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## EFFECTS OF A SLEEP HYGIENE TEXT-MESSAGE INTERVENTION ON SLEEP IN COLLEGE STUDENTS

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EFFECTS OF A SLEEP HYGIENE TEXT-MESSAGE INTERVENTION ON SLEEP  
IN COLLEGE STUDENTS

by

CHRISTINE S. GIPSON

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Ph.D.  
School of Nursing

Barbara K. Haas, Ph.D., R.N. Committee Chair

College of Nursing & Health Sciences

The University of Texas at Tyler  
May 2016

The University of Texas at Tyler  
Tyler, Texas

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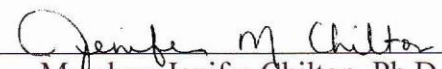
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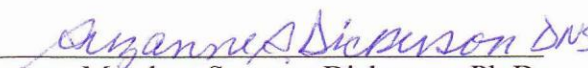
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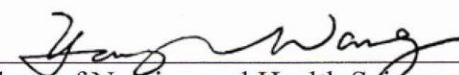
  
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## Table of Contents

List of Tables .....	v
List of Figures .....	vi
Abstract .....	vii
Chapter One Overview of the Program of Research .....	1
Introduction to Articles .....	2
Chapter Two Analysis of the Complementary Concepts of Trigger and Motivation: Influence on Health Behaviors.....	4
Abstract .....	4
The Concept of Trigger.....	7
Defining Attributes .....	9
Model Case .....	10
Antecedents and Consequences .....	11
The Concept of Motivation.....	11
Defining Attributes .....	15
Model Case .....	16
Antecedents and Consequences .....	17
Relational Discussion of Trigger and Motivation to Obesity .....	17
Relationship of trigger and motivation .....	18

Placing “Trigger” and “Motivation” Within the Nursing Vernacular .....	20
Implications for the Future of Nursing .....	21
Conclusion .....	22
References .....	24
Chapter Three. Effects of a Sleep Hygiene Text-Message Intervention on Sleep in College Students .....	31
Abstract .....	31
Review of literature.....	34
Sleep knowledge .....	36
Sleep hygiene .....	37
Self-efficacy for sleep hygiene .....	38
Sleep Quality.....	39
Text Messaging.....	40
Theoretical Framework.....	42
Research Hypothesis/Question .....	43
Methods.....	44
Measures .....	46
Demographic questionnaire. ....	46
Sleep Knowledge. ....	47



Sleep Hygiene.....	47
Self-efficacy.....	48
Sleep Quality.....	49
Statistical Analyses .....	50
Results.....	51
Sample.....	51
Hypothesis Testing.....	54
Associations between Sleep Quality, Self-Efficacy, Sleep Hygiene Index, and Sleep Knowledge .....	59
Discussion.....	60
Demographics .....	60
Hypothesis.....	62
Research Question .....	64
Limitations and Strengths .....	65
Future Recommendations .....	67
Conclusions.....	68
References.....	69
Chapter 4. Summary and Conclusion .....	80
Appendix A. Social Cognitive Theory.....	83

Appendix B. IRB Approval .....	86
Appendix C. Informed Consent .....	88
Appendix D. Recruitment Script.....	92
Appendix E. Recruitment Flyer .....	93
Appendix F. Intervention Protocol .....	94
Appendix G. Biweekly Text Messages.....	95
Appendix H. Demographic Information Form .....	96
Appendix I. Permission for Use of Instruments.....	99
Appendix J. Sleep Hygiene Awareness Scale.....	102
Appendix K. Sleep Hygiene Index .....	103
Appendix L. Self-Efficacy for Sleep Hygiene Inventory (SESHI).....	105
Appendix M. Pittsburgh Sleep Quality Index.....	107
Appendix N. Biographical Sketch .....	111

## List of Tables

### Chapter 2

Table 1. Congruity of Defining Attributes of Trigger and Motivation Concepts .....	18
--	----

### Chapter 3

Table 1. Study Participant Descriptive Statistics (N=96) .....	51
--	----

Table 2. Intervention & Control Groups: Sample Size by Demographic Categories (N=96) .....	53
---	----

Table 3. Means and Standard Deviations by Group and Time .....	55
--	----

Table 4. Correlations .....	59
-----------------------------	----

## List of Figures

Figure 1. Sleep Hygiene Interaction .....	57
Figure 2. Self-Efficacy for Sleep Hygiene: Time Management Interaction .....	58
Figure 3. Social Cognitive Theory (Bandura, 1986).....	85

## Abstract

### EFFECTS OF A SLEEP HYGIENE TEXT-MESSAGE INTERVENTION ON SLEEP IN COLLEGE STUDENTS

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Young adulthood is a time of transition with multiple stressors that may affect healthy lifestyle habits such as sleep. Prolonged sleep disturbances can have harmful health effects along with increased risk for development of chronic diseases. The purpose of this study was to test the effectiveness of a text-message intervention on sleep among young adult college students. Using Bandura's Social Cognitive Theory (SCT), it was hypothesized that a sleep hygiene text-message intervention would increase sleep hygiene knowledge, increase sleep hygiene, improve self-efficacy for sleep hygiene, and improve sleep quality among young adult college students. A randomized control trial (RCT) with a 2-group pretest-posttest design was used to test the hypotheses. A convenience sample of undergraduate university students (n=96), 18-26 years, were recruited using email messages, flyers, social media, and in-class announcements across campus. Participants were randomized to receive biweekly text messages about sleep or healthy behaviors for six weeks. There were no significant differences between groups. There were significant differences within groups for sleep hygiene, sleep quality, and the sleep influences subscale of the self-efficacy for sleep hygiene inventory. Though not significant, scores for sleep knowledge, sleep hygiene, sleep influences and sleep quality

improved in both groups. This study suggests that self-efficacy for sleep hygiene is an influential factor in sleep quality. Text-messaging may be an appropriate intervention to promote healthy behaviors to the young adult population.

## Chapter One

### Overview of the Program of Research

Numerous studies on diet and exercise and their relation to obesity have been conducted for many years. While the original intent of this program of research was to explore exercise and obesity, the importance of sleep as a health promotion behavior and its link to obesity emerged as the initial research step. The role of sleep has received less attention in the research literature. Though there is much to be learned about sleep, it is known that adequate sleep is vital for healthy functioning (National Sleep Foundation [NSF], 2016). In recent years, researchers have found associations between sleep and obesity, evaluating the relationship between sufficient sleep and body mass index [BMI] (Bailey et al., 2014). Though not a causal relationship, over time, epidemiological studies have shown that the average number of hours of sleep has steadily decreased while the prevalence of obesity and diabetes has increased worldwide (Knutson, Spiegel, Penev, & Van Cauter, 2007). The inability to form healthy sleep patterns affects short and long-term health. According to the Centers for Disease Control and Prevention (CDC, 2015b), insufficient sleep has deleterious effects on one's health and is associated with numerous chronic illnesses including diabetes, obesity, depression, and cardiovascular disease. College students are known to have irregular sleep schedules that include sleep deprivation. As many as half report daytime sleepiness while almost two thirds report insufficient sleep (Hershner & Chervin, 2014). Young adulthood is a time in life which brings many changes and transitions as individuals are often on their own for the first time. With these changes come greater independence in lifestyle choices and

behaviors. According to Ferrara (2009), there is potential for habits that are formed in college to extend into older adulthood. Multiple health issues are associated with poor sleep in young adults, and this transition time from adolescence into young adulthood is an important time period that must be examined.

### **Introduction to Articles**

Guided by Bandura's (1986) Social Cognitive Theory (Appendix A), the program of research reported in this portfolio focused on promoting healthy behaviors among young adults in college. The research began with an exploration of factors involved in adoption of healthy behaviors. Using Walker and Avant's (2011) methodology, a concept analysis considered the concepts of trigger and motivation and their influence upon health behaviors. The importance of motivation as an underlying factor related to behavior change and trigger as a cue to perform a behavior made this an area of interest to explore. Additionally, exploration of these factors guided the development of the sleep hygiene intervention for the subsequent research study. Results of the concept analysis are presented in Chapter 2 in the manuscript titled *Analysis of the Complementary Concepts of Trigger and Motivation: Influence on Health Behaviors*.

A quantitative study, titled *Effects of a Sleep Hygiene Text-Message Intervention on Sleep in College Students*, was subsequently conducted. Utilizing results of the concept analyses presented in Chapter 2, a text-message intervention was developed that served as a trigger to stimulate behavior changes related to sleep hygiene. Additionally, participant's motivation to practice good sleep habits or healthy habits was explored. Prior to study initiation, Institutional Review Board approval (IRB# F2015-02) was



obtained (Appendix B). Participants were recruited via classroom presentations and Blackboard announcements using a standardized script (Appendix C) and through flyers (Appendix D) posted on campus and on social media. All participants provided informed consent (Appendix E).

The overall purpose of the quantitative study was to determine if a text message intervention would improve sleep knowledge, sleep hygiene, self-efficacy for sleep hygiene, and sleep quality. The intervention followed a specific protocol (Appendix F) to ensure intervention fidelity. Examples of the bi-weekly text messages are found in Appendix G. The Demographic Survey (Appendix H) was developed specifically for the study. Open-ended questions were developed to determine the effectiveness of the intervention (Appendix I). Permission was obtained to use proprietary surveys prior to study initiation (Appendix J). Instruments used included the Sleep Hygiene Awareness and Practice Scale (Appendix K), Sleep Hygiene Index (Appendix L), Self-Efficacy for Sleep Hygiene Inventory (Appendix M), and the Pittsburgh Sleep Quality Index (Appendix N).

Chapter Four provides a summary of this developing program of research. Strengths and limitations of the current studies are discussed. Overall recommendations for practice, education, and further research are presented.

## Chapter Two

### Analysis of the Complementary Concepts of Trigger and Motivation: Influence on Health Behaviors

#### **Abstract**

Healthy behaviors are essential to life and happiness, but they do not just happen serendipitously. Something triggers health actions, and some inner drive sustains them. To help patients gain and retain optimal health, nurses must understand the “triggers” of healthy behaviors seen within the balance and support of “motivation.” This paper is written to examine the triggers of behavior change and the relationship of motivation in the change process. Avant and Walker’s method of concept analysis was used as a basis for comparison. The antecedents, defining attributes, and consequences of motivation and trigger were identified along with the relationship between the two concepts. Findings suggest that nurses can play a role in triggering health behavior change through simple motivational efforts.

*Keywords:* triggers, motivation, concept analysis, behavior change, nursing,  
young adults

People engage in health promoting behaviors for a variety of reasons. Losing weight before a class reunion, practicing harder to win a championship, participating in an activity to avoid losing points, and an innate drive to be the best are all considered motivating factors for individuals to perform certain behaviors. Motivation is a term often used to explain *why* someone does something. Understanding the motivation to stay healthy is an ongoing challenge for nurse researchers. Once considered to be an age of optimal health, the move from adolescence to young adulthood is acquiring recognition as a crucial time period for health promotion and prevention of disease (Nelson, Kocos, Lytle, & Perry, 2009). Young adulthood is a time of change which includes multiple stressors. Nelson, Lust, Story, and Ehlinger (2008) describe the unique combination of stressors, such as financial issues, poor dietary intake, and physical inactivity that greatly impact students' short-term and long-term health. Furthermore, lifestyle factors (Mohindra et al., 2009), along with social influences and the environment, contribute to the increase in obesity by encouraging or intensifying unhealthy behaviors (Eaton, Kann, Okoro, & Collins, 2007; Jago et al., 2004; Quick, Wall, Larson, Haines, & Neumark-Sztainer, 2013). As students transition from a time of dependence on their parents to a time of independence, there are changes and decisions that must be made on a daily basis. Obesity is a complex problem with multiple social, environmental, behavioral, and personal factors influencing the behavior of young adults. Weight gain in young adulthood is a multi-faceted, poorly-understood issue. Understanding the numerous factors that influence behavior and result in behavior change is necessary to decrease the current obesity epidemic.

Fogg (2011) described the three elements necessary for behavior change. These elements included motivation, ability, and triggers, and they must all occur at the same time for behavior change to occur. The term trigger is often interchanged with other words such as prompt, cue, call to action, request, or offer (Fogg, 2011). However, trigger is a concept with unique characteristics that separates it from the other terms. The role of motivation appears to complement the trigger to a behavior, but the relationship remains vague.

Motivation is a concept that has been studied for years in various fields. There are a variety of reasons that people behave the way they do. According to McKenzie, Neiger, and Thackeray (2009), motivation is a key element for involvement and participation in health promotion programs. Furthermore, this concept has been described as both simple and complex; what motivates one person may not be the same for another individual (McKenzie, Neiger, & Thackeray, 2009). Determining what motivates someone to change behavior is of great importance as the obesity epidemic continues to increase in the United States. The term motivation is often interchanged with other words such as drive and incentive (Motivation, 2014). The unique characteristics of motivation separate it from the other terms. This paper was written to provide a conceptual definition of the concepts of trigger and motivation along with their application. Their significance to the nursing profession and the relationship of the two concepts will also be discussed.

## **The Concept of Trigger**

Used as a noun in the Merriam-Webster dictionary (Trigger, 2014), *trigger* is defined as “something that causes something else to happen”. Different uses of the term trigger can be found throughout the literature: asthma triggers, migraine triggers, trigger tool method, trigger points, and pull the trigger are examples. The concept trigger has been used in criminal justice, medicine, academia, and behavioral science.

Criminal justice and the firearm industry use the word trigger to describe the lever on a gun which the user pulls to initiate an action (Trigger, 2014). This overt, conscious, and irrevocable action provides a clear mental image. Additionally, there are different triggers that can be installed on firearms which enhance this action. When the trigger is engaged, a bullet explodes through the barrel creating action. The trigger releases the hammer which strikes the bullet causing it to fire. A safety is located on the gun to keep the trigger from firing inadvertently. This visual of a “trigger” sparking an action which can be modified by an added mediator is instructive to the idea of initiating and modifying behavior change.

