

Improved Sleep Quality and Quantity Through Sleep Hygiene Education In Adults

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### Abstract

Sleep is a basic life necessity that rarely gets the attention it deserves. Most Americans do not get the recommended seven to eight hours of sleep each night and are not aware of the consequences it is having on overall health. The purpose of this project is to improve patient reported sleep quality and/or quantity through sleep hygiene education in a southwest Missouri family practice clinic. The project was a single group pretest posttest quasi-experimental design. Nineteen patients met all inclusion criteria and consented to participate in the sleep hygiene project. Participants completed the Pittsburg Sleep Quality Index and the scores of sixteen patients indicated poor sleep quality and/or quantity. These sixteen participants received the education intervention and were given one month to implement changes to improve their sleep hygiene. After one month ten participants returned the Pittsburg Sleep Quality Index posttest. Seven participants indicated improved sleep quantity and nine participants indicated improved sleep quality. This supports the use of sleep hygiene education in the family practice clinic to improve patient reported sleep quality and sleep quantity. This could lead to long-term improvements in overall health and safety of the community.

*Keywords:* sleep, sleep hygiene, EBP, PSQI, sleep quality, sleep quantity

### Improved Sleep Quality and Quantity Through Sleep Hygiene Education In Adults

The United States government identified improved sleep health as one of the objectives of Healthy People 2020 (“Sleep Health,” 2015). The goal of the sleep health objective is to increase knowledge of how adequate sleep can improve health, productivity, wellness, quality of life, and safety while at work and on the roads (“Sleep Health,” 2015). Sleep is often regarded to as a luxury, however it is a basic component of health and its timing, duration, and quality play an important role in how bodies function (Perry, Patil, & Presley-Cantrell, 2013). Our bodies rely on sleep to help maintain proper function related to metabolic regulation, emotion regulation, the immune system, cognitive performance, memory, learning, and hormone regulation (Carpenter, 2013; Perry et al., 2013; Whitton, 2012). It is recommended that adults get seven to eight hours of sleep each night (Institute of Medicine, 2006; Perry et al., 2013). Sleep deficiency is associated with higher rates of heart disease, high blood pressure, diabetes, stroke, obesity, and depression (Morgenthaler et al., 2006; Perry et al., 2013).

#### **Significance**

Sleep deprivation can have a significant impact on a patient’s health and quality of life (Perry et al., 2013). Less than seven hours of sleep each night and poor sleep quality are associated with cardiovascular morbidity and metabolic disorders (Perry et al., 2013). Patients who have shorter sleep duration are also at a 1.48 times greater risk of dying of coronary heart disease and 1.15 times more likely to have a stroke (Perry et al., 2013). Difficulty concentrating, remembering, and performing daily activities is associated with fewer than seven hours of sleep each night (Perry et al., 2013).

Not only can sleep deprivation have an impact on the individual, but sleep deprivation has a large impact on the community as a whole (Homsey & O’Connell, 2012). Lack of sleep

impacts how individuals function at their jobs, interact with others, and has been associated with many large scale tragic accidents (Homsey & O'Connell, 2012; Perry et al., 2013). Nuclear reactor meltdowns, grounding of large ships, aviation accidents and more specifically, the Exxon Valdez oil spill and the NASA Challenger shuttle explosion have all been linked to fatigue related human error (Phillips & Gelula, 2006). It is estimated that 10% of adults suffer from daytime symptoms of insomnia such as sleepiness, fatigue, difficulty concentrating, and irritability (Homsey & O'Connell, 2012). From 2009-2013, drowsy driving was involved in 6% of all vehicle crashes in which the vehicle was towed away from the scene. In seven percent of these crashes, someone was treated for injuries, 13% in which a person was hospitalized, and 21% of crashes in which a person was killed (Tefft & AAA Foundation for Traffic Safety, 2014). The United States spends more than \$13 billion a year on sleep related problems (Homsey & O'Connell, 2012; Mastin, Bryson, & Corwyn, 2006).

### **Local Assessment**

The family practice clinic for this project is located in Springfield, Missouri. This clinic sees a large volume of patients with chronic conditions and educating these patients on sleep hygiene and adequate sleep could greatly impact the success of their recovery and long-term outcomes. Patients need to be educated regarding ways to improve sleep quality, the risks and benefits of inadequate versus adequate sleep, and how improving their quality of sleep can improve conditions they have already been diagnosed with.

### **Population Diversity**

Men and women of all ages, races, and ethnicities are at risk for sleep deficiency (National Heart, Lung, and Blood Institute, 2012). There are some factors that increase one's likelihood for being sleep deprived and those include limited time for sleeping due to working long hours or

having more than one job, shift work, frequent traveling, abusing alcohol or drugs, having undiagnosed or untreated stress, anxiety, or sleep disorders, and having medical conditions or taking medications that can interfere with sleep (National Heart, Lung, and Blood Institute, 2012). The urban location of the clinic as well as the low socioeconomic status of the patient population of this clinic must be considered.

The United States Census Bureau (n.d.) estimated the population of Springfield to be 166,810 in 2015. In 2010 it was estimated that the population of Springfield was 88.7% Caucasian, 4.1% African American, 3.7% Hispanic, and 1.9% Asian. Approximately 19.9% of the population under age 65 does not have insurance and 11.2% of the population under age 65 has a disability. The poverty rate of Springfield is 25.7%. A lack of diversity in the project population was considered when applying the results of the study to the general public.

### **Problem Statement**

It is widely accepted that sleep deficiency is a problem, but a lack of knowledge by the patient as well as the provider has made this an under recognized problem (Phillips & Gelula, 2006). The growing awareness and increasing knowledge related to the risks of inadequate sleep has made sleep a public health priority and focus (Perry et al., 2013; Phillips & Gelula, 2006). Sleep hygiene education needs to be implemented into family practice clinics to improve patient reported sleep quality and sleep quantity. For the purposes of this project, sleep hygiene will refer to behavior and environmental modifications that improve patient reported sleep quantity and quality.

There are several secondary problems that can result due to inadequate sleep. Adequate sleep aids the body in fighting off infection, metabolizing sugar, performing well in school and work, and maintaining safety at work and while driving (Institute of Medicine, 2006; Mountain,

Quon, Dodek, Sharpe, & Ayas, 2007). Patients experiencing daytime fatigue, low energy, difficulty concentrating, irritability, aggression, frequent illness, or difficulty at work and/or school may not be getting adequate sleep (Institute of Medicine, 2006).

### **Intended Improvement with Purpose**

Studies have shown that the benefits of sleep hygiene presentations far outweigh the costs of the presentation (Barber, Grawitch, & Munz, 2013). The benefits of improved sleep hygiene are extensive. Patients need to be educated on how their sleep practices could be helping or harming their general health. The evidence-based suggestions presented in this project are behavioral modifications that are easily integrated into a patient's daily life with no financial obligation. While there are multiple pharmacological treatment options for insomnia, these can be expensive, interact with other medications, become addicting, and have side effects (Homsey & O'Connell, 2012; Schutte-Rodin, Broch, Buysse, Dorsey, & Sateia, 2008). The purpose of this project is to improve patient reported sleep quality and/or quantity through education regarding sleep hygiene. The Logic Model used during the development of this project is available for review in Appendix A.

### **Facilitators and Barriers**

Facilitators identified to support the project include very low cost, easy access to patient population in the family practice clinic, clinic staff, and ease of implementation. The clinic staff was supportive of the student investigator and project. The preceptor and clinic staff were excited for the study to be conducted in their clinic and to see how the intervention impacted patient outcomes. These factors will promote sustainability of the project, which may make it more likely for long-term implementation after project completion. Patients were already coming to the clinic for previously scheduled appointments so transportation and scheduling

were not an additional burden.

Barriers included willingness of the patient, as well as time constraints of the patient and provider. Although the project was implemented during previously scheduled appointments, it resulted in the patient being at the clinic longer than originally anticipated. It is difficult to anticipate the educational level of potential participants to make sure that the education and handouts are understandable to everyone.

### **Evidence**

#### **PICOT**

The research question for the evidence review reads: In adult patients, does sleep hygiene education compared to no sleep hygiene education, improve sleep quantity and quality after one month in the family practice clinic? Chronic sleep loss is a public health burden and with the lack of knowledge and understanding regarding poor sleep health from both the general population and health care professionals, a structured approach is needed to improve sleep related health (Institute of Medicine, 2006).

#### **Search Strategies**

The evidence regarding sleep hygiene education was collected through the use of multiple databases and search engines. PubMed, Cochrane, Medline through Ovid, Cumulative Index of Nursing and Allied Health Literature through Ebsco, and Google Scholar were searched using the key words sleep, sleep hygiene, patient education, insomnia, cognitive behavioral therapy, behavior modification, sleep quality, sleep disorders, technology, and fatigue. Results were further filtered by year published, English language, full text link, and adult population. Results that were not in English language, only included an abstract, that included pediatric populations, and focused on other comorbidities such as obstructive sleep apnea, mental illness,

restless leg syndrome, and cancer were excluded. Titles and abstracts were then reviewed for relevance.

An evidence table (Appendix B) was developed for the literature collected and includes five quantitative studies, four qualitative studies, eight systematic reviews, two information articles, one conceptual model, and two sets of practice guidelines. The quality level of these studies can also be found in the evidence table and includes five level one studies, one level two study, one level three study, seven level four studies, one level five study, two level six studies, and two level seven studies. The evidence table is organized by subtopic and includes first author, year, title, journal, research design, sample and sampling, measures and reliability, results and analysis used, and study limitations. The studies in the synthesis of evidence include a variety of populations, settings, design, and variables.

### **Evidence by Subtopics**

Certain cues in the environment signal the body's circadian rhythm that it is time for sleep. When the body receives mixed signals from the environment, an individual's sleep and wake cycle can get out of sync (National Heart, Lung, and Blood Institute, 2012). Behavioral modifications can improve sleep outcomes without the risk of medication side effects and are safe for long term use (Homsey & O'Connell, 2012). Sleep hygiene measures have both short and long term benefits to a patient's sleep quantity and quality (Homsey & O'Connell, 2012).

