective

What is the effectiveness of sleep education programs in improving sleep hygiene knowledge, sleep behavior practices and/or sleep quality of college students?

The review objective is to identify, appraise and synthesize the best available evidence on the effectiveness of sleep education programs in improving sleep hygiene knowledge, sleep behavior practices, and/or sleep quality versus traditional strategies.

## Background

Sleep is a physiological state occurring in alternation with wakefulness, and its duration and quality are equally important for the quality of life of an individual.<sup>1</sup> The World Health Organization (WHO) along with other organizations have realized the importance of sleep and its direct correlation to health.<sup>2</sup> According to WHO, one-third of the lifespan is spent asleep, a state that is crucial for physical, mental and emotional well-being.<sup>2</sup> The WHO and the National Sleep Foundation, a nonprofit organization dedicated to improve sleep via sleep education based in the United States (US), recommend that adults should be receiving an average of seven to nine

hours of sleep per night.<sup>1,3</sup> A reduction in sleep hours and sleep quality has a direct effect on lifestyle.<sup>1,3</sup>

Poor sleep health can have severe consequences for the individual as well as society.<sup>3,4</sup> Sleep health is essential for overall health, quality of life and safety. The Institute of Medicine (IOM), an independent nonprofit organization dedicated to provide advice and answers about health in the U.S., reports that approximately 20% of automobile accidents are caused by drivers' drowsiness.<sup>5</sup> Healthy People 2020, a US based initiative aimed at improving the nation's health, recognize that drowsy driving causes vehicular crashes and its objective is to reduce the rate of vehicular crashes per 100 million miles traveled that are due to drowsy driving.<sup>3,4</sup> Sleepiness from any cause can compromise memory, grades, perception of effort and driving performance.<sup>6,7,8</sup> The individual can experience a poorly functioning immune system, emotional instability, memory deficits and poor concentration.<sup>3</sup> Approximately half of the world's population is at risk for some kind of sleep disorder and the cost to society is over \$18 billion from a loss in productivity and mass transportation accidents.<sup>2</sup> The National Center on Sleep Disorder Research (NCSDR) estimates that 70 million Americans suffer from sleep problems, and nearly 60 percent have a chronic disorder.<sup>9</sup> Satisfactory sleep is comprised of numerous aspects, such as sleep quality and quantity.<sup>6</sup> These factors are affected by, but are not limited to, the following: consumption of alcohol, caffeine and drugs, establishing a regular relaxing bedtime routine, reducing lighting, the use of technology and being aware of environmental noise.<sup>6</sup>

For the past 20 years, researchers have found a reduction in the average number of hours of sleep among college students.<sup>10</sup> College students are notorious for sacrificing sleep to study, socializing during the week, and then sleeping long hours on weekends along with the consumption of alcohol, drugs and caffeine.<sup>5,7,10,11</sup> Many of these behaviors are not reflective of sleep hygiene practices that facilitate sleep health.<sup>7</sup> Sleep hygiene is "...a variety of different practices that are necessary to have normal, quality nighttime sleep and full daytime alertness".<sup>12</sup> <sup>(p1)</sup> Sleep practices are behaviors that an individual carries out to facilitate sleep health. These practices include: maintaining regular sleep wake times, limited alcohol, caffeine and nicotine use prior to bed time, regular sleep wake schedules, and sleep environments conducive to sleep.<sup>3</sup> In 2000, a study found that 68.3% of college students reported poor sleep health as a result of inappropriate sleep behaviors that do not reflect sleep hygiene practices.<sup>7,8</sup> Among college students, 50% reported daytime sleepiness while 70% experienced insufficient sleep.<sup>6</sup> Poor sleep has been ranked the third most common impediment among college students and has been associated with deficit in attention, reduction in academic performance, impaired driving, risk-taking behavior, depression, impaired social relationships and poorer health.<sup>8,11,13</sup> College students may have limited knowledge about sleep health and sleep hygiene practices that supports sleep health. This limited knowledge may lead to poor sleep behavior practices ultimately leading to poor sleep health resulting in diminished quantity and quality of sleep.