In the medical literature, De Wet and Bowie (2011) used a trigger tool to screen medical records for occurrences that alert reviewers to possible adverse events that had been previously undetected. Detection of possible patient harm occurrences led the reviewer to take action to prevent further harm to the patient. Peterson, Gaeta, Birkhahn, Fernandez, and Mancuso (2012) discussed the various triggers that precipitate asthma symptoms with importance placed on identifying and self-managing asthma triggers as a cornerstone of treatment. Individuals are often aware of specific factors that precipitate

asthma symptoms, so accurate identification of asthma triggers is necessary for adequate management (Peterson et al., 2012). Managing asthma involves the use of pharmaceuticals during times of exacerbation and avoiding triggers when possible. The most common trigger reported in an analysis of migraine triggers by Andress-Rothrock, King, and Rothrock (2010) was emotional stress, followed by lack of or too much sleep, odors, and skipping meals. To be considered a migraine trigger, exposure to the factor must consistently and promptly produce migraine symptoms. Avoiding migraine triggers was the mainstay of treatment (Andress-Rothrock, King, & Rothrock, 2010). Studies reviewed in the medical literature point to irritants which include internal and external influences that trigger or set off a chain of events in the human body.

A review of the literature in academia was concerned with determining what triggers someone to learn or engage in learning. O'Toole, Solan, Burkhardt, and Klein (2013) examined the use of a video trigger curriculum to increase medical residents screening for social determinants of health (SDH). In the study, residents were shown videos depicting various clinical scenarios that modeled appropriate and inappropriate techniques for screening. Residents who received the trigger curriculum experienced a significant change in screening for some SDH and were more likely to report knowledge and comfort to do so (O'Toole et al., 2013). A study on adult lifelong learning conducted by Kungu and Machtmes (2009) argued that understanding the triggers of participation by adults in their learning can provide insight for defining the concept of lifelong learning. They asked the question "What circumstances trigger adult engagement in

learning?” (Kungu & Machtmes, 2009). Triggers, when used in the academic setting, have potential to create action in the learner.

Psychology and behavioral management research use the term trigger to describe something, whether it be emotional distress or an external stimulus, that stimulates another behavior (Grave, Centis, Marzocchi, El Ghoch, & Marchesini, 2013). Furthermore, motivation for change is imperative to modify unhealthy habits which further necessitate the identification of triggers that lead to behavior change (Grave et al., 2013). A main point of emphasis was the importance of stimulus control.

Fogg (2009) developed a behavior model which posits that motivation, ability, and trigger are all needed simultaneously to produce behavior change. He describes three types of triggers: spark, facilitator, and signal, in which the motivation and ability of the individual determine the type of trigger needed to produce behavior change. A spark motivates behavior, a facilitator makes the target behaviors easier, and a signal reminds (Fogg, 2009). Each of these triggers spur an individual into action depending on the level of motivation and ability.

A goal of this review is a definition of the word “trigger.” After an extensive review of the literature, the working definition of the term trigger for the purposes of this paper is defined as “an external or internal spark that generates action within an individual.”

### **Defining Attributes**

Defining attributes are characteristics frequently associated with a concept and found repeatedly in the literature (Walker & Avant, 2011). The first defining attribute for

trigger is ‘unique to each individual’. A common theme throughout the literature review was the individuality of stimuli that produced action in different individuals. Another defining attribute of trigger is ‘an impulse that results in definitive action.’ Chambers and Swanson (2012) describe an alarm signal that elicits action in an individual. Thus the third defining attribute of trigger is ‘an internal or external spark that tells an individual to take action’.

### **Model Case**

According to Walker and Avant (2011), a model case is one in which all the defining attributes of the concept are exhibited. A model case for trigger appears below:

Janae is a registered nurse who is overweight and has recently been diagnosed with hypertension. One day she is caring for a patient in the emergency room who has had a heart attack. Janae sees the pain and suffering in the patient’s face and begins to think about her recent diagnosis of hypertension. As Janae reflects on this situation, she is determined not to let this happen to her. Once outside the room, she stomps her foot and declares, “That is not going to happen to me!” After Janae gets off from her shift, she drives to the gym to exercise. Instead of drinking alcohol after her shift, something she usually does, Janae chooses to drink water and eat a healthy meal.

This exemplifies a model case because it includes all of the defining attributes of trigger. Caring for a patient experiencing complications of high blood pressure served as a trigger for Janae to take action (unique, definitive action). Upon reflection of the situation, Janae decided to change her behavior (internal spark).



## **Antecedents and Consequences**

Antecedents are actions that must happen before the concept for it to occur (Walker & Avant, 2011). An antecedent supported by the literature was the presence of an external or internal stimulus. This stimulus leads someone to exhibit a behavior. In this case, since a certain behavior is present due to the stimulus, the response is the trigger. Another antecedent to trigger is ability and motivation. An individual must have the means and desire to perform a behavior. Consequences are the result of a trigger taking place. The consequences of a trigger can be negative or positive. Take for example an individual with asthma who comes into contact with an environmental irritant. The irritant would exacerbate the individuals' asthma symptoms and thus would be negative. On the other hand, when an individual experiences a trigger that results in definitive action towards healthy lifestyle habits, the trigger is considered to be positive. Essentially, the consequence is similar to a "fight or flight response," or action towards a health outcome. However, the outcomes of "trigger" alone are inadequate to explain human behavior without some understanding of the individual's motivation to actually take action.

## **The Concept of Motivation**

Merriam-Webster dictionary (Motivation, 2014) defines motivation as "a force or influence that causes someone to do something". The term motive is defined as "a reason for doing something" (Motive, 2014). Motivation is used throughout the literature with descriptive words or prefixes attached that give it different meanings. Terms such as autonomous motivation, amotivation, intrinsic motivation, and extrinsic motivation were

seen throughout the literature. The concept of motivation has been studied extensively across numerous disciplines including behavioral science, human resource development and management, education, and sports.

Various aspects of motivation have been extensively studied for years, and many theorists have constructs of motivation throughout their theoretical models. The most common theory seen in the literature review was based on self-determination. Deci and Ryan (1985) developed a theory of motivation called Self-Determination Theory (SDT) that has been widely used in various domains over the past 30 years to study motivation. According to SDT, the psychological needs of competence, relatedness, and autonomy are necessary to create sustainable motivation (Stone, Deci, & Ryan, 2009). These needs, when met, are accompanied by feelings of willingness and engagement which create “autonomous” motivation. Motivating people in this way increases the likelihood that the individual will internalize the need for change and be an active participant (Stone, Deci, & Ryan, 2009). Autonomy underlies the SDT continuum developed by Deci and Ryan (1985) which ranges from amotivation (a nonself-determined behavior) to intrinsic motivation (a self-determined behavior). Amotivation is the absence of motivation characterized by a lack of intention to act. Two major types of motivation are discussed in SDT. Acting or behaving in a certain way to attain a reward or to avoid a certain punishment is described as extrinsic motivation (Ryan & Deci, 2000). People who are extrinsically motivated are unlikely to maintain a behavior over time. Research has revealed that tangible rewards, deadlines, and imposed regulations are all extrinsic motivators that can diminish intrinsic motivation (Ryan & Deci, 2000). In contrast to

extrinsic motivation, intrinsic motivation is an innate desire that an individual has for doing an activity because of a personal interest in it or to get satisfaction out of it. According to Ryan and Deci (2000), the focus is primarily on internal sources of motivation, such as the need to gain knowledge or independence. Some researchers refer to this as autonomous motivation (Leal, Miranda, & Carmo, 2013). Though intrinsic motivation is inherent, there is evidence that there are conditions that elicit and sustain it; therefore, a supportive environment is necessary (Ryan & Deci, 2000). Both intrinsic and extrinsic motivation are contextual and can change over time. Missing from the discussion remains the initiator or predecessor of the motivational state.

Motivation has been studied extensively in psychology and behavioral management. Its application in this domain is complex and multifaceted with a wide array of approaches (Deci & Ryan, 1985). Determining how to change behavior or what stimulates behavior change is a question that is not easily answered in this field. Fogg (2009) described three core motivators in his behavioral model, which includes the presence of motivation, ability, and triggers at the same time to produce behavior change. While much of his model is about persuasive technology and the use of technology to produce behavior change, Fogg describes three core motivators in his model. Each of the three core motivators has two sides: Motivator 1, pleasure/pain, Motivator 2, hope/fear, and Motivator 3, social acceptance/rejection. These core motivators are all things that can motivate someone to perform a certain behavior. Additionally, personal motivation for change is imperative to modify unhealthy habits and lifestyle choices (Grave et al., 2013).

Exploration of motivation in education determined what motivates students to learn and its relationship with academic achievement and cognitive engagement. Anderson, Griego, and Stevens (2010) defined motivation as an intrinsic drive that activates and guides behavior. The drive that activates behavior is unique to each individual; therefore, motivation can be achieved in many different ways. Rose (2011) explained the importance of identifying motivators specific to students in nursing programs to motivate them to achieve their goal of becoming a nurse. Factors that determined motivation to learn were interest, relevance, and usefulness of presented content. Research shows that self-efficacy and intrinsic motivation contribute to cognitive engagement (Walker, Greene, & Mansell, 2006).

Motivation or lack of motivation is of primary concern to those in the sports industry. Stories of athletes and their drive to succeed in the face of adversity illustrate varying factors that motivate. Michael Jordan was cut from his high school basketball team, but his desire to prove others wrong fueled his fire to become the greatest player in the history of basketball. On the reverse side, there is the story of the football player Ricky Williams who had material wealth and athletic success, yet made bad decisions that derailed a promising career. The polar opposite path of each career illustrates the spectrum of motivation in sports. Professional athletes make a living from playing a sport, and yet there are many who allow money to affect their athletic performance. In a study of feelings of acceptance and intimacy among teammates as a predictor of motivation in intercollegiate athletes, Stults-Kolehmainen, Gilson, and Abolt (2013)

revealed that an athlete's intrinsic motivation was associated with relatedness of those with whom they practiced and competed.

Human resource development and management is another field in which motivation has been studied. According to Chalofsky and Krishna (2009), there is a relationship between individuals' perception of the meaningfulness of the work they do and their engagement at work. Moreover, meaningfulness is considered to represent a deeper level of intrinsic motivation in which the individual finds meaning in the work itself. Engagement is another emerging term associated with motivation that was seen throughout the literature (Chalofsky & Krishna, 2009).

### **Defining Attributes**

Four defining attributes of motivation were identified: a perceived need; a driving force; unique to each individual; and stimulates behavior. For an individual to have motivation there must be a driving force or a stimulus to behave in a certain way. This can be intrinsic or extrinsic. According to Alderman (2013), intrinsic and extrinsic motivators can coexist; for example, a person's sobriety can stem from an inner drive to avoid alcohol or a spouse's threat to leave. Motivation is unique to each individual. What motivates one person may be different from the next. The individual must perceive a need to attain a goal or achieve a certain positive outcome. If there is no interest or no perceived usefulness, motivation will not be sustainable. Several defining attributes are related to the perception of the individual. Determining how to change a person's perception is beyond the scope of this paper, but it is worth noting that perception is a key defining attribute. Perceived need was used rather than awareness of a reward because

perception of a need could be a motivating factor to achieve a goal that results in a reward. Thus, perceived need could include awareness of a reward. Rewards are often associated with extrinsic motivation. Including “reward” as a defining attribute related to this factor was negated because it only described one aspect of motivation rather than the concept as a whole.

### **Model Case**

A model case for motivation appears below:

Kaylee is a new mom who is having difficulty losing the last 15 pounds of weight she gained while pregnant. She has recently received an email from a former high school classmate about her upcoming high school reunion. It has been 10 years since Kaylee has seen her high school friends, and she wants to look better than she did in high school. Kaylee has 3 months until the reunion, and she has decided that she can lose at least 15 pounds by that time. Rather than sit down and watch television as she normally does, Kaylee goes to the gym for a workout and develops an eating plan to help meet her goal before the high school reunion.

This represents a model case because it includes all of the defining attributes of motivation. The driving force is the desire to lose weight before the reunion. Kaylee will see friends she has not seen in years, and she wants to look better than she did 10 years ago. This is the perceived need. The motivating factors in this case are unique to Kaylee and may not be the same for other classmates who received the email. One motivating factor is the fact that she is going to see old friends and wants to look better than she did in high school. This may not be the case for other classmates. Finally, Kaylee makes a

behavior change by going to the gym rather than continuing with her normal routine of lounging on the couch.

### **Antecedents and Consequences**

Self-efficacy or perceived ability is an antecedent to motivation. Perceived self-efficacy is an individual's belief in the ability to perform a behavior. A person's belief about ability is an important facilitator of motivation and is influential in the expectations and actions taken (Alderman, 2013). Another antecedent for motivation is interest or perceived usefulness. Before an individual can be motivated, they must perceive an action to be useful or meaningful. Consequences are the result of motivation. When an individual is motivated, the end result is pursuit of a goal or pursuit of achievement. According to Ryan and Deci (2000), motivation produces a behavior. Similarly, outcome is another result of motivation. If an individual is motivated to study for an exam, the outcome will be the grade which can be positive or negative. Motivation appears to be the basis for positive behavior change in difficult situations like smoking cessation and obesity management.

### **Relational Discussion of Trigger and Motivation to Obesity**

Numerous studies to date have addressed the growing epidemic of obesity. Obesity dramatically increases an individual's risk of morbidity from high blood pressure, hypercholesterolemia, diabetes, stroke, coronary artery disease, gallbladder disease, osteoarthritis, sleep apnea, and respiratory problems (National Heart, Lung, and Blood Institute [NHLBI], 1998). According to Ogden, Carroll, Kit and Flegal (2012), over 30% of American adults are obese. This issue is generally thought to be a problem

with individuals taking in more calories than they expend along with a lack of physical activity. Due to the tragic effects that excess weight can have on health, there is an urgent need to develop and identify strategies that can be used to decrease the incidence of obesity (Laska, Pelletier, Larson, & Story, 2012). One way to decrease this epidemic is through behavior change. For behavior change to occur, a trigger is necessary (Fogg, 2009). Additionally, the individual must have ability and motivation to perform the behavior. There is strong congruity in the defining attributes of trigger and motivation but not total conformity (See Table 1).