**Stress management.** Psychological stress increases arousal leading to increased heart rate, blood pressure, anxiousness, vigilance and worry (Irish, Kline, Gunn, Buysse, & Hall, 2015). These factors lead to psychophysiological arousal which is the main cause of stress related sleep disruption (Irish et al., 2015). There is a connection between how adequate sleep



influences how someone handles stress (Mullan, 2014). Stress reduction techniques such as relaxation and mindfulness have proven effective in promoting sleep (Cincotta, Gehrman, Gooneratne, & Baime, 2011; Irish et al., 2015; Maness & Khan, 2015; Schutte-Rodin et al., 2008). Hypnosis, meditation, yoga, abdominal breathing, and progressive muscle relaxation assist patients in coping with daily stress and lead to patients falling asleep faster (Maness & Khan, 2015).

Maintaining strict work-home life boundaries is also a major factor in minimizing the effects of stress on sleep (L. K. Barber & Jenkins, 2014; Pereira & Elfering, 2014). Creating boundaries around work related technology use at home allow the patient to separate from work and enter a more relaxed recovery process of sleep (L. K. Barber & Jenkins, 2014; Homsey & O'Connell, 2012). Occupational stress and information and communication technology use at home decreases psychological detachment and has been proven to lead to poorer sleep outcomes (L. K. Barber & Jenkins, 2014; Pereira & Elfering, 2014). Detachment from work related information and communication technology was associated with patient reported better sleep quantity, quality and consistency (L. K. Barber & Jenkins, 2014).

**Exercise.** Exercise has commonly been a recommended sleep hygiene practice with specific recommendations on time of day, length of exercise duration, and type of exercise being a topic of great debate. Research has shown sleep benefits related to regular exercise routines, as well as occasional acute bouts of exercise (Irish et al., 2015). Acute episodes of exercise have been shown to improve the following night's sleep including total sleep time, sleep efficiency, and duration of slow wave sleep (Irish et al., 2015; Kredlow, Capozzoli, Hearon, Calkins, & Otto, 2015). Sleep onset latency was less on days after acute exercise (Kredlow et al., 2015).

Patients have reported a moderate improvement in sleep quality, as well as an increase in total sleep time with exercise duration longer than sixty minutes (Irish et al., 2015).

**Sleep timing regularity and sleep restriction.** Irregular bed and wake times can lead to desynchrony in sleep wake timing and circadian rhythms (Irish et al., 2015; Morgenthaler et al., 2006). Maintaining regular sleep wake times maximizes the synchrony between sleep drive and circadian rhythms (Homsey & O'Connell, 2012; Irish et al., 2015; Maness & Khan, 2015).

There is a clear connection between sleep schedule irregularity and sleep problems in clinical samples (Irish et al., 2015). Restricting sleep can improve sleep continuity by increasing sleep drive and is most beneficial for patients who spend excessive amounts of time lying in bed trying to fall asleep (Maness & Khan, 2015; Morgenthaler et al., 2006; Schutte-Rodin et al., 2008).

Patients should be encouraged to not spend time in bed when they are not sleeping, however patients should spend a minimum of five hours in bed resting despite difficulty falling asleep (Maness & Khan, 2015; Schutte-Rodin et al., 2008). Avoiding daytime naps and maintaining regular sleep wake times can increase sleepiness at bedtime and increase patient reported restfulness during the day (Schutte-Rodin et al., 2008).

**Electronics.** There are many behaviors that patients implement in an attempt to fight insomnia that actually inhibit their sleep (Schutte-Rodin et al., 2008). Talking on the phone, watching television, and using the computer and/or other handheld electronic devices can be stimulating and result in impaired sleep (Schutte-Rodin et al., 2008). These activities are considered arousal related behaviors and the more a patient participates in these activities, the more sleep disruption they will have (Yang, Lin, Hsu, & Cheng, 2010).

**Substance use.** Insomnia has many causes, one of which is the use of alcohol, as well as stimulants such as illicit drugs, nicotine, and caffeine (Irish et al., 2015; Maness & Khan, 2015; Schutte-Rodin et al., 2008; Trauer, Qian, Doyle, Rajaratnam, & Cunnington, 2015; Yang et al., 2010). Limiting the intake of these substances, especially close to bedtime, can improve patient reported sleep (Homsey & O'Connell, 2012). The exact amount of these substances that it takes to negatively impact sleep is unknown, as sensitivity, metabolism, and accumulation are different for every individual (Irish et al., 2015). It has been concluded that the impact of caffeine intake on sleep is very patient specific and the negative effects of low dose caffeine intake is inconsistent (Irish et al., 2015). Like caffeine, nicotine use prior to bedtime can promote arousal and lead to poor sleep (Irish et al., 2015). Nicotine use has been associated with increased sleep onset latency, decreased total sleep time, and early morning awakening (Irish et al., 2015). Results show that poor sleep related to smoking can be resolved after smoking cessation and patients who quit smoking can have long term improvements in their sleep (Irish et al., 2015). Alcohol should also be discouraged when patients are trying to improve their sleep quality and quantity. For individuals that are not dependent on alcohol, occasional alcohol intake just before bedtime has been linked to impaired sleep that night (Irish et al., 2015). Individuals who consume alcohol prior to bedtime occasionally report faster sleep onset, however once the alcohol is metabolized it usually results in lighter sleep and an increased number of nighttime arousals (Irish et al., 2015). Individuals who are dependent on alcohol report chronic sleep disturbances, possibly related to nighttime withdrawal symptoms (Irish et al., 2015). In recovering alcoholics, insomnia has been linked with relapse and alcohol abuse (Irish et al.,

2015; Maness & Khan, 2015). Similarly to caffeine, nicotine and alcohol intake should generally be limited to four to six hours before bed (Irish et al., 2015; Maness & Khan, 2015).

**Environmental modifications.** Maintaining a bedroom environment that is conducive to sleeping is essential in promoting sleep quality and quantity (Homsey & O'Connell, 2012). Temperature, noise, and light are all factors that must be addressed when trying to improve sleep outcomes. Humid heat exposure has been shown to increase thermal load and affects thermoregulation and sleep stages (Okamoto-Mizuno & Mizuno, 2012). Extreme temperatures in a sleeping environment can affect the sleep of patients with and without identified insomnia (Okamoto-Mizuno & Mizuno, 2012). The core body temperature naturally lowers during nocturnal sleep, therefore maintaining a lower ambient temperature can prepare the body for sleep (Okamoto-Mizuno & Mizuno, 2012). A sleep environment that is either too hot, too cold, too humid, or too dry can have a negative impact on patient reported sleep (Yang et al., 2010).

Nocturnal noise, even those outside of the control of the individual such as traffic and plumbing, can have an impact on sleep (Irish et al., 2015). Noise disturbance can lead to increased arousals and result leading to poor sleep (Irish et al., 2015). In situations where the patient cannot control the environmental noise, sound reducing and sound masking methods can be effective. Studies looking at ways to improve sleep for patients in an intensive care unit environment have shown patient satisfaction with the use of earplugs and white noise (Irish et al., 2015). Road traffic noise has proven harmful on sleep quality and has led to decreased daytime functioning (Pirrera, De Valck, & Cluydts, 2010).

The brain receives signals of light and dark from the eyes which tell the body which chemicals to release to maintain a daily rhythm and consistent body clock (National Heart, Lung, and Blood Institute, 2012). When there is bright artificial light in the sleeping environment, this signals the brain that it is time to be awake. By removing and/or avoiding bright artificial light in the evenings, especially in the sleeping environment, the body prepares for sleep (Homsey & O'Connell, 2012; Maness & Khan, 2015).

**Aromatherapy.** There are no current guidelines for the use of aromatherapy, however, research has shown it to be effective in promoting sleep (Dyer, Cleary, McNeill, Ragsdale-Lowe, & Osland, 2016; Hwang & Shin, 2015; Lillehei, Halcón, Savik, & Reis, 2015). Lavender, cypress, and chamomile are the most commonly used and effective aromatherapy oils for sleep promotion (Dyer et al., 2016; Hwang & Shin, 2015). A study conducted specifically on the use of inhaled lavender essential oils in addition to sleep hygiene practices found that participants reported improved sleep quality compared to sleep hygiene practices alone (Lillehei et al., 2015).

### **Theory**

Pender's Health Promotion Model (HPM) provides the guidance needed to conduct the proposed sleep hygiene project. During her nursing career, Pender noticed a pattern in the relationship between a patient's behavior and lifestyle and the occurrence of diseases (Alligood & Tomey, 2010). Each patient has unique characteristics and experiences that influence their actions (Pender, Murdaugh, & Parsons, 2002). This is ideal for identifying the modifiable factors influencing a patient's current sleep hygiene practices and the best way to influence the patient to improve sleep hygiene practices (Heydari & Khorashadizadeh, 2014). The three concepts identified specific to the HPM are characteristics and experiences, behavior specific

cognitions and affect, and behavioral outcomes. Characteristics and experiences are the related behaviors and personal factors previously experienced by the patient (Allgood & Tomey, 2010; Pender, Murdaugh, & Parsons, 2002). This includes age, personality, race, ethnicity, and socioeconomic status (Pender et al., 2002). Behavior specific cognitions and affect are the patient's perceived benefits and perceived barriers to action, as well as the interpersonal influences and situational influences (Allgood & Tomey, 2010; Pender et al., 2002). This includes positive outcomes, what the patient sees as hurdles or personal costs, influences such as family, peers, and role models, and how compatible the patient sees this healthy behavior being with their life (Pender et al., 2002). Behavioral outcomes include a commitment to a plan of action, identifying the competing demands and preferences, and health promoting behaviors (Allgood & Tomey, 2010; Pender et al., 2002). This is essentially the desired outcome, whether it was met or not, and if so, how the patient plans on maintaining the behavior (Pender et al., 2002). The HPM was developed from influences of many different professions, theories, and philosophies. The model was formulated using inductive reasoning with existing research (Butts & Rich, 2015). A theory to application diagram is available for review in Appendix C.