Efforts to improve the overall health status of college students in the United States (US) began with Healthy Campuses in 2007. Healthy Campuses is closely aligned with Healthy People 2020 using Healthy People as a guiding framework.<sup>14</sup> Healthy Campus 2020 is an initiative that reflects the work of higher education professionals representing numerous organizations and disciplines.

The vision of Healthy Campus 2020 is to promote campus communities in which all members live long, healthy lives.<sup>15</sup> Overarching goals guide the work of the Healthy Campus initiative<sup>15</sup> and specific health objectives have been developed to track and measure successful attainment of these goals.<sup>16</sup> One of the major student objectives pertaining to sleep health is *Health Impediments to Academic Performance*.<sup>17</sup> Under this objective there is a series of sub-objectives. Sub-objective 1.2 states: “reduce the proportion of students who report that their academic performance was adversely affected by sleep difficulties in the past 12 months”.<sup>17(p1)</sup>

Sleep health is important not only for health, quality of life and safety but also for optimal academic performance in college students.<sup>10</sup> Gilbert and Weaver described how sleep deprived college students performed poorly academically. These students had poor concentration, often missed classes due to sleepiness and as a result had lower grade point averages, and more course incompletes, drops and withdrawals than participants with little sleep deprivation and good sleep quality.<sup>10</sup> Furthermore, without interventions that promote sleep hygiene practices and sleep health, there is the potential for later diagnosis of sleep disorders such as delayed sleep phase disorder and insomnia, both common to the population of college students.<sup>8</sup> Hershner and Chervin<sup>6</sup> found that there was a significant link between lack of sleep and academic performance. They hypothesized that effective interventions which focus on improving sleep behavior and disseminating sleep knowledge could help to improve academic performance among this population.<sup>5-8,10,11,18,19</sup>

Studies that have looked at sleep education programs have demonstrated positive outcomes. For example, a sleep 101 program for college students described improved sleep hygiene knowledge, reduced maladaptive beliefs about sleep, and a decrease in sleep disturbances.<sup>20</sup> Other studies have also revealed the potential benefits of formal sleep education with a curriculum based on sleep hygiene practices versus informal advice delivered via verbal prompts from school staff and professionals.<sup>5,7,8,16,17</sup> Formal sleep education programs on sleep, sleep health, and sleep hygiene practices developed for the college student population may increase this population’s knowledge on sleep and sleep hygiene practices.<sup>17</sup> The implementation of formal health promoting sleep education programs that focus on sleep hygiene practices is a strategy that has the potential to facilitate sleep health.<sup>7,10,13,16,20-24</sup>

A search of the Cochrane Library of Systematic Reviews, Medline, CINAHL and the Joanna Briggs Institute Database of Systematic Reviews and Implementation Reports found no systematic review on the effectiveness of sleep education programs on sleep hygiene knowledge, sleep behavior practices, and/or sleep quality in college students or in any other specific population. A systematic review on sleep education is necessary in providing valuable, evidenced based information concerning the impact of sleep education on college students.

## Keywords

sleep; sleep education; sleep hygiene; sleep hygiene knowledge; sleep quality; sleep behavior practices; Healthy People 2020; Healthy Campus 2020

## **Inclusion criteria**

### ***Types of participants***

This review will consider studies that include all undergraduate or graduate college students, male or female, and of all ages, cultures and ethnicities. All undergraduate and graduate college students will be considered for inclusion due to pre-existing behaviors and circumstances that occur when a student enters into the college environment, for example, late night sleep patterns due to studies and socializing as previously discussed in Background. Pre-existing knowledge on sleep hygiene practices, diagnoses and treatments are not considered in this systematic review as confounding variables as the entire population is exposed to the contexts and risks for poor sleep health.