*Table 1. Congruity of Defining Attributes of Trigger and Motivation Concepts*

TRIGGER	MOTIVATION
Unique to each individual	Unique to each individual
An impulse that results in definitive action	Stimulates behavior
Internal or external spark	Driving force
	A perceived need

#### **Relationship of trigger and motivation**

Henry Ford (1922) spoke the famous words “Whether you think you can, or you think you can’t—you’re right.” To fully understand the relationship between trigger and motivation, it is necessary to briefly discuss the idea of ability. An individual’s ability to perform a behavior is vital for change. One must have an “I can” attitude; a perceived self-efficacy for the desired behavior. Fogg (2009) described his model where one can have low ability and high motivation or high ability and low motivation. In both cases, the presence of a trigger can lead to behavior change.



While ability and motivation are imperative to changing behavior, they are not enough to move a person towards true change. There must be an impulse, a “trigger” that takes place at the right time to spur an individual to change. It is posited that trigger and motivation are both unique to each individual. Brunet and Sabiston (2011) and LaRose, Leahey, Hill, & Wing (2013) discovered that young adults have different motivations than older adults. Therefore, a one-size-fits-all approach will not work. This finding further supports the idea that motivation and trigger are unique to each individual. For this reason, programs and interventions must be designed for specific populations.

The trigger impulse is proposed to result in an action. This process is equated with the defining attribute of motivation as stimulating behavior. When someone is motivated, a behavior change is more likely. The source of the behavior change may well be the internal or external spark seen as a trigger, or a driving force toward an outcome. The complementary nature of trigger and motivation support the idea that having both present increases the likelihood of meeting a need through sustained behavior change.

There must be a perceived need for motivation to be present. Deci and Ryan (2000) described multiple behaviors that are specifically aimed at satisfying basic human needs. One example of this lies in an individual who is hungry. The individual perceives the need to eat to satisfy hunger and is motivated to eat something, however, there is something missing in this scenario. Trigger is different from perceived need as there is spontaneity of “trigger” which makes it independent of a perceived need. In other words, the need may not be perceived until after the trigger kicks in at which time it becomes motivational.

## **Placing “Trigger” and “Motivation” Within the Nursing Vernacular**

The term trigger has been used in the nursing literature to describe events that precipitate medical conditions such as migraines, cardiac events, and asthma. For these conditions, triggers are well defined and have been studied at length. In many cases, scales have been developed to measure their presence. However, this concept as it relates to behavior change is not well defined. Chambers and Swanson (2012), in a study about factors associated with successful and unsuccessful weight maintenance, described the need to define a clear trigger point for action to help counteract the tendencies of individuals to put off making a change. Visram, Crosland, and Cording (2009) described triggers to behavior change with the sub-themes of intrinsic motivation and extrinsic factors. Furthermore, concerns about health, loss of function or mobility, and cosmetic factors were listed as triggers to action for weight loss. Additionally, the stigma attached to those who are overweight can serve as a catalyst for behavior change (Visram, Crosland, & Cording, 2009). The term “catalyst” may be a precursor or milder version of the concept of “trigger.”

Motivation as a basis for behavior change has significance to nursing in today’s fluctuating health care environment. Health care evolution is not always pleasant; yet, motivating or encouraging nurses to adapt is vital in this time of chaos and change. The term motivation has been used in the nursing literature to discuss issues such as job satisfaction, academic performance, and retention. Banks and Bailey (2010) looked at motivation for retention and recruitment of nurses. They sought to understand what makes nurses stay at their jobs. In a study of undergraduate nursing students, Nilsson and

Stomberg (2008) determined the desire to become a nurse is a main motivating factor in nursing education along with a student's perceived self-efficacy. For nursing education and management, particular motivators have been identified, and strategies to motivate have been successful. This concept as it relates to health promotion has been discussed in recent years, but research in this area is still in its infancy (Pauline, 2013).

### **Implications for the Future of Nursing**

It is well known that practicing healthy lifestyle habits, which includes healthy eating, physical activity, limiting alcohol intake, and not smoking, is essential to reduce the incidence of premature morbidity and mortality (Allen, 2014). Nurses are known as one of the most trusted professions in the world, and they interact with patients on a daily basis creating the perfect opportunity to impact the lives of the clients they serve. The rates of overweight and obese individuals are continuing to increase dramatically during the collegiate years in the United States (Cahill, 2013). According to the Centers for Disease Control (2014), chronic diseases accounted for 70% of deaths in 2009. The national health plan for the United States identifies disease prevention and health promotion as the areas of most concern in the nation (Stanhope and Lancaster, 2014). Health risk behaviors include lack of exercise or physical activity, poor nutrition, tobacco use, and drinking too much alcohol (CDC, 2014). These unhealthy behaviors can be changed and are the cause of illness and early mortality related to chronic diseases and conditions (CDC, 2014). It is vital that nurses understand health risk behaviors and lifestyle factors that can lead to weight problems and engage with their clients to promote healthy lifestyle habits (Penn & Kerr, 2014). According to Burner, Menchine, Kubicek,

Robles, and Arora (2014), telling patients why they should perform health behaviors is not enough. Patients need to be reminded and urged to practice healthy lifestyle habits (Burner et al., 2014).

Nurses can take advantage of the concept of “trigger” as a way to jump-start the motivational efforts to help patients change unhealthy behaviors. Future studies should focus on the development of an instrument to identify triggers to unhealthy behaviors. Researchers could study those who have been successful in losing weight and determine if there are common triggers that spark an individual to make a change and maintain that change. Additional research is also needed to identify a strategy which precludes the trigger to negative behavior from actually taking place. Development of a behavior modification plan with strategies for reacting to triggers to the negative or unhealthy behaviors along with motivational steps to stay on a positive trajectory may be beneficial. Finally, research is needed to see if triggers can be activated by external actions or, in essence, caused.

## **Conclusion**

Despite interest in the obesity epidemic and numerous interventions to decrease its occurrence, overweight and obesity are continuing to increase (Grave et al., 2013). The increasing trend is detrimental to individuals, families, and the health care system alike. Determining the internal or external stimuli that trigger an individual to make a change and to take action is imperative to decrease the obesity epidemic. Triggers can change over time (Peterson et al., 2012). According to Fogg (2009), behavior will not occur without an appropriate trigger.

Despite years of research on the concept of motivation and interventions to measure its presence, a conceptual definition remains complex. Future studies should focus on development and testing of tools to assess motivation for behavior change. A vital piece of that discovery must be identifying what specific actions or cues serve as motivational “triggers.” With the increase in obesity, a method for sustained behavior change is necessary. Research testing interventions that produce long-term motivation will be vital to sustainable weight loss solutions. Answering the why questions related to behavior may be helpful to decrease this problem. The harmonious blending of motivational currents with positive behavior triggers will be a huge step in the control and treatment of behavior-based health challenges. Nurses should lead the way in this health-care revolution based on positive individual changes to ensure that a happy, healthy lifestyle becomes the norm rather than the exception.

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### Chapter Three. Effects of a Sleep Hygiene Text-Message Intervention on Sleep in College Students

#### **Abstract**

**Objective:** To test the effectiveness of a text-message intervention on sleep among young adult college students.

**Participants:** A convenience sample of undergraduate students ( $n=96$ ), 18-26 years old, were recruited in August 2015.

**Methods:** A randomized control trial (RCT) with a 2-group pretest-posttest design was used to test the hypotheses. Participants were randomized to receive biweekly text messages about sleep (experimental group) or healthy behaviors (attention control group) for six weeks. Students answered questions about sleep knowledge, sleep hygiene, self-efficacy for sleep hygiene, and sleep quality at baseline and posttest.

**Results:** Sleep quality, sleep hygiene, and sleep knowledge improved in both groups. Sleep quality was significantly related to level of stress ( $r = .43$ ); time management was significantly inversely related to sleep quality ( $r = -.44$ ) SHI, ( $r = -.44$ ) and sleep knowledge ( $r = -.37$ ).

**Conclusion:** This study suggests that self-efficacy for sleep hygiene is an influential factor in sleep quality. Sleep quality improved in both groups. Text-messaging may be an appropriate intervention to promote healthy behaviors to the young adult population.

*Key words:* sleep, young adults, self-efficacy, sleep quality

According to the National Institutes of Health (NIH, 2013), one-third of American adults get fewer than the recommended 7-8 hours of sleep per night. Inadequate sleep can result in daytime sleepiness which is prevalent among young adults (Lund, Reider, Whiting, & Pritchard, 2010; Millman, 2005). Angelone, Mattei, Sbarbati, and Di Orio (2011) noted the prevalence of sleep disorders among young adult college students is greater than young adults who are not students. College is a time in life when many individuals are on their own for the very first time and the transition to adulthood begins. Once considered to be an age of optimal health, young adulthood is a time of change that includes multiple stressors. The transition from adolescence to young adulthood is now recognized as a critical time period for health promotion and prevention of disease (Nelson, Kocos, Lytle, & Perry, 2009).

For many individuals, the transition to adulthood is associated with erratic sleep patterns, poor sleep hygiene, and poor sleep quality, which results in inadequate sleep and daytime sleepiness (Brown, Buboltz, & Soper, 2002; Hershner & Chervin, 2014; Orzech, Salafsky, & Hamilton, 2011). Porkka-Heiskanen, Zitting, and Wigren (2013) noted that prolonged sleep disturbances could have adverse health effects, which included increased risk for multiple chronic diseases such as depression, diabetes, obesity and cardiovascular disorders. Nelson, Lust, Story, and Ehlinger (2008) described the unique combination of stressors, such as financial issues, poor dietary intake, and physical inactivity that greatly impact college students' ability to sleep. Furthermore, lifestyle factors (Mohindra, Nicklas, O'Neil, Yang, & Berenson, 2009), along with social influences and the environment, contributed to the increase in obesity by encouraging or intensifying

unhealthy behaviors (Eaton, Kann, Okoro, & Collins, 2007; Jago et al., 2004; Quick, Wall, Larson, Haines, & Neumark-Sztainer, 2013) in young adults. Additionally, many college students are at risk for sleep disorders that may result in poor academic performance (Gualtney, 2010). A study to determine the most frequently identified health issues affecting academic performance of young adult college students found that 15.5% experienced sleep difficulties (Upright, Esslinger, & Hays, 2014). Though young adults are generally considered to be healthy, lifestyle habits formed in college may carry over into later life.

Self-efficacy refers to one's confidence to engage in a particular behavior under specific circumstances (Bandura, 1997; 1986). Self-efficacy is influenced by four factors: enactive mastery experiences; vicarious experiences; verbal persuasion; and physiological and affective states (Bandura, 1997). Physiologic and affective states can particularly influence efficacy expectations in threatening situations and the behaviors necessary to respond to that situation. According to Bandura (1997, 1986), high arousal usually debilitates performance. Specifically, self-efficacy for sleep hygiene refers to the belief in one's ability to implement recommended sleep practices. High arousal, such as stress over a major exam or assignment or worry about finances, may have a negative influence on self-efficacy for sleep in college students.

Two thirds of young adults own smartphones (Rainie, 2012). With the increase in technology over the past ten years, more innovative strategies to influence health behaviors have surfaced. Text messaging has been used with other health behaviors such as diet and exercise in the young adult population with some success. Napolitano, Hayes,

Bennett, Ives, and Foster (2011) indicated the potential for an innovative weight loss intervention that uses technology platforms such as Facebook and text messaging, which are frequently used and already integrated into the cultural life of college students. While much has been written about the use of technology in interventions to reach young adults, no studies using text messaging as an intervention for sleep related behaviors with this population were identified.

Sleep is a complex issue with multiple social, environmental, behavioral, and personal factors influencing the behavior of young adults. Sleep in young adulthood is a poorly-understood issue. The IOM (2014) published a report discussing young adults and the paucity of policies, programs, and research aimed at treating this distinct population. Therefore, identifying means to influence behavior that results in behavior change is necessary to impact the sleep among college students. The purpose of this research was to test the effectiveness of a text-message intervention on sleep knowledge, self-efficacy for sleep hygiene, sleep hygiene, and sleep quality among young adult college students.

### **Review of literature**

According to the Millman (2005), young adults are often excessively sleepy and as a group are at high risk to experience health consequences resulting from sleep loss. Inadequate sleep can be detrimental to the health of young adults and also contributes to a decrease in psychomotor, cognitive, and emotional functioning (Orzech et al., 2011). Furthermore, young adulthood, specifically students enrolled in postsecondary education, is an important and overlooked area for sleep education efforts (Orzech et al., 2011).



Findings from a longitudinal study of 186 Canadian college students by Galambos, Vargas-Lascano, Howard, and Maggs (2013) showed that poor sleep was common in university students and was associated with health problems and impaired academic performance. Therefore, interventions to enhance quantity and quality of sleep in this population are important.

A review of the literature by Hershner and Chervin (2014) examined at the prevalence of sleepiness and sleep deprivation among college students, along with contributing factors and how sleep affects learning and memory. They found that many factors contributed to poor sleep among young adult college students, and suggested further research is needed to determine the best way to translate knowledge about sleep hygiene into practice. Among the factors identified, Tsui and Wing (2009) found that poor sleep quality and sleep deprivation were common among 620 Hong Kong university business students and noted a growing concern about the sleep habits of university students especially as it relates to their health and well-being.