## **Methods**

### **IRB and Site Approval**

Before implementation of this project began, primary institutional review board (IRB) approval was obtained. The family practice clinic does not have its own IRB so the University of Missouri- Kansas City (UMKC) IRB was used. The project is considered human subjects research expedited category seven. IRB approval ensures that every measure has been taken to protect the participants of the sleep hygiene project. Written site approval was obtained from the provider by the student investigator.

**Ethical Considerations**

Basic ethical principles such as providing informed consent, patient autonomy, and maintaining confidentiality and privacy have all been addressed in the sleep hygiene project. When a patient signs an informed consent, they are agreeing to the activity and indicating that they understand what the activity involves, risks, and benefits (Grady, 2015). One of the identified barriers to informed consent is a lack of health literacy. Health literacy is a patient's ability to take presented health information, comprehend that information, and make an informed decision (Marks, 2009). This can also be an issue when considering the appropriate educational materials utilized in this project. The delivery method of this education needs to be strategically chosen so that it does not become a barrier. Written information is often hard to understand and can sometimes contain medical jargon (Reinhart et al., 2014). Health literacy of the population must be considered and any written information tailored to individual needs (Reinhart et al., 2014).

A patient's autonomy hinges on their ability to understand the information provided to them (Melnik & Fineout-Overholt, 2011). Each participant's literacy level was considered and the Doctor of Nursing Practice (DNP) student validated that they understood the informed consent prior to signing it. Patient confidentiality and privacy are identified in the American Nurses Association guidelines for the protection of human rights (Burkhardt & Nathaniel, 2014). Participation in the project, as well as pretest and posttest results was kept anonymous to those outside of the research project. It is inevitable that the DNP student knew each participant's pretest results because participant eligibility was based on those results. Patients were asked to create an identification code consisting of the first letter of their mother's maiden name, two-digit year of their birthday, and last letter of their middle name. The patient put this

code on the pretest and posttest so that both tools could be compared without compromising the patient's privacy. This identification code was designed to keep the posttest anonymous, including to the DNP student.

### **Funding**

The DNP student herself provided funding. There was no financial cost to the patient participants or the clinic. Most costs were related to the development of the project. Total cost of the project was \$ 1,755.84. Statistical analysis was completed free of charge by utilizing the UMKC statistician. In the future, hourly pay for the individual implementing the project will need to be considered, however for the purposes of this project, \$10.00 per hour has been allotted to the DNP student. Also in the future, a source from which to watch the video will be needed, but for the purposes of this project, the DNP student has used her personal iPad. A cost table is available for review in Appendix D.

### **Setting and Participants**

The sleep hygiene project was conducted in a family practice clinic in southwest Missouri. A convenience sample of 19 participants was taken with the inclusion criteria of English-speaking patients aged 18 years and older that have consented to participate. Patients completed a sleep assessment when they arrived at their previously scheduled appointment and the intervention was completed on patients whose score indicated a need for improved sleep. Patients were not excluded based on race or comorbid conditions. Ten participants completed the posttest survey and data analysis was completed on this group.

### **EBP Intervention**

The project began with each English-speaking patient, 18 years of age and over presenting to the clinic being approached regarding becoming a participant in the project upon



check-in by the student investigator. A sample recruitment script can be reviewed in Appendix E. The patients that met the inclusion criteria were asked to sign informed consents, if they consented, then filled out a Pittsburgh Sleep Quality Index (PSQI) (Appendix F). Based on the results of this pretest, patients were included or excluded from the intervention. Patients who scored greater than or equal to five on the PSQI received the sleep hygiene education intervention. The intervention consisted of an educational video (Appendix G) and informational handouts (Appendix H). Recruitment, pretest completion, and the education intervention occurred during the same visit during the months of February and March (Appendix I).

At the end of the patient's clinic visit, the DNP student discussed the results of the patient's pretest with the patient, the patient watched a sleep hygiene informational video, and was given education handouts to take home. The patient was given approximately one month to implement the sleep hygiene strategies discussed. After one month, participants were asked to complete the posttest through an online survey or by mail if they preferred. Completion of the pretest and posttest took approximately five minutes each and the patient education session took 5-10 minutes depending on the number of questions the patient had.

Data from the pre and posttests was collected and evaluated to determine statistical significance in conjunction with the UMKC statistician during March and April 2017. Patients also had an opportunity to provide suggestions for improvement, which no participant did. An intervention flow diagram is available for review in Appendix J.

### **Change Model**

The transtheoretical model of change was developed by Prochaska and Velicer in 1997 and suggests that individuals are at different stages of readiness when it comes to making behavior

changes and implementing healthy behaviors (Butts & Rich, 2015; Syx, 2008). The stages of change are precontemplation, contemplation, preparation, action, and maintenance (Butts & Rich, 2015). The proposed sleep hygiene project addressed each of these stages of change by identifying patients in the precontemplation or contemplation stage, educating them in preparation for healthier sleep hygiene, encouraging them to take action and implement these changes, and then following up after the program to evaluate the maintenance of these changes.

### **EBP Model**

The change process model being utilized is the Stetler Model. There are five phases to the Stetler Model: preparation, validation, comparative evaluation/decision making, translation/application, and evaluation (Melnyk & Fineout-Overholt, 2011; Stetler, 2001). Phase one includes the consideration of external and internal factors that can influence application of the project (Stetler, 2001) as well as confirming the priority of a need in the area of the project. Phase two includes gathering evidence that supports the project, as well as the development of an evidence table of supporting evidence (Stetler, 2001). Phase three is essentially making the decision of what evidence to use and what evidence is not supported (Melnyk & Fineout-Overholt, 2011). This includes identifying what criteria will be used when looking at the collected evidence and including or excluding certain evidence (Melnyk & Fineout-Overholt, 2011). This is the synthesis of evidence (Stetler, 2001). Phase four turns the findings of the research into a recommended change (Melnyk & Fineout-Overholt, 2011). This is the who, what, when, and where of the suggested project. Phase five is evaluation of the outcomes and success of the implementation of evidence (Melnyk & Fineout-Overholt, 2011).

### **Study Design**

This project had a single group, pretest posttest, quasi-experimental design. Each patient

meeting inclusion criteria and consenting to participate received a pretest at the beginning of their visit evaluating sleep quality and quantity. Based on the results of the pretest, the patient did or did not receive the sleep hygiene education intervention. The patients that received the education were asked to conduct the posttest one month later to evaluate for improved sleep quality and/or quantity after implementing sleep hygiene practices.

### **Validity**

Validity of the sleep hygiene project is critical to future implementation. Specific measures have been taken to promote internal and external validity. There are several potential threats to internal validity such as attrition, history, maturation, and testing (Melnik & Fineout-Overholt, 2011). The simplicity of the project, minimal financial costs to implement sleep hygiene practices, and patient specific interventions and education decrease participant dropout and improve patient interest and investment in the suggested modifications. Patient history is difficult to control because each individual undergoes different experiences throughout the project. The threat of maturation is minimal due to the short time frame of the sleep hygiene project but will be included as a potential alternative explanation for the findings of the project. Testing is a minimal validity threat to the sleep hygiene project because the participants will only be completing the measurement tool two times and there will be a relatively short time span between administration of the instruments.

External validity has been addressed by using convenience sampling for the project participants. The population of the project setting is not particularly diverse, however neither is the city in which the clinic is located. While the participants are likely representative of the region, the sample is likely not representative of the target population on a greater scale.

**Outcomes**

The primary outcomes to be measured were sleep quality and sleep quantity. This was measured before and after the sleep hygiene intervention using the PSQI. Scores from the pretest and posttest were compared for each participant. Secondary outcomes were not measured.

**Measurement Instrument**

The instrument that was used to measure both project outcomes is the PSQI. The PSQI is a 19 item self-rated questionnaire that evaluates subjective sleep quality over the last month (Buysse et al., 2008). Each component of the questionnaire is scored with total scores ranging from 0-21. Higher scores indicate worse sleep quality (Buysse et al., 2008). For the purposes of this project a score of 5 or greater will indicate a need for sleep hygiene education. The PSQI has shown to have good internal reliability, stability over time, and validity (Mastin, Bryson, & Corwyn, 2006). The PSQI has a Cronbach's alpha of 0.83 (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). After giving consent to participate in the project participants were instructed to complete the PSQI using pen and paper. Written permission (Appendix K) to use the PSQI was granted by Daniel Buysse at the University of Pittsburgh School of Medicine.

**Quality of Data**

Many factors have been considered to ensure a high quality of data for the sleep hygiene project. Baseline data was collected through pretest completion and posttest data was collected at the time of posttest completion. Pre and posttest data was compared for each participant and a lower score on the posttest indicated improvement in sleep hygiene and success of the intervention. No studies were found that were conducted exactly like this sleep hygiene project, however a systematic review conducted by Trauer et al. (2015) found multiple studies indicating that cognitive behavioral therapy for insomnia, including sleep hygiene, led to improved sleep

onset latency, wake after sleep onset, total sleep time, and sleep efficiency. This benchmark data will be used for comparison.

### **Analysis**

Each participant's total score, as well as answer to each individual question on the pretest and posttest was compared. The data from each test was compared as well as demographics of each participant (Appendix L). Statistical analysis was completed with the assistance of a UMKC statistician using Statistical Package for the Social Sciences software. A Wilcoxon signed rank test was used and confidence interval constructed to determine statistical significance.

## **Results**

### **Setting and Participants**

Nineteen patients consented to participate in the study at the family practice clinic. There were six males and thirteen females. Ages ranged from nineteen to seventy-nine years old. Eighteen participants were Caucasian and one participant was Asian. Pretest PSQI scores ranged from three to fourteen. Pretest sleep quantity ranged from three and one half hours per night to nine hours per night. Three participants pretest scores were less than five and did not meet eligibility to receive the education intervention and were not asked to complete a posttest PSQI. Ten participants completed and returned the posttest. Posttest PSQI scores ranged from two to ten. Posttest sleep quantity ranged from four and one half hours to seven and one half hours per night. Seven females and three males completed posttests. Nine participants were Caucasian and one was Asian. Posttest participant ages ranged from 25 years to 79 years old.