### ***Types of intervention(s)***

This review will consider studies that evaluate formal sleep education programs that include a curriculum on sleep hygiene practices that is designed to facilitate sleep health including but not limited to: maintaining regular sleep wake times, limited alcohol, caffeine and nicotine use prior to bed time, regular sleep wake schedules, and sleep environments conducive to sleep.<sup>3</sup> Formal educational delivery will include, for example: college courses/seminars that are delivered face-to-face, web-based computer programs, and/or a combination of these delivery methods. The formal sleep education program may be delivered any time throughout the participants' college experience.

### ***Comparator intervention***

This review will consider as a comparator no sleep hygiene education as an intervention.

### ***Types of outcomes***

This review will consider studies that include the following primary outcome measures:

Sleep hygiene knowledge – measured by tools such as the Sleep Hygiene Awareness and Practices Scale (SHAPS). The SHAPS contains three sections: sleep hygiene awareness and knowledge, sleep hygiene practices and caffeine. The first section has 13 items to measure participants' knowledge of activities that disrupt sleep. The second section assesses caffeine knowledge and has 19 items to measure participants' awareness of food, beverages or drugs that disrupt sleep. The final practice section of this instrument contains an additional 19 items asking participants how many nights per week where they engage in activities that promote or inhibit sleep.<sup>7,20,25</sup>

Sleep hygiene behavior – measured by tools such as the Sleep Hygiene Awareness and Practices Scale (SHAPS) and the Sleep Habits Surveys (SHS). The Sleep Habits Surveys consists of 10 fill-in-the-blank items that ask for estimates of respondents' sleep habits, such as bed times, rise times and total sleep times for both weeknights and weekends.<sup>25</sup>

Sleep quality – measured by tools such as the Pittsburgh Sleep Quality Index (PSQI). The Pittsburgh Sleep Quality Index (PSQI) measures and assesses sleep patterns. It is a self-rated

instrument with 19 items designed to assess sleep and sleep disturbances over a period of one month.<sup>7,10,11,20,25</sup>

### **Types of studies**

This review will consider both experimental and epidemiological study designs including randomized controlled trials, non-randomized controlled trials and quasi-experimental studies. In the absence of the above other designs will be considered for inclusion, including before and after studies, prospective and retrospective cohort studies, case control studies and analytical cross sectional studies.

### **Search strategy**

The search strategy aims to find both published and unpublished studies. A three-step search strategy will be utilized in this review. An initial limited search of MEDLINE and CINAHL will be undertaken followed by an analysis of the text words contained in the title and abstract, and of the index terms used to describe the article. A second search using all identified keywords and index terms will then be undertaken across all included databases. Thirdly, the reference list of all identified reports and articles will be searched for additional studies. Studies published in English will be considered for inclusion in this review. Non-English studies will be excluded due to limited language proficiency of the review team. Studies published from the year 1980 will be considered for inclusion in this review. This year was identified as the target start date as it has been noted that the trend of poor sleep among college students began in the 1980s. Hicks, Fernandez and Pellegrini conducted surveys and noted a trend of reported sleep problems beginning in the late 70s and 80's in which "24% of the respondents were dissatisfied with their sleep and in 1988, 53% were dissatisfied with their sleep".<sup>23(p660)</sup>

The databases to be searched include:

CINAHL, The Cochrane Central Register of Controlled Trials (CENTRAL), EMBASE, Academic Search Complete, PsycINFO, Healthsource Nursing/Academic edition, ProQuest Central, and PubMed and ERIC.

The search for unpublished studies will include:

New York Academy of Medicine, ProQuest Dissertations and Thesis, Google Scholar Advance, Virginia Henderson Library of Sigma Theta Tau, Robert Wood Johnson Institute

Initial keywords to be used will be:

college students, sleep, sleep education programs, sleep hygiene, sleep practices, sleep quality

### **Assessment of methodological quality**

Quantitative papers selected for retrieval will be assessed by two independent reviewers for methodological validity prior to inclusion in the review using standardized critical appraisal instruments from the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument (JBI-MASARI) (Appendix I). Any disagreements that arise between the reviewers will be resolved through discussion until consensus is reached, or with a third reviewer.