The American College Health Association (2012) has collaborated with various professionals and disciplines to develop initiatives that assist universities and colleges across the nation with implementing programs to promote health. *Healthy Campus 2020* created specific objectives to increase the health and wellness of college students. An objective for sleep was included under the topic of health impediments to academic practice; the goal was to reduce the proportion of students who reported academic performance was adversely affected by sleep difficulties in the past month. As a result of their mixed methods study of on-campus residents at a large state university, Orzech et

al. (2011) posed that students who are in their first year of college have problems with balancing life demands and school demands that may have contributed to sleep problems. George, Dixon, Stansal, Gelb, and Pheri (2008) studied the factors associated with academic and personal success among 231 university students and found that time-management skills were the largest predictor of cumulative grade point average (GPA). Sleep variables also influenced academic accomplishment, with a negative correlation between the two. Students, who slept less, had a lower cumulative GPA. According to results of a study by Brown et al. (2002), college students were often unaware that sleep deprivation can impact cognitive functioning. Therefore, education that includes information about sleep and its potential effect on memory and cognitive functioning may be beneficial for this population.

Throughout the literature, numerous correlational studies aimed at sleep in young adults were reviewed, but few intervention studies were available. Four main focus areas were identified from the correlational studies and included: sleep quality, sleep hygiene, student's knowledge, and self-efficacy for sleep.

### **Sleep knowledge**

Researchers have examined beliefs and attitudes of the young adult population to gain a greater understanding of their thoughts, beliefs, and motivating factors. However, few studies have investigated college student's knowledge about sleep. Throughout the literature, knowledge, attitudes and beliefs were discussed together and at times used interchangeably. For the purposes of this review, research that included scales with a section to measure sleep knowledge were identified. Buboltz et al. (2002) explained that

students are often unaware of the negative effects that sleep deprivation can have on their cognitive functioning. A mixed methods study by Coveney (2014) found that students perceived themselves to be in control of their sleep and described ways to catch up on sleep or change their sleep patterns to fit the demands of their social lives and studying. This may have resulted in students getting less sleep on the weekdays and attempting to “catch up” on sleep during the weekend (Buboltz et al., 2002; Gaultney, 2010). A correlational study of 124 psychology students by Buboltz et al. (2002) reported that greater sleep hygiene knowledge resulted in better sleep hygiene practice with resulting improved sleep quality. These findings are similar to Gallasch and Gradisar (2007) who explained that sleep knowledge may have a weak effect on sleep quality while sleep practices have a larger impact. Of the studies reviewed that assessed sleep knowledge, four (Brown et al., 2002; Gallasch & Gradisar, 2007; Grandner, Jackson, Gooneratne, & Patel, 2014; Lacks & Rotert, 1986) were correlational designs and one (Buboltz et al., 2006) utilized an intervention to improve sleep knowledge. Therefore, further experimental research in this area is indicated (Gallasch & Gradisar, 2007).

### **Sleep hygiene**

Research has predominantly focused on sleep hygiene knowledge rather than sleep hygiene and factors that influence sleep behaviors (Digdon, 2010; Todd & Mullan, 2013). Sleep hygiene includes guidelines and recommendations for activities or lifestyle habits that can help or hinder sleep (Brown, Buboltz, and Soper, 2006; Brown et al., 2002; Knowlden, Sharma, and Bernard, 2012). Factors that comprise sleep hygiene vary across studies, but generally included information about bed/wake time, use of alcohol,

drugs, and stimulants, physical activity, and the sleeping environment (Lillehei, 2014). The National Heart, Lung, and Blood Institute (NHLBI, 2009) has recommended habits such as maintaining a consistent bed and wake time each day, avoiding stimulants such as caffeine and nicotine, participating in relaxing activities before bed, and creating a good sleep environment with minimal distractions, such as technology, to help individuals get a good night's sleep. These habits were generally referred to as sleep hygiene in the literature. Identifying ways in which sleep hygiene can be improved in college students is an important area for future research (Kor & Mullan, 2011; Todd & Mullan, 2013).

Interventions aimed at improving sleep hygiene practices of university students may have a positive effect on health practices and academic achievement (Orzech et al., 2011; Todd & Mullan, 2013). In a study of university students in an introductory psychology class conducted by Brown et al. (2006), a psychoeducational sleep intervention, which consisted of a 30-minute Sleep Treatment and Education Program (STEPS), had the greatest impact on sleep hygiene practices, suggesting that interventions aimed at sleep hygiene practices may increase sleep quality in university students.

### **Self-efficacy for sleep hygiene**

A person's belief about ability is an important facilitator of motivation and is influential in the expectations and actions taken (Alderman, 2013). Self-efficacy is known to affect numerous health behaviors and practices. However, few studies have examined how self-efficacy is related to sleep behaviors in university students.

Measuring student' self-efficacy for sleep hygiene indicates the level of confidence that students have in their ability to practice healthy sleep behaviors.

In a study of adults with insomnia, Rutledge, Guardia, and Bluestein (2013) found that patients must believe that they can be successful in order to participate in behavioral therapy effectively. Additionally, patients with dysfunctional beliefs about sleep demonstrated a lower self-efficacy for sleep. Digdon (2010) studied circadian preference and college students' beliefs about sleep education. Participants who had poorer self-efficacy for implementing recommended sleep practices were more likely to be evening types than intermediate or morning types. This finding supported the idea that self-efficacy may distinguish good sleepers from poor sleepers. Digdon (2010) further explained the results of students' outcome expectations and their incompatibility with recommended sleep practices are often included in sleep education. When considering sleep hygiene information given to students in educational programs, it is important to consider what is known and to ensure that education is relevant, credible, and not redundant (Digdon, 2010). Findings supported the need to understand students' beliefs and how they may impact sleep behaviors and self-efficacy for sleep hygiene

### **Sleep Quality**

Studies that looked at sleep patterns of college students demonstrated irregular sleep-wake patterns and insufficient sleep are present in this population (Bailey et al., 2014; Lund et al., 2010; Tsui & Wing, 2009). Moreover, stress is a contributing factor to poor sleep and can lead to sleep deprivation in college students (Lee, Wuertz, Rogers, & Chen, 2013). Though the phenomenon of sleep and why we sleep is not completely

understood, it is known that restorative sleep is an important process that helps the brain perform properly (Bailey et al., 2014). Of particular interest is determining if college major plays a role in sleep habits and sleep quality. According to Hershner and Chervin (2014), this area has not received much research but may play a substantial role in sleepiness and sleep duration.

### **Text Messaging**

The use of mobile technologies such as text messaging to disseminate health information has grown substantially in recent years (Centers for Disease Control and Prevention [CDC], 2010). The use of text messaging via cell phone, or short message service (SMS) texting is prevalent among those living in the United States and even more so for adolescents and young adults who see it as an important social tool (Harrison & Gilmore, 2012). A recent Pew survey found that 83% of American adults own a cell phone, and young adults are among the top users in terms of text messages sent per day and per month (Smith, 2011).

Often referred to as mHealth or mobile health in the literature, numerous studies were identified that utilized text-messaging to reach young adult college students. A systematic review by Cole-Lewis and Kershaw (2010) examined text message interventions and found evidence to support it as an effective tool for behavior change. Studies addressing text-message based interventions in young adults have been conducted to reduce alcohol and tobacco use (Haug, 2013), increase physical activity (Munoz et al., 2014; Yan et al., 2015), provide nutrition education (Brown, O'Connor, & Savaiano, 2015), disseminate information about the use of sunscreen (Youl, Soyer, Baade,

Marshall, Finch, & Janda, 2015), and promote weight loss (Napolitano et al., 2011). Buchholz, Wilbur, Ingram, and Fogg (2013) conducted a systematic review of 10 physical activity text message interventions among adults and concluded that this method can be an effective way to increase physical activity. However, limitations among the studies reviewed included small sample size and limited details about the frequency and content of messages sent.

A study of 102 college students conducted by Harrison and Gilmore (2012) on texting and the social context of messages, participants reported sending an average of 71 texts per day. Participants in this study further indicated that text messaging is their preferred method of communication when compared to cell phone calls. Yan et al. (2015) used a formative participatory approach for the development of text messages as part of a physical activity promotion program and through the use of focus groups and SCT as the theoretical underpinning, reported that students were excited about an SMS-based intervention. The participatory approach allowed researchers to collect input from the target population and tailor the intervention. Participants indicated that they preferred SMS messages to be sent between the hours of 9 AM and 9 PM and did not want to receive messages on the weekend. In contrast to other mhealth applications, SMS-based interventions do not require that an individual continually make a decision to access the intervention such as an application that must be accessed consistently for the participant to benefit (Yan et al., 2015). The use of SMS allows the participant to automatically receive the information.

A review conducted by Fjeldsoe, Marshall, and Miller (2009) explored the use of SMS for delivering interventions related to health behavior change. Of the 14 studies reviewed, four focused on preventive health behavior change, six were RCTs, and significant changes in behavior were observed in eight while five reported positive behavior trends that did not meet statistical significance. Wei, Hollin, and Kachnowski (2010) also conducted a systematic review of text messaging interventions. Their findings supported the use of SMS-based interventions to promote healthy behaviors. Studies reviewed demonstrated the potential for the use of SMS to deliver interventions in the young adult population. However, this area of research is still fairly limited and further research is warranted (Fjeldsoe et al., 2009).

### **Theoretical Framework**

Bandura's (1986) Social Cognitive Theory (SCT) served as the theoretical framework to guide this study. According to SCT, behavior is influenced by three reciprocal factors, which include person, environment, and behavior (Bandura, 1986). The interaction among these three factors is dynamic and does not occur independently (Bandura, 1998).

**Personal factors.** Participant demographics such as gender, age, and race/ethnicity capture personal factors that may play a role in college students' sleep quality and sleep hygiene. Student's sleep knowledge and self-efficacy for sleep hygiene also represented personal factors.

**Environmental influences.** Internal and external factors that influence college students' ability to sleep such as social norms, living environment, the presence of



roommates, use of sleep aids, noise, light, and other environmental influences represent environmental influences that affect sleep. The text messaging intervention also served as an environmental influence.

**Behavior.** Sleep quality and sleep hygiene were the behaviors assessed in the study. Buysse et al. (1989) has defined sleep quality as the degree of excellence in sleep, which includes both quantitative and subjective data. Sleep hygiene included those behaviors that impact sleep quality and sleep quantity (Mastin, Bryson, & Corwyn, 2006).

In SCT, an individual's efficacy beliefs act as one of several factors that regulate motivation, and behavior (Bandura, 1998). Self-efficacy, in turn, is influenced by four factors: enactive mastery, vicarious experiences, verbal persuasion, and psychological/affective states. Enactive mastery or personal experiences are considered the most reliable source of efficacy expectations. Vicarious experiences refers to observing others successfully performing an activity. Verbal persuasion is used to influence someone else's efficacy expectation that they possess certain capabilities; it is less likely to be effective over time, unless successful personal experiences reinforce the persuasion. Physiologic and affective states partially influence how one judges capability, strength, and vulnerability to dysfunction.

### **Research Hypothesis/Question**

Based on the theoretical model, this study addressed the following research hypothesis and question:

Ha1: Following a text message intervention, young adult college students will report improved sleep knowledge, sleep hygiene, self-efficacy for sleep hygiene, and sleep quality.

Research Question. What are the relationships among sleep knowledge, sleep hygiene, self-efficacy for sleep hygiene, and sleep quality?

## **Methods**

The study was approved by the Institutional Review Board (IRB) before data collection began. Consent was received by all participants after confirming eligibility to participate and prior to completion of the survey online.

A power analysis using G\*Power (Faul, Erdfelder, Lang, & Buchner, 2007) was utilized to determine the size of the convenience sample needed for this study. With a power of .80, alpha of .05, and a medium effect size (.25), a total sample of 98 young adult undergraduate students, age 18-26 years were sought. Allowing for 10% attrition, a total sample of 110 participants were recruited through email messages, flyers, social media, and in-class announcements across campus. Eligibility criteria included: (a) enrolled as a full-time undergraduate student; (b) age 18-26 years, (c) currently owned and used a personal mobile device with unlimited text messaging capability, (d) ability to read and speak English, (e) no medical diagnosis of a primary sleep disorder, (f) no current use of hypnotics, sedatives, or antidepressants, and (g) not pregnant, lactating, or have plans to become pregnant during the study.

Participants were screened for eligibility by completing an initial questionnaire online. Upon eligibility to participate, consent was included as part of an online survey

where participants either accepted or declined before exiting the survey. After confirmation of eligibility and consent, participants were randomly assigned to the intervention or attention control group for the study using computer-generated randomization.

The baseline survey included screening questions, consent, demographic questions, and self-report of sleep knowledge, sleep hygiene, self-efficacy for sleep hygiene, and sleep quality. Respondents were asked to include their phone number and email address. The posttest survey included self-report of the same instruments used at baseline and open ended questions that asked about the effectiveness of the intervention.

Text messages with sleep hygiene or healthy habit information were sent biweekly on Monday and Thursday at 3 o'clock in the afternoon over six weeks. The sleep hygiene group received text messages adapted from the National Sleep Foundation (NSF) recommendations for sleep hygiene, and written according to the Center for Disease Control and Prevention's ([CDC], 2010, 2012) social media guidelines and best practices. Examples of text messages sent included: "Lack of sleep can lead to health problems, academic issues, & poor productivity. Memories are formed during sleep. So make sleep a priority!" and "Chocolate has caffeine in it and can disrupt sleep."

According to Lindquist, Wyman, Talley, Findorff, and Gross (2007), research involving changes in health behaviors should include a control condition that provides for participation concurrently and equivalently with the experimental condition. The control condition must contain nonspecific properties of the intervention. Therefore, just like the intervention group, participants in this group received biweekly text messages over six

weeks. However, the content focused on healthy behaviors rather than sleep hygiene. The message content was adapted from the CDC (2015) recommendations for college health and safety, and the United States Department of Agriculture ([USDA], 2015) Choose My Plate. The messages were also sent to participants at 3 o'clock in the afternoon on Monday and Thursday of each week. Examples of the healthy habits messages included "Eating 5 or more servings of fruits and vegetables a day is key to a healthy diet. Eat 5 or more to improve your diet" and "Regular physical activity can help decrease your risk for many chronic conditions. Find something you enjoy and get moving!" Participants in both groups were instructed to text "STOP" if they wished to stop receiving text messages. Those who completed the study were entered into a drawing to win one of six seventy-five dollar gift cards.