### **Intervention Course**

The project was implemented over four days at the family practice clinic. Four participants

were recruited on day one, five participants were recruited on day two, four participants were recruited on day three, and six participants were recruited on day four. Sixteen participants received the education intervention and were asked to complete a posttest. The total time from recruitment to completion of the intervention was approximately ten minutes for each participant. After thirty days the posttest was mailed to the patient for completion. Zero participants opted for email posttest completion. Participants were given a two-week grace period to complete and return the posttests. Ten participants returned posttests in the allotted time.

### **Outcome Data by Subtopic**

Data analysis revealed that the sleep hygiene education intervention did improve participants sleep quality and/or quantity. Nine participants (90%) had improved sleep quality scores after thirty days. One participant scored less than five, indicating no further need for improvement. Data for sleep quality and sleep quantity were significant at  $p=0.007$  and  $p=0.016$  respectively (Appendix L). Seven participants (70%) had improved sleep quantity after thirty days. Three participants did not have any change in their sleep quantity after thirty days. In total, seven participants had both improved sleep quantity and sleep quality.

On each individual question, 5a-9, answers were compared to see if posttest answers improved. On question 5a, regarding sleep latency, four individuals had improved scores. On 5b, regarding waking up in the middle of the night, two participants had improved scores and one participant had a worse score. On 5c, regarding getting up in the night to use the bathroom, one participant had an improved score and one participant had a worse score. On 5d, regarding breathing comfort, one participant had an improved score and three participants had a worsening score. On 5e, regarding coughing or snoring, zero participants had improved scores and one

participant had a worsening score. On 5f, regarding feeling too cold, five participants had improved scores and one participant had a worse score. On 5g, regarding feeling too hot, one participant had an improved score and three had worsening scores. On 5h, regarding having bad dreams, three participants had improved scores and zero had worsening scores. On 5i, regarding pain, two participants had improved scores and one participant had a worsening score. On 5j, which was a patient fill in the blank, three participants had improved scores and only one had a worsening score. On question 6, regarding overall sleep quality, one participant had an improved score and two participants had worsening scores. On question 7, regarding the use of medication sleep aids, one participant had an improved score and two had worsening scores. On question 8, regarding trouble staying awake during activities, zero participants had improved or worsening scores. On question 9, regarding enthusiasm, five participants had improved scores and zero participants had worsening scores. Participants that did not have improved or worsening scores answered the question the same on the pretest and posttest. The questions can be seen in their entirety in appendix F.

## **Discussion**

### **Successes**

There were several successes of the sleep hygiene project. Not only were the results statistically significant, but also implementation of the project was successful. Despite the initial goal of 30 participants not being met, the number of participants still allowed for significant outcomes. The project confirmed that sleep hygiene education does improve patient's sleep quality and/or quantity and can be implemented into routine patient visits. Finding from this project can be implemented into multiple clinical settings with this patient population.

### **Study Strengths**

There were many factors that led to the strength and success of this project. The geographical location provides easy access for patients due to its urban setting and close proximity to bus stops. The clinic staff was enthusiastic about the implementation of the project and was supportive and accommodating to any needs of the DNP student. The project preceptor was a source of support and leadership to the DNP student before, during, and after implementation of the project. The project participants accepted the education intervention without hesitation. The project is considered a success due to the findings of improved sleep quality and/or quantity.

### **Results Compared to Evidence in the Literature**

The pretests revealed that 84% of the participants scored greater than or equal to five on the PSQI indicating a need for improved sleep. This supports the findings by the CDC that 35.3% of Americans do not get the recommended seven hours of sleep per night (CDC, 2011). Posttest data revealed that all participants had improved sleep quality and/or quantity after receiving the education intervention. This supports the findings of the literature review that patients who implement sleep hygiene practices will have improved sleep.

### **Limitations**

**Internal validity effects.** Despite every effort to minimize internal validity effects, it was inevitable. The DNP student remained in the exam room while the patients completed the PSQI pretest, which could have influence the way they answered the questions. Also, due to time constraints, participants could have been hesitant to ask questions or for clarification. This study did not look at which particular sleep hygiene interventions the participants chose to implement at home. This could have had an impact on how successful the project was.



**External validity effects.** The participants in the study were 95% Caucasian, 68% female, and only 21% were aged 60 or above. These statistics are significantly less diverse than the city of Springfield which is 88.7% Caucasian, 51.5% female, and 14.5% aged 65 and over (“Springfield city, Missouri,” n.d.). This would need to be considered if implementing the project in a more diverse setting or rural clinic. A convenience sample was used which encourages representation of the clinic population.

**Sustainability of effects and plans to maintain effects.** This sleep hygiene project has been designed with sustainability in mind. By providing the clinic with specific instructions and patient education information, the providers will be able to easily implement sleep hygiene education in the future. It is expected that the positive outcomes of the project will encourage the clinic to continue evaluating and implementing sleep hygiene education in their patient visits, as well as expand the project to other clinics within the system. Providers will be encouraged to periodically reassess sleep quality and quantity and to encourage sleep hygiene practices over time in an effort to sustain any improvements that occur during the project. Copies of the education handouts have already been placed in each exam room at the family practice clinic.

**Efforts to minimize the study limitations.** The limitations of the study are largely related to the small sample size. Future studies with larger sample sizes would increase validity and make the results more generalizable. In the future, more days could be spent recruiting participants, and the student investigator could implement the study at multiple family practice sites within the community. Efforts could also be made to make the demographic makeup of the sample more representative of the population as a whole, specifically with more racial diversity and more male participants.

## **Interpretation**

**Expected and actual outcomes.** It was expected that the majority of patients in the family practice clinic had a need for improved sleep quality and/or quantity. The results show that a resounding 84% of participant PSQI pretests indicated this need. It was expected that the posttests would reveal that the education intervention improved posttest PSQI scores. This was confirmed by 100% of participants having improved sleep quantity and/or quality on the posttest.

**Intervention's effectiveness.** There are multiple factors that led to the success of the sleep hygiene education intervention. The primary factor impacting the projects success was the support of the family practice clinic's staff and the preceptor. Their willingness and enthusiasm for the project encouraged the participants. In addition, the PSQI was already an established tool with proven reliability. The educational handouts and video were developed by reputable sources and developed for this population in mind.

## **Intervention Revision**

The student investigator has identified several revisions that could be done in the future when implementing the sleep hygiene project. First would be to obtain the highest level of education of each participant. This would help with population generalization and to ensure that participants are receiving information that matches their literacy level. Also, perhaps developing a shorter video or having the video playing on a loop in the waiting room or in the exam room would cut down on time restraints. Evaluation of which specific interventions the participants chose to implement could also be beneficial. This would allow the investigator to focus on the most significant interventions.

**Expected and actual impact to health system, costs, and policy.** Research has shown that the benefits of sleep hygiene education far outweigh the costs (L. Barber et al., 2013). With

insomnia costing an estimated \$92.5 to \$107.5 billion a year, improved sleep quality and/or quantity could have a significant financial impact on Americans (Maness & Khan, 2015). One study revealed only 43% of primary health clinics include sleep related questions in their health screening (Perry et al., 2013). By implementing the assessment of sleep quality and quantity, and providing the educational intervention of sleep hygiene into routine clinic visits in the family practice setting, it will not only improve the individual's overall health, but also impact the community financially.

## **Conclusion**

### **Practical Usefulness of Intervention**

The impact of improved sleep quality and quantity goes beyond the setting of this project. Insomnia and decreased sleep has a significant burden on not only the individual, but society as a whole (Wickwire, Shaya, & Scharf, 2016). The greatest barrier identified in treating sleep problems is a lack of knowledge by the patient and a concern of cost by the provider (Wickwire et al., 2016). Previous research has shown that the patient benefits of a sleep hygiene presentation far outweighs the costs of the presentation (Barber, Grawitch, & Munz, 2013). This sleep hygiene education project addresses both of these barriers by educating the patient in a cost effective manner.

### **Further Study of Intervention**

Development and implementation of this project is quite complicated. Feedback from the participants must be taken into consideration and used to improve the participant experience and success of the program. Data analysis and participant feedback needs to be used to make changes to the future of the program. Future project expansion is expected including implementing sleep hygiene education in pediatric populations, focusing on patients with

specific medical conditions, and developing an education opportunity in a classroom setting for patients to attend regularly. Future studies could include reassessment of the PSQI at multiple time intervals, such as three and six months, as opposed to just one month post intervention.

### **Dissemination**

Dissemination of the information and results of this project is a key factor in long-term implementation and sustainability. The project proposal poster was presented at two local and one regional conference; the Interdisciplinary Student Conference and Community of Scholars in Kansas City, Missouri, February 2017, the UMKC Health Sciences Student Summit in April 2017, and the Advanced Practice Nurses of the Ozarks Cradle to Grave Conference in Branson, Missouri, November 2016 respectively. Submission for dissemination of the final results with data analysis will be completed in Fall 2017.

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Appendix A

Logic Model for DNP Project

Student: Sarah Williams

PICOTS: In adult patients (P), does sleep hygiene education (I) compared to no sleep hygiene education (C) improve sleep quantity and quality (O) after one month (T) in the family practice clinic?