## **Data extraction**

Data will be extracted from papers included in the review using the standardized data extraction tool from JBI-MAStARI (Appendix II). The data extracted will include specific details about the interventions, populations, study methods and outcomes of significance to the review question and specific objectives. Additionally, attempts will be made to obtain data missing from the study report(s) by contacting the appropriate author(s).

## **Data synthesis**

Quantitative data will, where possible be pooled in statistical meta-analysis using JBI-MAStARI. All results will be subject to double data entry. Effect sizes expressed as weighted mean differences (for continuous data) and their 95% confidence intervals will be calculated for analysis. Heterogeneity will be assessed statistically using the standard Chi-square and also explored using subgroup analyses based on the different study designs included in this review. Where statistical pooling is not possible the findings will be presented in narrative form including tables and figures to aid in data presentation where appropriate.

## **Conflicts of interest**

The authors have no conflict of interest to declare.

## **Acknowledgements**

We would like to thank Jennifer Rosenstein MLS, MA for her input and guidance with the construction of this protocol.

We would like to thank Noreen McGuire MLS, MA, Assistant University Librarian for Collection Development, for her guidance and extensive assistance with literature searches and databases.

This review will partially fulfill degree requirements for successful completion of the Doctor of Nursing Practice Program at Pace University, College of Health Professions, New York, NY, for SD, CF-J, MK and IU.

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## Appendix I: Appraisal instruments

### MAStARI appraisal instrument

#### JBI Critical Appraisal Checklist for Randomised Control / Pseudo-randomised Trial

Reviewer ..... Date .....

Author ..... Year ..... Record Number .....

	Yes	No	Unclear	Not Applicable
1. Was the assignment to treatment groups truly random?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were participants blinded to treatment allocation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Was allocation to treatment groups concealed from the allocator?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Were the outcomes of people who withdrew described and included in the analysis?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Were those assessing outcomes blind to the treatment allocation?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Were the control and treatment groups comparable at entry?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were groups treated identically other than for the named interventions	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were outcomes measured in the same way for all groups?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Were outcomes measured in a reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal:    Include                       Exclude                       Seek further info.

Comments (Including reason for exclusion)

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### JBI Critical Appraisal Checklist for Comparable Cohort/ Case Control

Reviewer ..... Date .....

Author ..... Year ..... Record Number .....

	Yes	No	Unclear	Not Applicable
1. Is sample representative of patients in the population as a whole?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Are the patients at a similar point in the course of their condition/illness?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Has bias been minimised in relation to selection of cases and of controls?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Are confounding factors identified and strategies to deal with them stated?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Are outcomes assessed using objective criteria?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Was follow up carried out over a sufficient time period?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Were the outcomes of people who withdrew described and included in the analysis?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Were outcomes measured in a reliable way?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Was appropriate statistical analysis used?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Overall appraisal:    Include                   Exclude                   Seek further info.

Comments (Including reason for exclusion)

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## Appendix II: Data extraction instruments

### MAStARI data extraction instrument

#### JBI Data Extraction Form for Experimental / Observational Studies

Reviewer ..... Date .....

Author ..... Year .....

Journal ..... Record Number .....

#### Study Method

RCT                       Quasi-RCT                       Longitudinal   
 Retrospective                       Observational                       Other

#### Participants

Setting \_\_\_\_\_

Population \_\_\_\_\_

#### Sample size

Group A \_\_\_\_\_ Group B \_\_\_\_\_

#### Interventions

Intervention A \_\_\_\_\_

Intervention B \_\_\_\_\_

Authors Conclusions:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

Reviewers Conclusions:  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Study results**

**Dichotomous data**

Outcome	Intervention ( ) number / total number	Intervention ( ) number / total number

**Continuous data**

Outcome	Intervention ( ) number / total number	Intervention ( ) number / total number