## **Measures**

***Demographic questionnaire.*** Demographic information was assessed at baseline from a self-report questionnaire that included age, race, gender, university major, time of earliest and latest class, employment status, and living arrangement. Additionally, questions about perceived level of stress, social activities involving late nights, preference for staying up late or sleeping in late, and time of day that participants felt most productive were included. Level of stress was measured on a 0-10 scale from no stress-very stressed.

Sleep knowledge, sleep hygiene, self-efficacy for sleep hygiene, and sleep quality was assessed at baseline and post-intervention using a questionnaire that included items from the Sleep Hygiene Awareness and Practice Scale (SHAPS, Lacks & Rotert, 1986),

Sleep Hygiene Index (SHI, Mastin et al., 2006), Self-efficacy for Sleep Hygiene Inventory (SESHI, Gipson, n.d.), and Pittsburgh Sleep Quality Index (PSQI, Buysse et al., 1989).

***Sleep Knowledge.*** Sleep Knowledge, an individual's understanding of specific activities and whether they are beneficial to sleep, disruptive to sleep, or have no effect, was assessed using the Sleep Hygiene Awareness and Practice Scale (SHAPS, Lacks & Rotert, 1986). The 50-item scale includes three sections (sleep hygiene knowledge  $\alpha=.78$ , caffeine knowledge  $\alpha=.47$ , and sleep hygiene practices  $\alpha=.55$ ) however, only the awareness section of the scale, which measures knowledge, was used for this study due to reported low internal reliability of the other subscales (Brown et al., 2006; Brown et al., 2002). The Awareness subscale is composed of 13 items assessing general sleep hygiene knowledge ranging from beneficial to sleep, disruptive to sleep, or have no effect. Responses are given 1 point if correct, 2 points if omitted, and 3 points if incorrect. Scores range from 13-39 with higher scores indicating poor sleep hygiene (Lacks & Rotert, 1986, Brown et al., 2002). Cronbach's  $\alpha$  for this present study was 0.66.

***Sleep Hygiene.*** Sleep hygiene, assessed using the Sleep Hygiene Index (SHI), refers to behaviors that impact sleep quality and sleep quantity (Mastin, Bryson, & Corwyn, 2006). These behaviors include consistent and regular wake and sleep pattern every day, staying away from large meals before bedtime, exercising in the morning or afternoon, avoiding stimulants close to bedtime, and using your bed only for sleep (NSF, 2014). The respondent is asked to rate 14 statements using a scale of (5) always, (4) frequently, (3) sometimes, (2) rarely, and (1) never. Total scores range from 14-70 and

higher scores are indicative of poor sleep hygiene status. There are several instruments that have been used to assess sleep hygiene. However, most of them have low internal consistency (Cho, Kim, & Lee, 2013). Of those that have been tested, the SHI has the highest internal consistency (Cronbach's  $\alpha=.66$ ). A study of undergraduate students with an established *a priori* criterion of .70 for the SHI showed the SHI to be internally reliable with a Cronbach's  $\alpha$  of .726 (Knowlden et al., 2012). Mastin et al. (2015) tested the addition of social technology questions to the original SHI and suggests that it is an important aspect of sleep hygiene that should be included in future use of the SHI. The additional technology questions were included in the present study and the Cronbach's  $\alpha$  was 0.68.

***Self-efficacy.*** Self-efficacy is an individual's belief in their ability to practice a particular behavior (Bandura, 1998). Self-efficacy for sleep hygiene, defined as an individual's confidence in their ability to practice sleep-related behaviors, was assessed using the Self-Efficacy for Sleep Hygiene Inventory (SESHI). Following Bandura's guidelines for construction of self-efficacy scales, the SESH I was developed based on a literature review of best sleep hygiene practices and those recommended by the NSF (2014). Following review by two content experts, the scale included 30 items scored on a 0-100 point scale to assess respondents' confidence in performing specific sleep hygiene behaviors, with "0" indicating "not confident at all" and "100" representing "completely confident." The 30-item scale was pilot tested with a sample of 311 young adults using online surveys. Exploratory factor analysis revealed a 3-factor solution. Items with a factor loading  $<0.4$  were deleted. Two items were reworded and the final scale consisted

of 24 items with 3 subscales. Reliability coefficient (Cronbach's alpha) were: .87 (time management subscale), .73 (sleep influences subscale), and .69 (disruptive influences subscale). Items on the time management and sleep influences subscales reflect positive influences upon sleep while the disruptive subscale reflects negative influences. Based on the three distinct factors, a sum score was not calculated as it was determined a total score would violate the underlying tenets of each subscale.

The SESH used in the current study consists of 24 items with 3 subscales: time management, disruptive influences, and sleep influences. Prior to scoring, one item on the sleep influences subscale is reverse scored. To score each subscale, the number of items answered are summed and divided by the number of items answered. Scores for each subscale range from 0-100, with higher scores indicating higher self-efficacy. Cronbach's  $\alpha$  for this present study were .89 (time management subscale), .78 (disruptive influences subscale), and .74 (sleep influences subscale).

***Sleep Quality.*** Sleep Quality, defined as the degree of excellence in sleep which includes both quantitative and subjective data (Buysse et al., 1989; Yi et al., 2006), was assessed using the Pittsburgh Sleep Quality Index (PSQI, Buysse et al., 1989). PSQI is a 19-item self-rated survey that measures sleep quality retrospectively over a 1-month time period. The scale is comprised of seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction (Buysse et al., 1989). Each component is weighted equally on a 0-3 scale. Scores range from 0-21 with higher scores indicating greater sleep disturbances. The sum of the seven component scores yields a global score (Buysse

et al., 1989). The PSQI is a validated instrument often used to measure sleep quality with a reported Cronbach's alpha of .83. This measure of sleep quality has been used in numerous studies with the target population (Brown et al., 2006; Brown et al., 2002). Cronbach's  $\alpha$  for this present study was 0.74.

### **Statistical Analyses**

All analyses were performed using SPSS statistical software version 21.0. Prior to conducting any analyses, variables were tested to ensure that assumptions required for the statistical tests to be used were met. Frequency distributions, histograms, and measure of skewness and kurtosis were reviewed. Self-efficacy and sleep hygiene were approximately normally distributed. Sleep quality and sleep knowledge did not meet assumptions. Five outliers were identified between the two measures. The outliers were 'winsorized' and replaced with the next highest or lowest value. Assumptions for homogeneity of variances and homogeneity of covariances were also met for all variables. The repeated measures variable, condition, only had two levels, therefore the assumption of sphericity was not relevant. Missing data was managed using mean substitution. Prior to hypothesis testing, descriptive statistics and frequencies were analyzed for all study variables. After that, within-between analysis of variance (ANOVA) was conducted to address the hypothesis. The dependent variables for this study were sleep knowledge, sleep hygiene, self-efficacy for sleep hygiene subscales, and sleep quality. The independent variable for the study was the condition to which the participant was randomly assigned.



## Results

### Sample

The total number of participants who completed the pretest was 120 (94 females, 26 males). Of the 120 participants in the pretest group, 111 (92.5%) completed the 6 week intervention. However, 15 of those completing the intervention did not complete the post test, resulting in a final sample of 96. This resulted in an attrition rate of 20%. Of the 96 participants retained, 52 (54%) were intervention group participants and 44 (46%) were in the attention control group. Descriptive statistics were calculated for the 96 study participants (see Table 1). Participants ( $n=96$ ) included 16 males and 80 females. Ages ranged from 18 years to 26 years with an average age of 20.61 years ( $SD=2.05$ ). The average time in bed was almost eight hours ( $M=7.93$ ,  $SD=1.20$ ). The healthy young adults in the study self-reported 63.5% good sleep quality at baseline with 78 % reporting good sleep quality at posttest.

*Table 1. Study Participant Descriptive Statistics (N=96)*

<i>Variable</i>	<i>Categories</i>	<i>Frequency</i>	<i>Percentage</i>
Age	18	10	10.4
	19	25	26
	20	19	19.8
	21	17	17.7
	22	9	9.4
	23	5	5.2
	24	5	5.2
	25	2	2.1
	26	4	4.2
Race/Ethnicity	White/Caucasian	78	81.3
	Black/African American	6	6.3
	Asian	3	3.1

(Table 1 continued)

	Other	5	5.2
	Mixed	4	4.2
Classification			
	Freshman	10	10.4
	Sophomore	24	26.0
	Junior	42	43.8
	Senior	19	19.8
Major			
	Nursing	36	37.5
	Health and Kinesiology	18	18.8
	Business	3	3.1
	STEM	20	20.8
	Education/Psychology	12	12.5
	Liberal Arts	7	7.3

Data were examined to determine if the intervention and control (n=96) groups differed across key demographic variables. An independent samples t-test confirmed no significant mean age differences between the intervention group ( $M=20.85$ ,  $SD=2.03$ ) and the attention control condition ( $M=20.34$ ,  $SD=2.07$ ).

A series of chi-square ( $\chi^2$ ) tests of independence were conducted to determine if the intervention and attention control groups differed with regard to race/ethnicity, classification, major, earliest class, latest class, living arrangement, marital status, and employment status. The numerical breakdown of participants by intervention and control group and the chi-square ( $\chi^2$ ) results for each demographic variable are provided in Table 2. As seen in Table 2, the participants in the intervention and control groups were very similar. There were not any significant differences between the groups.

Table 2. Intervention & Control Groups: Sample Size by Demographic Categories (N=96)

		Intervention Group	Control Group
Gender	Male	11	5
	Female	41	39
		$\chi^2(1) = 1.65, p = .200$	
Classification	Freshman	3	7
	Sophomore	15	10
	Junior	22	20
	Senior	12	7
		$\chi^2(3) = 3.37, p = .338$	
Major	Nursing	22	14
	Health and Kinesiology	10	8
	Business	2	1
	STEM	11	9
	Education/Psychology	4	8
	Liberal Arts	3	4
		$\chi^2(5) = 3.37, p = .644$	
Earliest Class	Before 8:00 AM	4	0
	8:00 AM-8:59 AM	29	22
	9:00 AM-9:59 AM	13	15
	10:00 AM-10:59 AM	4	4
	11:00 AM-11:59 AM	2	2
	Other	0	1
		$\chi^2(5) = 5.48, p = .361$	
Time of Latest Class	Before 5:00 PM	36	29
	5:00 PM-5:59 PM	8	4
	6:00 PM-6:59 PM	7	10
	7:00 PM-7:59 PM	1	0
	Other	0	1
		$\chi^2(4) = 3.98, p = .409$	
Living Arrangement	On campus in dorms	2	2
	On campus apartments	10	13
	Off campus multiple dwelling	20	14

	Off campus single dwelling	20	15
		$\chi^2(3) = 1.51, p = .680$	
Marital Status	Single	47	42
	Married/partnered	5	2
		$\chi^2(1) = .906, p = .341$	
Employment Status	Full Time	5	9
	Part Time	28	17
	Not Employed	19	18
		$\chi^2(2) = 3.21, p = .200$	
Race/Ethnicity	White	40	38
	Black or African American	3	3
	Asian	3	0
	Other	4	1
	Mixed	2	2
		$\chi^2(4) = 4.21, p = .378$	

The percentages should be considered when examining males and females in the sleep and healthy habits conditions, as there were a larger number of females. Results from the chi-square test of independence were not significant,  $\chi^2(1) = 1.65, p = .200$ .

### Hypothesis Testing

To determine any within and between group effects from the text-message intervention, a within-between ANOVA was conducted. The within-subject factor was time and had two levels: pretest and posttest. The between-subjects factor was the treatment condition and had two levels: the experimental condition and the attention control condition. The dependent variables were the SHAPS sleep hygiene awareness score, the SHI score, the SESH time management, sleep influences, and disruptive sleep

influences subscale scores, and the PSQI total sleep quality score. Means and standard deviations for all scales at pre-test and post-test are summarized in Table 3.

*Table 3. Means and Standard Deviations by Group and Time*

	Sleep (n=52)		Healthy Habits (n=44)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Sleep Quality				
Pretest	5.46	2.41	5.45	2.12
Posttest	4.75	1.82	4.57	2.10
Sleep Knowledge				
Pretest	19.73	3.67	20.28	3.79
Posttest	19.03	4.44	20.00	3.37
Sleep Hygiene Index				
Pretest	38.90	6.30	41.50	6.31
Posttest	38.69	6.98	38.61	6.06
Self-efficacy Time Management				
Pretest	59.31	21.87	59.15	18.13
Posttest	59.75	23.70	57.40	20.34
Self-efficacy Sleep Influences				
Pretest	62.83	15.24	58.80	15.06
Posttest	65.17	18.80	62.50	19.55
Self-efficacy Disruptive Influences				
Pretest	49.89	21.10	50.48	16.76
Posttest	49.72	17.71	50.48	18.76

### **Sleep Knowledge**

There were no significant between group differences ( $F [1, 94] = 1.355; p = .25$ ). The main effect of time, ( $F [1, 94] = 1.222; p = .27$ ) was not significant for sleep knowledge. There was an increase in sleep knowledge among both groups but no significant between or within group differences were observed.

### **Sleep Hygiene**

There were no significant between group differences ( $F [1, 94] = 1.086; p = .300$ ). There was a statistically significant within-group effect of time on sleep hygiene ( $F [1, 94] = 8.508, p = .004, \eta^2 = .083$ ). There was a statistically significant interaction between group and time on sleep hygiene ( $F [1, 94] = 6.34, p = .01$ , partial  $\eta^2 = .063$ , a small effect size). Sleep Hygiene at time 1 for the sleep group was ( $M = 38.90, SE = .87$ ) and time two ( $M = 38.69, SE = .91$ ). Sleep Hygiene at time 1 for the attention control group was ( $M = 41.5, SE = .95$ ) and time two ( $M = 38.61, SE = .99$ ). The attention control group sleep hygiene score decreased to a level below the sleep intervention group score (see Figure 1); lower scores indicated better sleep hygiene.