	Intervention(s) Activities	Outputs Participation	Outcomes -- Impact		
			Short (Completed as student)	Medium (after student DNP)	Long (after student DNP)
<p><b>Evidence, sub-topics</b> Stress Management Exercise Sleep Timing Regularity and Sleep Restriction Electronics Substance Use Environmental Modifications Aromatherapy</p> <p><b>Major Facilitators or Contributors</b> Low cost Easy access to patient population Ease of implementation</p> <p><b>Major Barriers or Challenges</b> Willingness of the patient Time restraints Differing education and literacy levels</p>	<p><b>EBP intervention which is supported by the evidence in the Input column</b> Sleep hygiene modifications to improve patient reported sleep quality and quantity presented to patients by handout and video.</p> <p><b>Major steps of the intervention</b> 1. Preparation 2. Validation 3. Comparative evaluation/decision making 4. Translation/application 5. Evaluation</p>	<p><b>The participants (subjects)</b> Ten adults in the family practice clinic scoring a five or greater on the PSQI.</p> <p><b>Site</b> Family practice clinic in Springfield MO</p> <p><b>Time Frame</b> Approximately three months for implementation and data collection</p> <p><b>Consent Needed or other</b> Consent was obtained by the participants, as well as by the clinic site.</p> <p><b>Person(s) collecting data</b> Sarah Williams</p> <p><b>Others directly involved</b> Site Preceptor, NP Dr. Nancy Willis-Smith</p>	<p><b>Outcome(s) to be measured with valid &amp; reliable tool(s)</b> Sleep Quality Sleep Quantity Both measured using the PSQI</p> <p><b>Statistical analysis to be used</b> Wilcoxon signed rank test</p>	<p><b>Outcomes to be measured</b></p>	<p><b>Outcomes that are potentials</b> Improved mood Improved work performance Increased productivity Improved health Improved community safety</p>

Appendix B

Evidence Table

First author, year, title, Journal	Research Design <sup>1</sup> & Evidence Level <sup>2</sup>	Sample & Sampling	Measures & Reliability (if reported)	Results & Analysis Used	Limitations
Sharon Schutte-Rodin, 2008, Clinical Guideline for the Evaluation and Management of Chronic Insomnia in Adults, JCSM	Guidelines	Applicable for older and younger adults		Purpose: guidelines to assess and manage chronic adult insomnia	
Timothy Morgenthaler, 2006, Practice parameters for the psychological and behavioral threatment of insomnia: An update, An American Academy of Sleep Medicine Report	Guidelines			Recommendations for behavioral and psychological treatment in insomnia.	

<p>Marianne Homsey, 2012, Use and success of pharmacologic and nonpharmacologic strategies for sleep problems, Journal of the American Academy of Nurse Practitioners</p>	<p>Quantitative, descriptive, correlational study, Level 4</p>	<p>Adults 18 years and older reached through advertisements on GoogleAds. Data used from 300 participants</p>	<p>PSQI was used. Reliability is not reported.</p>	<p>The most frequently used and most successful were medications and sleep hygiene strategies. Analysis conducted using SPSS.</p>	<p>No limitations identified by researchers.</p>
<p>Larissa Barber, 2012, Are better sleepers more engaged workers? A self-regulatory approach to sleep hygiene and work engagement, Stress Health</p>	<p>Qualitative, correlational study, Level 4</p>	<p>328 Adult workers recruited through online electronic university message board, convenience sample</p>	<p>Sleep Hygiene using the sleep hygiene index (internal consistency and acceptable test retest reliability). Self control using the Brief Self Control Scale (internal consistency and test retest reliability). Psychological strain using the Perceived Stress Scale (reliability not indicated). Work engagement using the Utrecht Work Engagement Scale (internal consistency, test retest reliability and factorial validity).</p>	<p>Poor sleep hygiene leads to being less engaged at work. Bivariate correlations among all variables, Cronbach's alpha for each multi item measure</p>	<p>Low response rate, self report methodology, can not determine causal influences</p>

<p>Chien-Ming Yang, 2010, Maladaptive Sleep Hygiene Practices in Good Sleepers and Patients with Insomnia, Journal of Health Psychology</p>	<p>Qualitative, level 6</p>	<p>106 insomnia patients and 89 good sleepers. Some participants were from the sleep clinic of a federal hospital diagnosed based on DSM-IV criteria. Others were from the community and matched the gender, age, and education with the insomnia participants.</p>	<p>Sleep Hygiene Practice Scale Chronbach's alpha coefficients were .70 and .58 for arousal related behaviors, .67 and .65 for sleep environment, .72 and .70 for eating/drinking habits, and .82 and .74 for sleep scheduling for good sleepers and insomniacs respectively. PSQI Chronbach's alpha =.83. ISI Cronbach's alpha=.74.</p>	<p>T-tests were conducted to compare the scores on the PSQI, ISI, and SHPS. Pearson correlations were done to assess the associations of poor sleep hygiene practices with sleep quality and severity of insomnia in both groups. Pearson correlations were compared in both groups. In the good sleepers, almost all aspects of sleep hygiene related significantly with their sleep ratings. In insomnia patients, only the arousal related behavior related to sleep ratings.</p>	<p>There are inconsistencies on the PSQI and the ISI in their association with the SHPS.</p>
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Leah A. Irish, 2014, The role of sleep hygiene in promoting public health: A review of empirical evidence, Sleep Medicine Reviews	Systematic Review, Level 3	Looked at research that examined specific recommendations and research that evaluated the change in sleep after following sleep hygiene recommendations. Emphasis was placed on studies that used nonclinical samples.	Not identified	Found a general association between individual sleep hygiene recommendations and nocturnal sleep.	Lack of current evidence on the use of sleep hygiene recommendations in the general population.
David L. Maness, 2015, Nonpharmacologic management of Chronic Insomnia, American Academy of Family Physicians	Informational article, level 7			Discusses statistics, diagnostic criteria, economic impact, and use of nonpharmacologic methods to improve insomnia	
Jeannie Dyer, 2015, The use of aromasticks to help with sleep	A qualitative descriptive prospective audit, Level 6	Aromasticks were offered to all patients referred to the complementary therapy team. 65	A questionnaire was created specifically for this audit, no reliability discussed.	Aromastick use was helpful, aiding sleep, improving relaxing, calmness, and increasing time	Not discussed

problems: A patient experience survey, Complementary therapies in clinical practice		participants		asleep. All results were given in percentages but specific analysis was not discussed.	
Kazuo Okamoto-Mizuno, 2012, Effects of thermal environment on sleep and circadian rhythm, Journal of physiological anthropology	Informational Article, Level 7			The effects of temperature exposure on sleep cycle and circadian rhythm	
Angela S. Lillehei, 2014, A systematic review of the effect of inhaled essential oils on sleep, The Journal of Alternative and Complementary Medicine	Systematic Review, Level 1	Ovid Medline, PubMed, CINAHL, PsychINFO, Science Direct, Natural Standard, Cochrane Library.		15 studies indicated a positive effect of essential oils on sleep. Lavender oil led to statistically significant sleep quality improvements.	Geographic location, small homogeneous sample, no power analysis, all convenience samples, limited external validity.
Martin Hagger, 2014, Where does sleep fit in models of self control and health	Conceptual model			This model is used to explain how self control predicts health behavior and associated outcomes.	

behavior, Stress and Health					
Jerome Sarris, 2010, A systematic review of insomnia and complementary medicine, Sleep Medicine Reviews	Systematic review, level 1	Medline, Cinahl, PsycINFO, The Cochrane library using terms insomnia, sleep disorders, sleep disturbances, sleep initiation, sleep maintenance, acupuncture, yoga	Modified augmented Jaded scale	Evidence supported the use of acupressure, tai chi, and yoga. There was mixed evidence for acupuncture and L-tryptophan, and weak and unsupportive evidence for herbal medicines such as valerian.	Studies involving several mainstream CAM therapies did not meet inclusion criteria.
Emerson M. Wickwire, 2015, Health economics of insomnia treatments: The return on investment for a good night's sleep, Sleep Medicine Reviews	Systematic review, level 4	Ten studies evaluating the cost effectiveness of both pharmacological and behavioral treatments for insomnia.		The cost of treating primary and comorbid insomnia is less than the cost of not treating it. Treatments were generally found to be cost effective using commonly employed standards, with treatment costs being recouped within 6-12 months.	Difficult to obtain accurate estimates of total costs due to the methodological differences between studies. Studies employed various inclusion criteria and outcome measures.
M. Alexandra Kredlow, 2014, The effects of physical	Systematic Review, level 1	PubMed andPsycINFO were used to identify 66 studies for inclusion	Meta analysis	Exercise has some beneficial effects on sleep. Analysis was done using Comprehensive	Baseline levels of physical activity used. Could not examine



activity on sleep: a meta-analytic review, Journal of Behavioral Medicine				Meta-Analysis. Effects for acute and regular exercise were analyzed separately. Effects were calculated using random effects models. Cohen's d 95% confidence interval as an indicator of effect size and interpreted effects as small (0.2) medium (0.5) or large (0.8).	baseline levels of sedentary behavior. More restrictive exclusion criteria than past meta analyses. Risk of bias of many studies included was unclear. Limited to data that has been published.
James M. Trauer, 2015, Cognitive Behavioral Therapy for Chronic Insomnia, Annals of Internal Medicine	Systematic Review, level 1	MEDLINE, EMBASE, PsycINFO, CINAHL, Cochrane library, PubMed. 20 studies were included	Meta analysis	CBT-I is an effective treatment for adults with chronic insomnia. All statistical tests were 2 tailed with P values less than 0.05 considered statistically significant. Analyses performed using Stata, version 13.0, and R, version 3.1.3.	There was narrow inclusion criteria. Findings could not necessarily be applied to patients with comorbid insomnia and other sleep problems.
Diana Pereira, 2013, Social stressors at work, sleep quality and psychosomatic health complaints-	Quantitative Longitudinal, level 4	Snowball sampling via personal advertisement by two research assistants	General questionnaires at T1 and T2, social stressors using a scale of Frese and Zapf, nine item scale	Social stressors at work are related to poor sleep and psychosomatic health complaints. Social stressors at work were not related to other	Unknown reliability and validity of the actigraphy data, higher than average education of participants,

A longitudinal ambulatory field study, Stress Health			based on Mohr's work, actigraphy, and subjective sleep diaries.	sleep quality parameters. First hypothesis: regression analysis with SPSS 19.0. Second hypothesis: SPSS 19.0 using a bootstrap test of the indirect effects	small sample size.
Andrea Cincotta, 2010, the effects of a mindfulness-based stress reduction programme on pre-sleep cognitive arousal and insomnia symptoms: A pilot study, Stress and Health.	Quantitative, Non-controlled, quasi-experimental. Level 4	Heterogeneous convenience sample. 70 participants from the Penn Program for Mindfulness, no exclusion criteria	Insomnia Severity Index, Pre-sleep Arousal scale, Meditation diaries, sleep diaries, actiwatch-64	There were significant reductions in week 1 to week 7 ISI scores. Subjects with insomnia had greater improvements in their ISI scores after participating than those who originally did not have insomnia. Significant week 1 to week 7 reductions in PSAS. Meditation led to significant decreases in cognitive arousal. Single group pre to post test design with intent to treat analysis.	No control group included. Possible Hawthorne effect.
Larissa Barber, 2014, Creating technological boundaries to protect	Quantitative, Observational Level 4	Participants were recruited through Amazon's Mechanical Turk. Access was limited to	Four items measuring work to home segmentation preference $\alpha=0.94$ , five items	Indirect effect of increased work home boundary crossing on sleep through psychological detachment	Use of the same source data for all variables and lack of multiple measurements

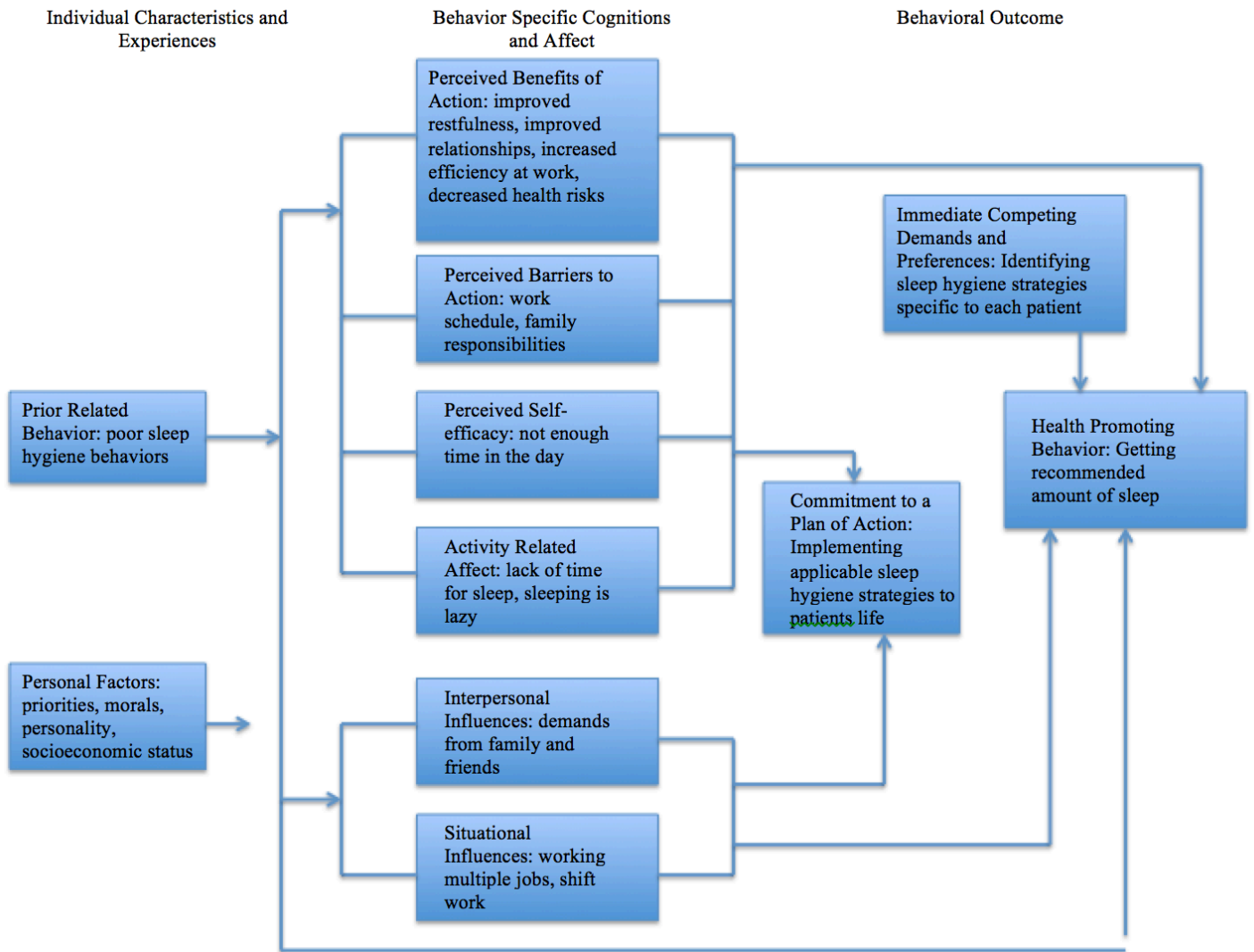
<p>bedtime: Examining work-home boundary management, psychological detachment and sleep, Stress Health.</p>		<p>US workers who were employed full time and respondents were paid 25 cents. 315 surveys were used for data analysis.</p>	<p>assessing workload <math>a=0.81</math>, three items assessing work scheduling autonomy <math>a=0.79</math>.</p>	<p>occurred only among individuals with low boundaries around ICT use and not among those with high boundaries. Analysis was conducted using moderated mediation analyses.</p>	<p>ts.</p>
<p>Sandra Pirrera, 2010, Nocturnal road traffic noise: A review on its assessment and consequences on sleep and health, Environmental International</p>	<p>Systematic review, level 5</p>	<p>Not specified</p>	<p>Reviewed noise exposure indicators, noise-sleep relation, noise assessment, sleep quality assessment, research settings, impact of nocturnal road traffic noise on sleep, subjective primary effects, secondary long term effects</p>	<p>Noise has harmful effects on sleep and it is important to develop adequate countermeasures.</p>	<p>None identified</p>
<p>Angela Lillehei, 2015, Effect of inhaled lavender and sleep hygiene on self-reported sleep issues: A</p>	<p>Qualitative RCT level 2</p>	<p>Participants were recruited using flyers posted on campus and presentations to health advocates in on campus living</p>	<p>Pittsburgh Sleep Quality Index (high test retest reliability and good validity), NIH patient reported outcomes</p>	<p>The lavender and sleep hygiene group demonstrated better sleep quality at postintervention and two week follow up.</p>	<p>Possible that race influences the differences between groups, newer versions of trackers are</p>

<p>randomized controlled trial, The Journal of Alternative and Complementary Medicine.</p>		<p>facilities. 79 participants included.</p>	<p>measurement information system (validated for sleep wake function), sleep hygiene survey, Fitbit One tracking device, daily sleep diary</p>		<p>available and may be better for research, data was self report, patches did not stay on skin overnight, cannot accurately measure the inhaled amount, difficult to blind participants to smells.</p>
<p>Eunhee Hwang, 2015, The effects of aromatherapy on sleep improvement : A systematic literature review and meta analysis, The Journal of Alternative and Complementary Medicine.</p>	<p>Systematic Review, Level 1</p>	<p>RCTs and quasi-experimental trials that included aromatherapy for improvement of sleep quality. 12 studies were used in the meta analysis</p>	<p>Meta Analysis</p>	<p>Use of aromatherapy was effective in improving sleep quality. Inhalation aromatherapy is more effective than massage therapy.</p>	<p>Not identified</p>
<p>Geir Brunborg, 2011, The relationship between media use in the bedroom,</p>	<p>Quantitative, non experimental, Level 4</p>	<p>2500 Norwegians between 16-40 years old were randomly chosen from the national</p>	<p>Media use was measured by asking participants to report how often they used a</p>	<p>Participants that reported using a computer often in the bedroom compared to those that reported rare use</p>	<p>This study focused only on the frequency of media use and not the volume of</p>

<p>sleep habits and symptoms of insomnia, Journal of Sleep Research</p>		<p>register got a questionnaire. 816 were completed and returned.</p>	<p>computer, watched television, used a dcd player used a game console, used a phone, or listened to music in their bedrooms. Sleep habits were measured using BIS (Cronbach's alpha 0.83), HADS (Cronbach's alpha 0.73 for anxiety and 0.77 for depression). Data analysed using Predictive Analytics Software Statistics relase version 17.0.</p>	<p>woke up later on weekdays, turned off the lights later, slept more hours on the weekends, and had greater discrepancy between turning off lights on weekdays compared to weekends. Repsondents who used a phone often compared to rarely turned off the lights later on weekdays and weekends. There was no significant differences in participants that used other media.</p>	<p>media use, no conclusions about cause and effects can be drawn, response rate was low</p>
---	--	---	---	---	--

Appendix C

Theory to Application Diagram



## Appendix D

## Cost Table

<b>Expense</b>	<b>Cost</b>
Printed Materials:	
Ream of paper	\$ 7.00
Pretest (#50)	
Education Handouts (#100)	
Pens (one pack)	\$ 6.00
Printer Ink	\$ 75.00
Envelopes	\$ 10.00
Time for development and implementation \$10/hour (165 project hours)	\$ 1,650.00
Sleep Hygiene Video	Available online free
Location	Donated by clinic
iPad	Free (Student used her personal iPad)
Statistician	Free at UMKC
Postage	\$ 7.84
<b>Total:</b>	<b>\$ 1,755.84</b>

## Appendix E

**Sample Recruitment Script for  
Investigator Initiated In-person Contact**

Excuse me, sir/ madam.

Do you have a minute? My name is Sarah Williams.

I am a student at the University of Missouri- Kansas City and I am working on a research study.

I am approaching you because we are looking for adults over the age of 18 who might have difficulty sleeping. This research is totally separate from the care you are receiving here and whether or not you decide to hear more about the research won't affect your care.

Are you interested in hearing some details about the research study?

- If not interested, thank the individual for his/ her time.
- If interested, then move to the consent form.