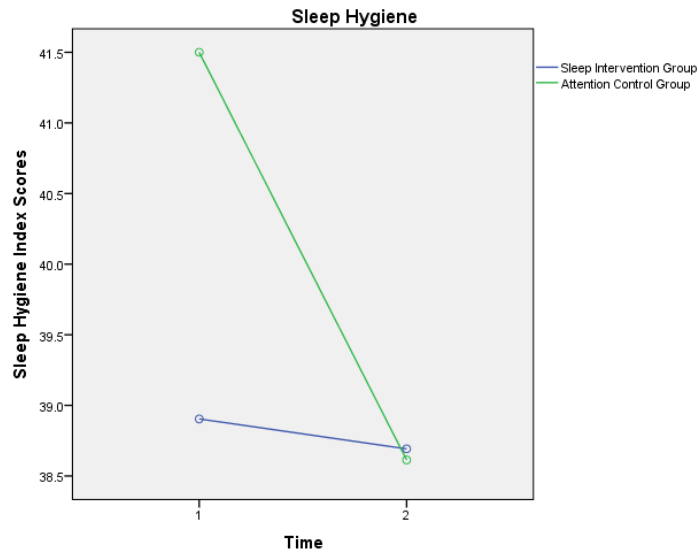
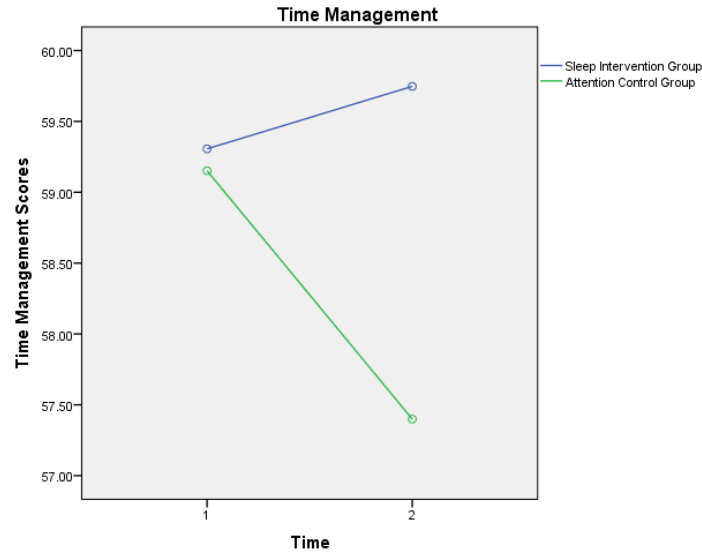


Figure 1. Sleep Hygiene Interaction

### Self-efficacy for Sleep Hygiene

**Positive Influences.** There were no significant between group differences ( $F [1, 94] = .107, p = .75$ ). The main effect of time ( $F [1, 94] = .100, p = .75$ ) and the group by time interaction ( $F [1, 94] = .281; p = .60$ ) were not significant for the time management subscale. There was an increase in self-efficacy for time management for the sleep intervention group and a decrease for the healthy habits attention control group, but no significant differences between or within groups (see Figure 2). There were no significant between group differences for the sleep influences subscale ( $F [1, 94] = 1.083, p = .30$ ). There was a significant within group difference with the main effect of time for Sleep Influences ( $F [1, 94] = 4.26, p = .04$ , partial  $\eta^2 = .043$ ). In order to determine where the differences lie, paired sample t-test were conducted for each condition. However, sleep influences was not statistically significant when examined independently for the attention control group or the sleep intervention group.



*Figure 2. Self-Efficacy for Sleep Hygiene: Time Management Interaction*

**Disruptive Influences.** There were no significant between group differences ( $F [1, 94] = .038; p=.85$ ). In addition, the main effect of time was also not significant for disruptive influences ( $F [1, 94] = .003, p=.96$ ).

### **Sleep Quality**

There were no significant between group differences ( $F [1, 94] = .060, p=.81$  for sleep quality. There was a significant within group difference with the main effect of time for PSQI ( $F [1, 94] = 16.20, p<.001, \text{partial } \eta^2 = .147$ ). To confirm the results, paired samples t-tests were conducted for both groups. For the sleep intervention group there was a significant decrease for PSQI ( $t=2.49, p=.02$ ). For the healthy habits control group there was a significant decrease for PSQI ( $t=3.30, p=.002$ ). The decrease in PSQI score for both groups was indicative of better sleep quality.



## Associations between Sleep Quality, Self-Efficacy, Sleep Hygiene Index, and Sleep Knowledge

A Pearson's product-moment was used to assess the relationship between sleep quality, self-efficacy for sleep hygiene (time management, sleep influences, and disruptive influences subscales), sleep hygiene, and sleep knowledge among young adults aged 18-26 years. Preliminary analysis showed the relationship to be monotonic, as assessed by visual inspection of a scatterplot for all measures.

Sleep quality scores were significantly related to scores on the sleep hygiene index ( $r = .34, p < .01$ ) and time management ( $r = -.48, p < .01$ ). Thus, sleep quality improves as sleep hygiene scores improve. As time management improves, so does sleep quality. Additionally, intercorrelations between sleep quality, sleep hygiene, sleep knowledge, time management, sleep influences, and disruptive influences can be seen in Table 4.

*Table 4. Correlations*

Pearson Correlation	1	2	3	4	5
1. Sleep Quality	--				
2. Sleep Hygiene	.323**	--			
3. Sleep Knowledge	.227*	.243*	--		
4. Time Management	-.437**	-.443**	-.365**	--	
5. Sleep Influences	-.138**	-.281**	-.325**	.490**	--
6. Disruptive Influences	-.134	-.043	-.178	.323**	.496**
**. Correlation is significant at the 0.01 level (2-tailed)					
*. Correlation is significant at the 0.05 level (2-tailed)					

## Additional findings

Additional analyses were run to assess the influence of demographic variables on outcome variables. A factorial ANCOVA controlling for pretest scores was run to

determine if degree major influenced sleep quality. Liberal arts had the worst sleep quality while nursing majors had the best sleep quality in comparison to the other groups ( $F [5, 89]=4.313, p<.005$ , partial  $\eta^2 = .195$ ). Sleep quality was significantly correlated with number of roommates ( $r=.31, p<.01$ ), and level of stress ( $r=.43, p<.01$ ). Sleep hygiene was significantly related to preference for staying up late or getting up early ( $r_s=.21, p<.05$ ), and level of stress ( $r=.32, p<.01$ ). Time management was significantly related to experiencing interruptions ( $r=.27, p<.01$ ), preference for staying up late or getting up early ( $r_s=-.29, p<.01$ ), time of productivity ( $r_{pb} = -.22, p<.05$ ), number of roommates ( $r=-.022, p<.05$ ), level of stress ( $r_s=-.40, p<.01$ ), and time in bed ( $r=.22, p<.05$ ).

## Discussion

### Demographics

Participants in this study were predominantly female and may not be representative of the young adult/ college student population in general. The preponderance of females may also be related to the higher percentage of participants reporting nursing as their university major. Those majoring in a health related field, such as nursing or health and kinesiology, may already have a better understanding of healthy behaviors and engage in better sleep hygiene than the general population, which may account for some of the insignificant results.

Participants were asked to include the time of their earliest class and their latest class in the survey, however, it is not clear if this was a consistent pattern for participants on a daily basis. The survey did not distinguish between weekend sleep/wake times and

weekday sleep/wake times, and the PSQI asks participants to consider the last month of sleep when answering items. Students completed the baseline survey at the beginning of the semester when their sleep habits may have been different due to a break from school. The posttest was taken close to the midterm which may have adversely affected sleep. Of interest, though, is the resulting improved sleep quality though the timing occurred at a time that is believed to be a stressful time in the semester when sleep quality may be worse. Interestingly, students reported improved sleep quality even though the timing of the study occurred near midterms. Time in Bed (TIB) at baseline ( $M=8.16$ ,  $SD=1.24$ ) and posttest ( $M=7.93$ ,  $SD=1.20$ ) was within the recommended range as described in previous research (NHLBI, 2009; NIH, 2013). Though the TIB from baseline to posttest decreased, sleep quality improved for both the intervention and attention control groups. Using the PSQI cutoff score of  $\leq 5$  as indicative of good sleep quality and  $< 5$  as poor sleep quality, 46% of participants reported poor sleep quality at baseline and only 28% reported poor sleep quality after 6 weeks. These findings suggest that a text-message intervention may be beneficial for preventing the decrease in sleep quality that is common as the semester progresses for young adult college students (Brown et al., 2006). Though both groups received different messages, it is possible that the healthy habits attention control messages contributed to improved sleep as physical activity has been reported to have moderate beneficial effects on sleep quality (Kredlow, Capozzoli, Hearon, Calkins, & Otto, 2015). Content for the healthy habits messages included tips about physical activity, healthy eating, and managing stress. Although no specific

information related to sleep was included in the messaging, it is possible that the messages related to other healthy habits influenced the results of this study.

## **Hypothesis**

The study hypothesis, which predicted participants in the experimental group would have significantly higher scores for sleep knowledge, sleep hygiene, self-efficacy for sleep hygiene, and sleep quality, was not supported. Though not significant between groups or consistently across time, there was improvement for sleep knowledge, sleep hygiene, and sleep quality, and the sleep influences subscale. Time management improved in the sleep intervention group, but it did not improve in the attention control group. It is possible that the content of the messages for the sleep intervention group influenced participant's confidence in managing their time. The disruptive influences subscale score improved in the sleep intervention group and remained the same for the attention control group.

Sleep knowledge scores did not significantly improve in spite of the experimental group receiving specific text messages related to sleep. Of the 96 participants who completed the pretest and posttest, 15 (16%) reported receiving information from other sources including the internet, friends, news, other participants, classes, and family. This potentially could have been a confounding variable that impacted results. Additionally, the knowledge scores at baseline for participants indicated that they had a relatively good knowledge of sleep practices prior to the intervention. Therefore, this particular sample had less room for an improved score compared to those who scored lower at baseline.

An unexpected finding was the improvement in reported sleep hygiene among the control group compared with the intervention group. As noted, it may be that the control group received messages that stimulated other healthy behaviors that subsequently improved sleep hygiene. Sixty six percent of the participants indicated that the text messages motivated them to practice good sleep practices and/or health behaviors. A follow-up cross-over study may help sort out the importance of the content of the messages in changing sleep hygiene practices.

Findings from the study revealed that sleep quality improved in both groups but did not improve more for the experimental group. It is possible the content of the message may be less important than receiving a message. The text-message itself may have acted as a reminder or trigger for the participants to improve their health behaviors. It is also possible that improving other health behaviors as a result of receiving text messages, such as increasing activity, may have contributed to better sleep quality in the control group.

Self-efficacy for sleep hygiene subscale scores did not significantly improve in either the control or the experimental group. Since persuasion has the least amount of impact on improving self-efficacy, it may be that the current study did not allow for adequate time to capture the impact of enactive mastery on self-efficacy for sleep. The use of a new instrument may also have affected the results of the study. As the only known stand-alone self-efficacy scale for sleep hygiene, the SESH has a better reported reliability than the self-efficacy subscales embedded within other sleep instruments (Digdon, 2013; Grandner et al., 2013). However, additional testing and refinement may

be required to ensure the SESHII adequately captures self-efficacy for sleep among young adults.

### **Research Question**

The research questions explored the relationships among the key study variables of sleep knowledge, sleep hygiene, self-efficacy for sleep, and sleep quality. Additional analysis explored the relationship of the study variables to demographic variables.

As expected, sleep knowledge was positively correlated with sleep hygiene and negatively correlated with self-efficacy for sleep hygiene subscales. The finding that sleep quality is related to sleep hygiene is supported in the literature (Brown et al., 2002; Mastin et al., 2006). Of interest is the finding that the time management subscale was most closely related to sleep quality. Additionally, the time management subscale was significantly related to sleep hygiene and knowledge, suggesting that time management is an important component associated with sleep. Interventions with a time management component could be beneficial to the sleep hygiene practices of young adult college students.

Upon additional analyses of study variables and demographic variables, level of stress was closely related to multiple study variables including PSQI, SHI, and Time Management. Research looking at stress and sleep variables has been done, but measures of stress have not been consistent across studies. According to Lee et al. (2013), stress and sleep problems affect health and well-being and they are strongly linked. Therefore, it is vital to understand what factors may enhance young adults' ability to cope with life stressors in a positive way so that sleep is not negatively affected (Barber et al., 2010;

Lee et al., 2013; Tavernier & Willoughby, 2014). Though not a major variable in this study, the results support those of others that report stress is related to sleep.

Dependent variables associated with multiple demographic variables included PSQI and the Time Management subscale of the SESH. Of interest is the relationship between time management and multiple dependent variables. Though time management is considered to be an important life skill introduced as young adults attend college, research focused specifically on this concept in college students is lacking. George et al. (2008) studied the factors associated with academic and personal success among university students and found that time-management skills were the largest predictor of cumulative grade point average (GPA). Sleep variables also influenced academic accomplishment, but there was a negative correlation between the two. Students who slept less, had a lower cumulative GPA (George et al., 2008). Results from this study suggest that time management may be an influencing factor in sleep among young adult college students. Therefore, future research is indicated in this area.

### **Limitations and Strengths**

There are several limitations of this study. First, some of the instruments, although previously used in the literature, did not demonstrate reliability with this sample. Second, it is possible that extraneous activities, classes, or interactions could have affected their sleep patterns. Throughout the study, participants may have had events such as exams, assignments, or other stressful coursework that affected their sleep quality; these were not captured in the current study. Students were enrolled in various courses throughout the university and may have accessed information that influenced

their sleep knowledge beyond the information included as part of the study. To help control for this threat, participants were asked if anything happened during the study that affected their sleep patterns. Though participants were recruited across the undergraduate student community and randomly assigned to a condition, it is possible that participants in the treatment group discussed the intervention with students in the control group which could have contaminated the results. Third, the sample for this study was relatively healthy. It is possible that limiting the sample to those who did not necessarily need treatment may have impacted the effect size. Next, genders were not equally represented. While the sample does not accurately represent the demographics of the university, there was an equal distribution of gender in the control and intervention groups. Another limitation includes the use of self-report measures. An objective measure of sleep, such as actigraphy, would strengthen the external validity and should be explored in the future. Social desirability is another potential threat to the external validity of the study. A statement was included in the survey that reminded participants that there were no “right” answers and they could respond truthfully. Scores improved over time. It is possible that the improved scores and results of significance may have been influenced by testing. Finally, participants in the study were all college students at one university and results may not be generalizable to the greater young adult population.

Strengths of this study include the experimental design, randomization of participants, and utilization of an attention control group. Additionally, the text-messaging intervention used in this study is widely utilized by young adults and is relatively inexpensive to implement. Attrition may pose a threat to the internal validity



especially involving young adult college students, however in this study the attrition rate was acceptable at 20%.

### **Future Recommendations**

The transition into young adulthood is an important time for health promotion. Though knowledge alone does not produce or lead to behavior change, strategies to determine whether poor sleep quality is an issue that results from a knowledge deficit is needed. An assessment of knowledge may be helpful to determine target educational interventions for this population. In the literature, the use of the terms sleep knowledge and sleep beliefs were used interchangeably. Exploration of these terms, how they differ, and their influence on sleep behaviors among young adults may provide information for future studies. Additionally, future research to develop a reliable instrument that measures knowledge is needed.

According to Bandura (1997), self-efficacy is an important component of behavior change. This study was unique in that it assessed student's self-efficacy for sleep hygiene behaviors. Future research could include the use of SESH1 across a larger sample of young adult college students.

The literature indicated that sleep is an issue for students and can be associated with academic problems (Gualtney, 2010). Therefore, research that supports efforts to provide education can help students implement healthy sleep hygiene practices and may provide benefits to academic achievements of young adult college students enrolled in college.

It is possible that participant's with health related majors may have had an increased knowledge base of healthy sleep and lifestyle behaviors at baseline. In the future, considerations to exclude health related majors should be explored. It is also possible that questions included in the pretest survey could have inadvertently impacted participant's behavior through testing. Future consideration should be given to use of other research designs to help limit this threat. Finally, there was no way to document if a text message was read by the recipient. The use of a two-way text messaging intervention which requires the recipient of the text to respond may strengthen the design of the study.

## **Conclusions**

Text messaging and the use of social media is prevalent among young adult college students. To our knowledge, this is the first study to use a text messaging intervention to assess how a text-message intervention affected sleep quality, sleep knowledge, self-efficacy for sleep hygiene, and sleep hygiene among a selected group of relatively healthy young adult college students. One of the most interesting findings is the improved scores for both the intervention and attention control groups. Future research should consider comparing text messaging and other methods of sleep education to improve sleep among young adult college students.

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## Chapter 4.

### Summary and Conclusion

This program of research began with an initial interest in the obesity epidemic among young adults, followed by an interest in behaviors that have been shown to be associated with obesity. Further exploration involved review of interventions among young adults and methods that demonstrated effectiveness in this population. To further understand behaviors that lead to change, an exploration of the concepts of motivation and trigger was acquired through concept analyses reported in the first manuscript, *Analysis of the Complementary Concepts of Trigger and Motivation: Influence on Health Behaviors*. Characteristics of behavior change were explored through the context of motivation and trigger. The idea of ability was also explored as a necessary component to behavior change. Findings from this analysis led to an interest in the use of text-messaging as a trigger to influence or motivate behavior change among young adults.

*Effects of a Sleep Hygiene Text-Message Intervention on Sleep in College Students* in Chapter 2 was a report of original research that evaluated the effects of a text-message intervention on sleep quality, sleep hygiene, self-efficacy for sleep hygiene, and sleep knowledge. While not significant between groups, the text messaging in general appeared to improve sleep hygiene and sleep quality.

Findings from this study have implications for nurses and university health professionals to educate the young adult population about the importance of sleep and its health benefits. Nurses, have the expertise as health educators to contribute to the goals and objectives outlined in *Healthy People 2020*. Though not specifically related to young

adult college students, Vallidon, Jackson, and O'Brien (2010) conducted a qualitative study to evaluate nurses' knowledge of adolescent sleep. They concluded that there is a need for nurses to be educated about sleep issues among adolescents and young adults; specifically regarding the physiology of sleep and their propensity to experience negative outcomes as a result of poor sleep.

This study adds to the literature by demonstrating the feasibility of a text-message intervention among young adult college students. As technology continues to evolve, it is important for healthcare professionals to explore methods such as text-messaging that are used by a majority of the young adult population to intervene for improvement of healthy behaviors. Building upon this research, focus groups to further explore attitudes and beliefs about sleep among young adults may yield valuable information about the content and duration of messages to improve upon the results of this study. The difference in messages in this study did not have a significant impact on the results, therefore, further research is indicated to further understand the preferences and needs of the young adult population. The time management component of the self-efficacy for sleep hygiene inventory was associated with other sleep measures. Though time management is considered to be an important skill to develop during the transition to young adulthood, it is unclear if a focus on time management would improve sleep behaviors in this population. Further exploration of the relationship between time management and sleep behaviors may provide additional information on those factors that impact sleep and further inform future interventions.

A text-messaging campaign tailored to individuals based upon certain responses about sleep-behaviors may also yield valuable information. A study conducted by Skov-Eltrup et al. (2014) compared smoking cessation rates for adolescent and young adult smokers using a tailored and untailored text message intervention. Results of the study support the use of tailored messages, which may include personalization, content matching, or feedback to participants. Thus, further exploration for sleep behaviors and tailored text messages is indicated. Evidence from this study will help guide future intervention studies among the young adult population.

According to the United States Department of Health and Human Services and *Healthy People 2020* objectives (USDHHS, 2011), adequate sleep is vital to good health, and goals related to sleep include increasing knowledge of the health benefits associated with adequate sleep. Specifically, treatment of sleep disorders and knowledge of adequate sleep is associated with improved health, productivity, wellness, quality of life, and safety at work and on the road. The emerging program of research reported in the portfolio will be continued with investigation of measures to work toward *Healthy People 2020* goals to improve the current and future health of the young adult and college-age population.



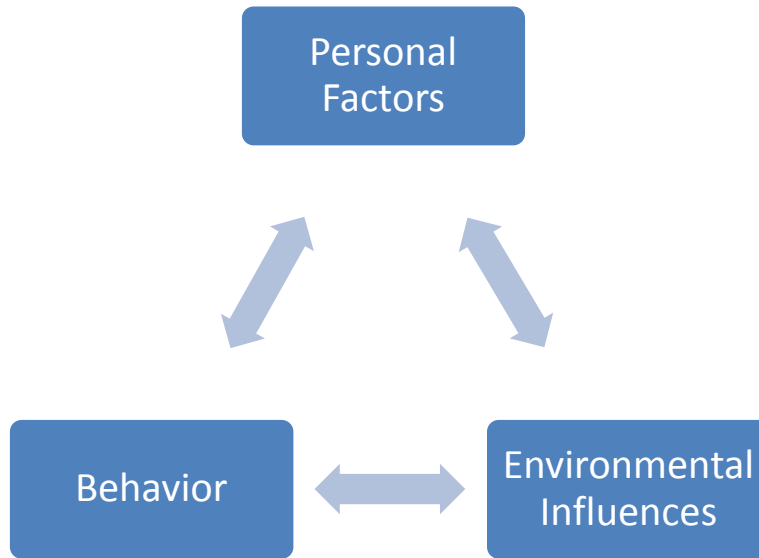
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## Appendix A. Social Cognitive Theory



*Figure 3. Social Cognitive Theory (Bandura, 1986)*

## Appendix B. IRB Approval



THE UNIVERSITY OF TEXAS AT TYLER

3900 University Blvd. • Tyler, TX 75799 • 903.565.5774 • FAX: 903.565.5858

Office of Research and  
Technology Transfer

Institutional Review Board

August 28, 2015

Dear Ms. Gipson,

Your request to conduct the study: *Effects of a Sleep Hygiene Text-Message Intervention on Sleep in College Students*, IRB# F2015-02, has been approved by The University of Texas at Tyler Institutional Review Board under expedited review. This approval includes the written informed consent that is attached to this letter, and your assurance of participant knowledge of the following prior to study participation: this is a research study; participation is completely voluntary with no obligations to continue participating, and with no adverse consequences for non-participation; and assurance of confidentiality of their data.

In addition, please ensure that any research assistants are knowledgeable about research ethics and confidentiality, and any co-investigators have completed human protection training within the past three years, and have forwarded their certificates to the IRB office (G. Duke).

**Please review the UT Tyler IRB Principal Investigator Responsibilities, and acknowledge your understanding of these responsibilities and the following through return of this email to the IRB Chair within one week after receipt of this approval letter:**

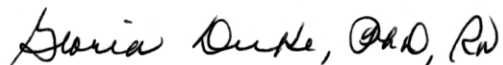
- This approval is for one year, as of the date of the approval letter

Appendix B (Continued)

- **The Progress Report form must be completed for projects extending past one year.** Your protocol will automatically expire on the one year anniversary of this letter if a Progress Report is not submitted, per HHS Regulations **prior** to that date (45 CFR 46.108(b) and 109(e): <http://www.hhs.gov/ohrp/policy/contrev0107.html>
- Prompt reporting to the UT Tyler IRB of any proposed changes to this research activity
- **Prompt reporting to the UT Tyler IRB and academic department administration will be done of any unanticipated problems involving risks to subjects or others**
- Suspension or termination of approval may be done if there is evidence of any serious or continuing noncompliance with Federal Regulations or any aberrations in original proposal.
- Any change in proposal procedures must be promptly reported to the IRB prior to implementing any changes except when necessary to eliminate apparent immediate hazards to the subject.

Best of luck in your research, and do not hesitate to contact me if you need any further assistance.

Sincerely,



Gloria Duke, PhD, RN

Chair, UT Tyler IRB

Appendix C. Informed Consent

**THE UNIVERSITY OF TEXAS AT TYLER**

**Informed Consent to Participate in Research**

**Institutional Review Board # F2015-02**

**Approval Date: August 28, 2015**

**Project Title:** Effects of a Sleep Hygiene Text-Messaging Intervention on Sleep in College Students

- 1. Principal Investigator: Christy Gipson, MSN, RN, CNE**
- 2. Participant's Name: Young Adults**

**To the Participant:**

You are being asked to take part in this study at The University of Texas at Tyler (UT Tyler). This permission form explains:

- Why this research study is being done.
- What you will be doing if you take part in the study.
- Any risks and benefits you can expect if you take part in this study.

After talking with the person who asks you to take part in the study, you should be able to:

- Understand what the study is about.
- Choose to take part in this study because you understand what will happen

**4. Description of Project**

- The purpose of this research is to see if text-messaging can make a difference in college students understanding of sleep and its effect on health. Nurses and researchers can use this information to help other college students who have difficulty sleeping.

**5. Research Procedures**

If you agree to be in this study, we will ask you to do the following things:

- Participate voluntarily
- Provide your phone number and email address so you may be contacted via

## Appendix C (Continued)

text message or email with further information about the study.

- Complete a confidential online survey about sleep at the beginning and end of the study
- After you have completed the initial questionnaire, you will be asked if you are willing to be randomized to receive text messages about sleep or healthy lifestyle education over a 6 week period.
- Agree to communicate with the researcher if more information is needed.
- 

### **6. Side Effects/Risks**

Minimal risks associated with this study may involve concerns with access to personal data such as participant name, phone number, and email address. All personal identifying information will be removed before it is used in the study. Beyond that, there are no known risks to participating in this study other than the time it will take to complete the surveys and read the brief educational information sent by text-message.

### **7. Potential Benefits**

While completing the survey may not benefit you individually, you will be helping researchers understand sleep in young adult college students, which can help guide future research. You may benefit by learning more about healthy behaviors and sleep during the study.

### **Understanding of Participants**

8. I have been given a chance to ask any questions about this research study. The researcher has answered my questions.
9. If I sign this consent form I know it means that:
  - I am taking part in this study because I want to. I chose to take part in this study after having been told about the study and how it will affect me.
  - I know that I am free to not be in this study. If I choose to not take part in the study, then nothing will happen to me as a result of my choice.
  - I know that I have been told that if I choose to be in the study, then I can stop at any time. I know that if I do stop being a part of the study, then nothing will happen to me.

### Appendix C (Continued)

- I will be told about any new information that may affect my wanting to continue to be part of this study.
  - The study may be changed or stopped at any time by the researcher or by The University of Texas at Tyler.
  - The researcher will get my written permission for any changes that may affect me.
10. I have been promised that that my name will not be in any reports about this study.
11. I also understand that any information collected during this study may be shared as long as no identifying information such as my name, address, or other contact information is provided). This information can include health information. Information may be shared with:
- Organization giving money to be able to conduct this study
  - Other researchers interested in putting together your information with information from other studies
  - Information shared through presentations or publications
12. I understand The UT Tyler Institutional Review Board (the group that makes sure that research is done correctly and that procedures are in place to protect the safety of research participants) may look at the research documents. These documents may have information that identifies me on them. This is a part of their monitoring procedure. I also understand that my personal information will not be shared with anyone.
13. I have been told about any possible risks that can happen with my taking part in this research project.
14. I also understand that I will not be given money for any patents or discoveries that may result from my taking part in this research.
15. If I have any questions concerning my participation in this project, I will contact the principal researcher: Christy Gipson at (903-918-1684) or email ([cgipson@uttyler.edu](mailto:cgipson@uttyler.edu)).



Appendix C (Continued)

16. If I have any questions concerning my rights as a research subject, I will contact Dr. Gloria Duke, Chair of the IRB, at (903) 566-7023, [gduke@uttyler.edu](mailto:gduke@uttyler.edu),

or the University's Office of Sponsored Research:  
The University of Texas at Tyler  
c/o Office of Sponsored Research  
3900 University Blvd  
Tyler, TX 75799

I understand that I may contact Dr. Duke with questions about research-related injuries.