## Appendix F

## Measurement Tools

Page 1 of 4

Subject's Initials \_\_\_\_\_ ID# \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_ AM  
PM

**PITTSBURGH SLEEP QUALITY INDEX****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.

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

BED TIME \_\_\_\_\_

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

NUMBER OF MINUTES \_\_\_\_\_

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

GETTING UP TIME \_\_\_\_\_

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

HOURS OF SLEEP PER NIGHT \_\_\_\_\_

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

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

- a) Cannot get to sleep within 30 minutes

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

- b) Wake up in the middle of the night or early morning

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

- c) Have to get up to use the bathroom

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

d) Cannot breathe comfortably

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

e) Cough or snore loudly

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

f) Feel too cold

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

g) Feel too hot

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

h) Had bad dreams

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

i) Have pain

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

j) Other reason(s), please describe \_\_\_\_\_

---

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

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

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

Very good \_\_\_\_\_

Fairly good \_\_\_\_\_

Fairly bad \_\_\_\_\_

Very bad \_\_\_\_\_

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

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

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

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

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

No problem at all \_\_\_\_\_  
 Only a very slight problem \_\_\_\_\_  
 Somewhat of a problem \_\_\_\_\_  
 A very big problem \_\_\_\_\_

10. Do you have a bed partner or room mate?

No bed partner or room mate \_\_\_\_\_  
 Partner/room mate in other room \_\_\_\_\_  
 Partner in same room, but not same bed \_\_\_\_\_  
 Partner in same bed \_\_\_\_\_

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

a) Loud snoring

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

b) Long pauses between breaths while asleep

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

c) Legs twitching or jerking while you sleep

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

d) Episodes of disorientation or confusion during sleep

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

e) Other restlessness while you sleep; please describe \_\_\_\_\_

---

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

Appendix G

Educational Video Outline

Sleep Hygiene: United States sleep statistics

Important Issues for Good Sleep Hygiene:

Sleep Schedule

Sleep Efficiency

Sleep Environment

Caffeine, Alcohol and Tobacco

Exercise

Napping During the Day

Anxiety Over Insomnia

Things To Remember

What We Have Learned Quiz

(Duration of Video 5:43) <https://www.youtube.com/watch?v=ACmUi-6xkTM>

## Appendix H

## Education Handouts

National Heart,  
Lung, and Blood Institute

AT-A-GLANCE:



## Healthy Sleep

**S**leep is not just a block of time when you are not awake. Thanks to sleep studies done over the past several decades, it is now known that sleep has distinctive stages that cycle throughout the night. Your brain stays active throughout sleep, but different things happen during each stage. For example, certain stages are needed to help you feel rested and energetic the next day, and other stages help you learn and make memories.

A number of vital tasks carried out during sleep help maintain good health and enable people to function at their best. On the other hand, not getting enough sleep can be dangerous for both your mental and physical health.

### How Much Sleep Is Enough?

Sleep needs vary from person to person, and they change throughout the lifecycle. Most adults, including older adults, need 7–8 hours of sleep each night. Children have different sleep needs, depending on how old they are.

### Why Sleep Is Good for You and Skimping Isn't

Not only does the quantity of your sleep matter, but also the quality is important as well. How well rested you are and how well you function the next day depend on your total sleep time and how much of the various stages of sleep you get each night.



U.S. Department of Health and Human Services  
National Institutes of Health  
National Heart, Lung, and Blood Institute

### Performance

We need to sleep to think clearly, react quickly, and create memories. In fact, the pathways in the brain that help us learn and remember are very active when we sleep.

Skimping on sleep has a price. Cutting back by even 1 hour can make it tough to focus the next day and slow your response time. Studies have shown that when you lack sleep, you are more likely to make bad decisions and take more risks. This can result in poor performance on the job or at school and a greater risk for an accident or car crash.

### Mood

Sleep also affects mood. Insufficient sleep can make you irritable and is linked to poor behavior and trouble with relationships, especially among children and teens. People who chronically lack sleep are also more likely to become depressed.

### Health

Sleep also is important for good health. Studies show that not getting enough sleep or getting poor quality sleep on a regular basis increases the risk of high blood pressure, heart disease, and other medical conditions. In addition, during sleep, your body produces valuable hormones. These hormones help children grow and help adults and children build muscle mass, fight infections, and repair cells. Hormones released during sleep also affect how the body uses energy. Studies find that the less people sleep, the more likely they are to be overweight or obese, develop diabetes, and prefer eating foods high in calories and carbohydrates.

### Get a Good Night's Sleep

Like eating and being physically active, getting a good night's sleep is vital to your well-being. Here are a few tips to help you:

- Stick to a sleep schedule—Go to bed and wake up at the same time every day.
- Avoid caffeine and nicotine.
- Don't exercise too late in the day.
- Avoid alcoholic drinks before bed.
- Avoid large meals and beverages late at night.
- Don't take a nap after 3 p.m.
- Relax before bed—for example, take a hot bath.
- Create a good sleeping environment. Get rid of distractions such as noises, bright lights, an uncomfortable bed, or a TV or computer in the bedroom.
- See a doctor if you have continued trouble sleeping.


Talk with your doctor if you suspect you have a sleep disorder, such as insomnia, sleep apnea, restless legs syndrome, or narcolepsy.

### Learn More

More information on healthy sleep and sleep disorders is available from the National Heart, Lung, and Blood Institute (NHLBI) Web site at [www.nhlbi.nih.gov](http://www.nhlbi.nih.gov) (under Health Information for the Public). Podcasts and Spanish-language articles also can be found in the online Diseases and Conditions Index at [www.nhlbi.nih.gov/health/dci](http://www.nhlbi.nih.gov/health/dci).

You also can order or download information on healthy sleep from the NHLBI Web site or by calling the NHLBI Health Information Center at 301-592-8573 (TTY: 240-629-3255).

**Want More Information?**  
**These NHLBI resources will help you get adequate sleep and manage sleep disorders!**





**Your Guide to Healthy Sleep (#06-5271)**  
 This easy-to-read booklet provides the latest science-based information about sleep, including common sleep myths and practical tips for getting adequate sleep.

**Also of interest:**


- **Sleep Disorders Fact Sheets**  
 The online Diseases and Conditions Index (DCI) has fact sheets on insomnia, narcolepsy, restless legs syndrome, and sleep apnea, as well as information on sleep-related tests and procedures. Download at [www.nhlbi.nih.gov/health/dci](http://www.nhlbi.nih.gov/health/dci).
- Visit the **National Center on Sleep Disorders Research**  
 Web site at <http://www.nhlbi.nih.gov/about/nscdr/index.htm> for an interactive "sleep IQ" quiz and publications and resources on sleep disorders research.

**In Brief: Your Guide to Healthy Sleep (#06-5800)**  
 Critical messages from "Your Guide to Healthy Sleep" are provided in this easy-to-read fact sheet.





**U.S. Department of Health and Human Services**  
 National Institutes of Health



**National Heart Lung and Blood Institute**

NIH Publication No. 09-7426  
 August 2009

**To Order: Visit [www.nhlbi.nih.gov](http://www.nhlbi.nih.gov) or [http://email.nhlbihin.net](mailto:nhlbihin@nhlbi.nih.gov) or call 301-592-8573**



Sleep Lab  
2828 North National  
Springfield, MO 65803  
(417) 875-4640

## **Good sleep hygiene**

1. Maintain a regular bed and wake schedule including weekends.
2. Establish a bedtime routine. This could include soaking in the bathtub, reading a book, listening to soothing music. Try to avoid watching TV or using the computer too close to bedtime.
3. Create a sleep-conducive environment that is dark, quiet, comfortable, and cool.
4. Sleep on a comfortable mattress and pillows.
5. Use your bedroom only for sleep and sex.
6. Finish eating at least 2-3 hours before your regular bedtime.
7. Exercise regularly. It is best to complete your workout at least a few hours before bedtime.
8. Avoid caffeine (including coffee, tea, soft drinks (some orange sodas and root beers too), chocolate, some pain killers, energy drinks, and appetite suppressants) too close to bedtime. It may not keep you awake, but it can decrease your deep sleep, and increase your awakenings.
9. Avoid nicotine. Used close to bedtime, it can lead to poor sleep.
10. Avoid alcohol close to bedtime. It causes disruption in sleep during the night.

[http://www.sleepfoundation.org/site/c.huIXKjM0IxF/b.2417321/k.BAF0/Healthy\\_Sleep\\_Tips.htm](http://www.sleepfoundation.org/site/c.huIXKjM0IxF/b.2417321/k.BAF0/Healthy_Sleep_Tips.htm)



## Appendix I

## Project Timeline

January 2016- February 2016	March 2016- July 2016	August 2016- January 2017	February 2017- March 2017	March 2017- April 2017
Complete literature review and gather supporting evidence.	Conduct synthesis of evidence and develop project design.	Get IRB approval and facility approval.	Implement Project, gather pretest data, and perform education intervention.	Gather posttest data and perform data analysis.

## Appendix J

## Intervention Flow Diagram



## Appendix K

## Permission Letter to Use Tools

Sent on behalf of Dr. Buysse

Dear Sarah,

You have my permission to use the PSQI for your research study. You can find the instrument, scoring instructions, the original article, links to available translations, and other useful information at [www.sleep.pitt.edu](http://www.sleep.pitt.edu) under the Research/Instruments tab. Please ensure that the PSQI is accurately reproduced in any on-line version (including copyright information). We request that you do cite the 1989 paper in any publications that result.

**Note that Question 10 is not used in scoring the PSQI. This question is for informational purposes only, and may be omitted during data collection per requirements of the particular study.**

This copyright in this form is owned by the University of Pittsburgh and may be reprinted without charge only for non-commercial research and educational purposes. You may not make changes or modifications of this form without prior written permission from the University of Pittsburgh. If you would like to use this instrument for commercial purposes or for commercially sponsored research, please contact the Office of Technology Management at the University of Pittsburgh at 412-648-2206 for licensing information.

Good luck with your research.

Sincerely,

Daniel J. Buysse, M.D.

Appendix L

Data Analysis

**Hypothesis Test Summary**

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between PreQuantity and PostQuantity equals 0.	Related-Samples Wilcoxon Signed Rank Test	.016	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

\*Nonparametric Tests: Related Samples.  
 NFTESTS  
 /RELATED TEST (PreQuality PostQuality) WILCOXON  
 /MISSING SCOPE=ANALYSIS USERMISSING=EXCLUDE  
 /CRITERIA ALPHA=0.05 CILEVEL=95.

➔ **Nonparametric Tests**

**Hypothesis Test Summary**

	Null Hypothesis	Test	Sig.	Decision
1	The median of differences between PreQuality and PostQuality equals 0.	Related-Samples Wilcoxon Signed Rank Test	.007	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.

IBM SPSS Statistics Processor is ready | Unicode:ON

Appendix M

Definition of Terms

Sleep Deficiency: not getting enough sleep

Insomnia: difficulty sleeping

Sleep Hygiene: behavioral and environmental modifications that improve patient reported sleep quantity and quality

Sleep Quality: a subjective evaluation of patient reported sleep quality usually determined based on restfulness and/or tiredness the next day

Sleep Quantity: the objective measurement of the number of hours spent asleep each night

## Appendix N

## IRB Approved Consent Form

UMKC IRB #

**Consent for Participation in a Research Study****Improved Sleep Quality and Quantity Through Sleep Hygiene Education In Adults**

Dr. Nancy Willis-Smith, DNP, RN, FNP-C, WHNP-BC  
Sarah Williams, RN, BSN

**Request to Participate**

You are being asked to take part in a research study. This study is being conducted at a family practice clinic in Springfield MO

The researcher in charge of this study is Dr. Nancy Willis- Smith. While the study will be run by her, other qualified persons who work with her may act for her.

The study team is asking you to take part in this research study because you are an English speaking adult aged 18 years or older. Research studies only include people who choose to take part. This document is called a consent form. Please read this consent form carefully and take your time making your decision. The researcher or study staff will go over this consent form with you. Ask him/her to explain anything that you do not understand. Think about it and talk it over with your family and friends before you decide if you want to take part in this research study. This consent form explains what to expect: the risks, discomforts, and benefits, if any, if you consent to be in the study.

**Background**

This research study is evaluating the effectiveness of sleep hygiene education on a patient's reported sleep quality and sleep quantity. Participants will be asked to complete an assessment tool and depending on the results of that assessment, you might be asked to watch a patient education video and be given some education handouts to take home. Only individuals whose assessment tool indicates that they are poor sleepers will be asked to participate in the education intervention.

You will be one of about 30 subjects in the study|

**Purpose**

The purpose of this project is to improve patient reported sleep quality and/or quantity through education regarding sleep hygiene. Previous studies have shown that behavior modifications have been successful in improving patient reported sleep quality and/or quantity.

**Procedures**

If you decide to participate in this study, you will first be asked to complete a Pittsburgh Sleep Quality Index form. This should take approximately five minutes. If you score a five or greater, you will then be asked to watch a brief education video on sleep hygiene

Sleep Hygiene Consent Form  
Page 1 of 4  
Version Date: 5/22/2012

UMKC IRB #

and will be given education handouts to take home with you. The video will take approximately five minutes. ~~If you score less than a five you will have no further participation in the study.~~

After the education intervention you will be encouraged to go home and implement the sleep hygiene practices you learned for one month. After one month, ~~you will be contacted by the study team to complete the Pittsburgh Sleep Quality Index again.~~ You can choose to do this through an online survey or by mail.

All participants will undergo the exact same steps. You may refuse to participate in the study at any time and you may refuse to answer any questions you do not wish to answer.

If you agree to take part in this study, you will be involved in this study for approximately one month.

When you are done taking part in this study, you will still have access to the education intervention material. It is available online at no cost.

### **Risks and Inconveniences**

This research is considered to be minimal risk. That means that the risks of taking part in this research study are not expected to be more than the risks in your daily life. The main risk is the potential loss of confidentiality. This could include name, date of birth, address, phone number, email address, and/or answers to the PSQI survey. You will be notified immediately if the study team realizes any breach in confidentiality. In an attempt to prevent this from happening, multiple measures will be taken to protect your information including: limiting those that have access to the information to the primary investigator and student investigator, utilizing an encrypted USB drive to transfer information between the student investigator and the primary investigator, and shredding all paper copies of surveys once the data has been collected.

### **Benefits**

Potential benefits that you may directly experience include improved sleep quality and increased sleep quantity. This may result in increased productivity, increased feelings of restfulness, improved personal relationships, and improved health.

Indirect benefits to society may include a decrease in motor vehicle accidents, aviation accidents, and ship wrecks all related to fatigue related human error.

It is possible that your sleep quality and quantity may improve with study treatment.

Other people may benefit in the future from the information about sleep hygiene that comes from this study.

### **Fees and Expenses**

Sleep Hygiene Consent Form  
Page 2 of 4  
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UMKC IRB #

There are no financial costs to you for participating in this study. There are some suggested behavioral modifications that may cost money, but implementation of those is optional and not required.

#### **Compensation**

You will receive no payment for participation in the study.

#### **Alternatives to Study Participation**

The alternative is not to take part in the study.

#### **Confidentiality**

While we will do our best to keep the information you share with us confidential, it cannot be absolutely guaranteed. Individuals from the University of Missouri-Kansas City Institutional Review Board (a committee that reviews and approves research studies), Research Protections Program, and Federal regulatory agencies may look at records related to this study to make sure we are doing proper, safe research and protecting human subjects. The results of this research may be published or presented to others. You will not be named in any reports of the results.

The results of your pretest and posttest will be kept confidential. Only the researcher will have access to your personal information, including the results of your pre and posttests. Once the results of your questionnaires have been analyzed, all forms of information will be destroyed. If you withdraw from the study at any time, any previously collected data will be destroyed at that time.

#### **In Case of Injury**

There is minimal risk to you during this study. There is no anticipated risk of injury.

The University of Missouri-Kansas City appreciates people who help it gain knowledge by being in research studies. It is not the University's policy to pay for or provide medical treatment for persons who are in studies. If you think you have been harmed because you were in this study, please call the researcher, Dr. Nancy Willis-Smith at 417-529-2080.

#### **Contacts for Questions about the Study**

You should contact the Office of UMKC's Institutional Review Board at 816-235-5927 if you have any questions, concerns or complaints about your rights as a research subject. You may call the researcher Sarah Williams at 417-655-5698 if you have any questions about this study. You may also call her if any problems come up.

#### **Voluntary Participation**

Sleep Hygiene Consent Form  
Page 3 of 4  
Version Date: 5/22/2012



UMKC IRB #

Taking part in this research study is voluntary. If you choose to be in the study, you are free to stop participating at any time and for any reason. If you choose not to be in the study or decide to stop participating, your decision will not affect any care or benefits you are entitled to. The researchers, doctors or sponsors may stop the study or take you out of the study at any time if they decide that it is in your best interest to do so. They may do this for medical or administrative reasons or if you no longer meet the study criteria. You will be told of any important findings developed during the course of this research.

You have read this Consent Form or it has been read to you. You have been told why this research is being done and what will happen if you take part in the study, including the risks and benefits. You have had the chance to ask questions, and you may ask questions at any time in the future by calling Sarah Williams at 417-655-5698. By signing this consent form, you volunteer and consent to take part in this research study. Study staff will give you a copy of this consent form.

\_\_\_\_\_  
**Signature (Volunteer Subject)**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Printed Name (Volunteer Subject)**

\_\_\_\_\_  
**Signature of Person Obtaining Consent**

\_\_\_\_\_  
**Date**

\_\_\_\_\_  
**Printed Name of Person Obtaining Consent**

Appendix O  
IRB Approval Letter



UMKC  
5319 Rockhill Road  
Kansas City, MO 64110  
TEL: (816) 235-5927  
FAX: (816) 235-5602

**NOTICE OF AMENDMENT APPROVAL**

Principal Investigator: Dr. Nancy Willis-Smith  
379 SW 123rd Lane  
Mindenmines, MO 64769

Protocol Number: 16-311  
Protocol Title: Improved Sleep Quality and Quantity Through Sleep Hygiene Education In Adults  
Type of Review: Designated Review  
Expedited Category #: 7

**Date of Approval: 02/02/2017**

**Date of Expiration: 11/29/2017**

Dear Dr. Willis-Smith,

The above referenced study, and your participation as a principal investigator, was reviewed and approved, under the applicable IRB regulations at 21 CFR 50 and 56 (FDA) or 45 CFR 46 (OHRP), by the UMKC IRB. You are granted permission to conduct your study as described in your application.

- Addition of clinica within Ozark Community Hospital

This approval includes the following documents:

**Attachments**

Sarah Letter

If a consent is being used in this research study you may find the stamped version in section 16 of your application.

The ability to conduct this study will expire on or before 11/29/2017 unless a request for continuing review is received and approved. If you intend to continue conduct of this study, it is your responsibility to provide a Continuing Review form prior to the expiration of approval or a final report if you plan to close the study.

This approval is issued under the University of Missouri - Kansas City's Federal Wide Assurance FWA00005427 with the Office for Human Research Protections (OHRP). If you have any questions regarding your obligations under the Board's Assurance, please do not hesitate to contact us.

There are 5 stipulations of approval:

- 1) No subjects may be involved in any study procedure prior to the IRB approval date or after the expiration date. (PIs and sponsors are responsible for initiating Continuing Review proceedings).
- 2) All unanticipated or serious adverse events must be reported to the IRB.
- 3) All protocol modifications must be IRB approved prior to implementation unless they are intended to reduce risk. This includes any change of investigator.
- 4) All protocol deviations must be reported to the IRB.
- 5) All recruitment materials and methods must be approved by the IRB prior to being used.



**UMKC**  
5319 Rockhill Road  
Kansas City, MO 64110  
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FAX: (816) 235-5602

Please contact the Research Compliance Office (email: [umkcirb@umkc.edu](mailto:umkcirb@umkc.edu); phone: (816)235-5927) if you have questions or require further information.

Thank you,

A handwritten signature in black ink that reads "C. Thompson". The signature is written in a cursive style.

Cynthia Thompson