17. **CONSENT/PERMISSION FOR PARTICIPATION IN THIS RESEARCH STUDY**

I have read and understood what has been explained to me. I give my permission to take part in this study as it is explained to me. I give the study researcher permission to register me in this study. I have read, understood, and printed a copy of the above consent form and desire of my own free will to participate in this study.

☐ Yes

☐ No

## Appendix D. Recruitment Script

Hi! My name is Christy Gipson. I am a doctoral student at the University of Texas at Tyler. I am collecting data on sleep in young adults. If you are interested please click on the link below to see if you are eligible to participate. As part of this study, you will be asked to complete an online survey which asks questions about your sleep and demographic data and receive text messages three times a week with information about sleep or healthy habits. You will not be paid for participating but those who complete the study will be eligible for a drawing of one of six \$75.00 gift cards.

This study has been approved by the Institutional Review Board at the University of Texas at Tyler, and is intended for students enrolled full time at UT Tyler who are between the ages 18-26 years old and currently own and use a personal mobile device with unlimited text messaging capability. Your anonymous answers will help with future research related to sleep.

This online survey should take no more than 30 minutes of your time. Your participation in this study is voluntary and you may withdraw at any time. Please contact the IRB chair, Dr. Gloria Duke at [gduke@uttyler.edu](mailto:gduke@uttyler.edu) or the primary researcher, Christy Gipson at [cgipson@uttyler.edu](mailto:cgipson@uttyler.edu), for any questions or concerns.

[https://uttyler.az1.qualtrics.com/SE/?SID=SV\\_514Jcs0bW0m4tbT](https://uttyler.az1.qualtrics.com/SE/?SID=SV_514Jcs0bW0m4tbT)

Appendix E. Recruitment Flyer

Are you an undergraduate student interested in **SLEEP?**

Seeking volunteers for a 6 week research study on sleep

Participants will be entered to win 1 of 6 \$75 gift cards



**In order to participate in this study you must be:**

- Enrolled as a full-time undergraduate student at UT Tyler
- Age 18-26
- Own and use a personal mobile device with unlimited text messaging capability
- Able to read and speak English

**To volunteer for this sleep research study or for more information contact:**

**Christy Gipson MSN, RN, CNE**  
(PhD candidate)  
cgipson@uttyler.edu

This project has been approved by the UT Tyler Institutional Review Board (IRB).  
Institutional Review Board # F2015-02

**If you take part in the study, you will:**

- Complete sleep questionnaires at the beginning and end of the study
- Receive information about healthy behaviors via text message

## Appendix F. Intervention Protocol

1. Upon confirmation of eligibility, participants will be assigned to the attention control or treatment group using a table or random numbers.
2. Once all participants have been placed in the control or treatment group, participants in each group will be notified by text message.
  - a. Participants in both the treatment and control groups will receive bi-weekly text messages at 3:00 in the afternoon on Tuesday and Thursday for the duration of 6 weeks from an online program, ProTexting, which can send messages to participants. . Participants will have the option to opt out of receiving messages at any time by following the instructions included in the bi-weekly text messages that are sent. Participants will also be reminded about the post-test survey at the 4 week mark. Details about the content of messages for the text-message intervention can be found in Table 2 and 3.
  - b. To help with retention of participants, text messages unrelated to the educational intervention will be sent once a week to help engage participants in the intervention. Content for the messages can be found in the table below:

Week 1	Thank you for participating in the sleep study! Let me know if you have any questions! You can contact me via email at <a href="mailto:cgipson@uttyler.edu">cgipson@uttyler.edu</a>
Week 2	Hope your classes are going well!
Week 3	Halfway through the study! Hope your semester is off to a good start!
Week 4	Hope you are doing well – remember your faculty are available for help if needed!
Week 5	We are almost at midterm, which can be a stressful time. Remember to take some time for yourself. Healthy habits will help you feel better!
Week 6	This is the final week of the study! Thank you for participating and remember to complete the survey that will be sent next week to your email.

## Appendix G. Biweekly Text Messages

<b>Wk</b>	<b>Sleep Group Message Content</b>	<b>Healthy Habits Group Message Content</b>
<b>1</b>	<ul style="list-style-type: none"> <li>Consistent wake &amp; sleep times are important. Choose a time that you can go to bed &amp; wake up so you can get 7-9 hours of sleep each night.</li> <li>Lack of sleep can lead to health problems, academic issues, &amp; poor productivity. Memories are formed during sleep. So make sleep a priority!</li> </ul>	<ul style="list-style-type: none"> <li>Physical activity is important. It is recommended that adults get at least 150 minutes a week to improve overall health and fitness.</li> <li>Regular physical activity can help decrease your risk for many chronic conditions. Find something you enjoy and get moving!</li> </ul>
<b>2</b>	<ul style="list-style-type: none"> <li>Caffeine, nicotine, alcohol, and energy drinks can disrupt your sleep and should not be used close to bedtime (within 4-6 hours).</li> <li>Napping during the day can interrupt your normal pattern of sleep.</li> </ul>	<ul style="list-style-type: none"> <li>Eating 5 or more servings of fruits and vegetables a day is key to a healthy diet. Eat 5 or more to improve your diet.</li> <li>Did you know that sugar-sweetened drinks are a major source of added sugar and calories? Drink water during the day and avoid sugary drinks</li> </ul>
<b>3</b>	<ul style="list-style-type: none"> <li>Eating large meals right before bedtime can disrupt sleep, so avoid large meals close to bedtime.</li> <li>Chocolate has caffeine in it and can disrupt sleep.</li> </ul>	<ul style="list-style-type: none"> <li>Fruits and vegetables are a natural source of energy in your diet and are great for eating on the go in between classes.</li> <li>Having trouble staying active? Try stretching or walking around during study breaks to get some physical activity.</li> </ul>
<b>4</b>	<ul style="list-style-type: none"> <li>Exercising is good for your health and can promote good sleep, but you should be careful to avoid strenuous exercise close to bedtime.</li> <li>You should only use your bed for sleep. Using it to watch TV, do homework, listen to music, or read can be disruptive to your sleep.</li> </ul>	<ul style="list-style-type: none"> <li>Stress can impact your school performance. Try taking a break from your studies and doing something you enjoy!</li> <li>Physical activity can help you reduce stress, improve your focus for studying, and maintain a healthy weight.</li> </ul>
<b>5</b>	<ul style="list-style-type: none"> <li>Create a regular, relaxing, bedtime routine and avoid upsetting conversations right before trying to go to sleep.</li> <li>Make sure where you sleep is comfortable and there is not too much light or the temperature is not too hot or too cold.</li> </ul>	<ul style="list-style-type: none"> <li>Did you know that people who eat breakfast tend to do better in school? Find something quick and easy that you can grab on the go.</li> <li>It can be overwhelming to change health habits. Try choosing 1 healthy habit to practice today!</li> </ul>
<b>6</b>	<ul style="list-style-type: none"> <li>Sleep can affect your grades and your ability to reach your dreams and goals, so it is vital to form good sleep habits.</li> <li>If you are unable to sleep, it is best to get up &amp; go into another room &amp; do something relaxing (but no technology!) until you feel sleepy.</li> </ul>	<ul style="list-style-type: none"> <li>Managing stress and having balance in your life is important. Meet up with some friends and take some time for yourself today.</li> <li>It's that time in the semester when you may be feeling stressed. Get outside, go for a walk, or get some fresh air.</li> </ul>

## Appendix H. Demographic Information Form

### Demographic Information Form

Please provide a response for each of the following questions:

1. What is your college major? \_\_\_\_\_
2. What is the time of your earliest class? \_\_\_\_\_
3. What is the time of your latest class? \_\_\_\_\_
4. What is your Age (in years)? \_\_\_\_\_
5. To which gender do you identify?      Male      Female
6. Where do you live?      \_\_\_\_\_  
                                 On campus      On campus      Off campus      Off campus  
                                 in the      apartments      multiple      single  
                                 dorms           dwelling      dwelling  
                                           (apartments,      (house)  
                                           condo)
7. Do you live alone?      Yes      No
8. If no to # 8: How many roommates do you have? \_\_\_\_\_
9. Please estimate the number of interruptions you usually experience when trying to sleep \_\_\_\_\_

10. Please evaluate how quiet it is when you want to sleep	Slider question from very quiet to very loud.					
11. What is your marital status?	Single (never married, widowed, divorced)	Married / partnered				
12. What is your employment status?	Full Time (40 or more hours per week)	Part Time (less than 40 hours per week)	Not employed			
13. Are you of Hispanic or Latino origin or descent?	Yes	No				
14. What is your race? (Please mark one or more)	White	Black or African American	Asian	American Indian or Alaskan Native	Native Hawaiian or other Pacific Islander	Other
15. Do you attend college?	Full Time	Part Time	I do not attend			
16. On a scale of 0-10, please rate how stressed you feel at this time.	Question with a slider from					

no stress-

to very

stressed

17. Do your social activities with friends involve late nights?

Yes

No

18. Do you consider yourself to be a morning person or a night owl (preference for staying up late and sleeping in late)?

I am

definitely a

morning

person

I am more

of a

morning

person than

a night owl

I am more of a

night owl than

a morning

person

I am

definitely a

night owl

19. When do you feel you are most productive?

Morning

Evening



### Appendix I. Posttest Open-Ended Questions

1. Over the 6 weeks of this study, did you receive information about sleep from any other sources besides the text messages that were sent? If yes, please indicate your other sources of information (you can select more than one answer)
  - a. Radio
  - b. Internet
  - c. Friends
  - d. New source
  - e. Someone else in the study
  - f. Class
  - g. Other (please explain)
2. Has anything happened during the 6 weeks of the study that has impacted your sleep in any way?
3. Is there anything else you want to tell me about your sleep?
4. What are some reasons you don't get as much sleep as you would like?
5. After participating in this study, how likely are you to change your sleep habits?
6. Did the text messages you received motivate you to practice good sleep habits and/or healthy behaviors?

## Appendix J. Permission for Use of Instruments

Sent on behalf of Dr. Buysse

Dear Christy,

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 Instruments tab. Please ensure that the PSQI is accurately reproduced in any on-line version (including copyright information). We request that you to 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.  
Professor of Psychiatry and Clinical and Translational Science  
University of Pittsburgh School of Medicine  
E-1123 WPIC  
3811 O'Hara St.  
Pittsburgh, PA 15213  
T: (412) 246-6413  
F: (412) 246-5300  
[buyssedj@upmc.edu](mailto:buyssedj@upmc.edu)

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← REPLY   ← REPLY ALL   → FORWARD   ✖

Mark as unread




Victoria Felix <[vaf006@latech.edu](mailto:vaf006@latech.edu)>  
Mon 7/20/2015 3:16 PM

To: ☐ Christy Gipson;

● You replied on 7/20/2015 4:05 PM.

📎 1 attachment



Hi Christy,


My name is Victoria and I am Dr. Buboltz's research assistant. I am attaching the SHAPS to this email. Feel free to use it in your research. For scoring, we have not been able to find any hard and fast rules about what constitutes healthy and unhealthy sleep hygiene, so we follow the premise that higher scores indicate poor sleep hygiene.

Hope this helps and let me know if you have any additional questions.

Victoria

←   ←   →

Mark as unread



Victoria Felix <[vaf006@latech.edu](mailto:vaf006@latech.edu)>  
Tue 7/21/2015 12:27 PM

Hi Christy,

Dr. Buboltz informed me that this is not a copyrighted instrument and that you can use it for research purposes.

Take good care,

Victoria

## Appendix J (Continued)



David Mastin <dfmastin@ualr.edu>  
Wed 6/17/2015 3:48 PM  
Graduate School

← ⏪ →  
Mark as unread

Approved! Family health problems delaying a prompt detailed response. Please write again soon!  
Sincerely,  
David



Christy Gipson  
Mon 6/8/2015 11:35 PM  
Sent Rems

← REPLY ⏪ REPLY ALL → FORWARD \*\*\*  
Mark as unread

To: □ David Mastin <dfmastin@ualr.edu>;

Dr. Mastin,

Thank you for taking time to speak with me today about the second version of the SHL. I look forward to working with you and I cannot wait to use your tool with the new question(s). I know that you verbally gave me permission to use the tool, but I would like to request your written permission to use the second version of the tool with the social technology use question(s). Thank you again for your time!

Warm Regards,

Christy Gipson PhD(c), RN, CNE  
The University of Texas at Tyler  
School of Nursing  
Doctoral Student

## Appendix K. Sleep Hygiene Awareness Scale

This is a survey of the effect of daytime behaviors upon sleep. We are interested in knowing your opinion about whether any of these daytime behaviors influence the quality and/or quantity of sleep. For the following list of behaviors, please indicate your opinion as the general effect, if any, that each behavior may have on nightly sleep. Please use the following scale and answer each item by writing the appropriate number in the space provided. Note that numbers 1, 2, and 3 indicate degrees of benefit to sleep, number 4 indicates no effect, and numbers 5, 6, and 7 indicate degrees of disruption of sleep.

Beneficial to sleep

Disruptive to sleep

1-Very 2-Moderately 3-mildly 4-no effect 5 -mildly 6-moderately 7-very

What effect does each of these behaviors have upon sleep?

1. Daytime napping\_\_\_\_\_
2. Going to bed hungry\_\_\_\_\_
3. Going to bed thirsty\_\_\_\_\_
4. Smoking more than one pack of cigarettes a day\_\_\_\_\_
5. Using sleep medication regularly (prescription or over the counter) \_\_\_\_\_
6. Exercising strenuously within 2 hours of bedtime\_\_\_\_\_
7. Sleeping approximately the same length of time each night\_\_\_\_\_
8. Setting aside time to relax before bedtime\_\_\_\_\_
9. Consuming food, beverages, or medications containing caffeine\_\_\_\_\_
10. Exercising in the afternoon or early evening\_\_\_\_\_
11. Waking up at the same time each day\_\_\_\_\_
12. Going to bed at the same time each day\_\_\_\_\_
13. Drinking 3 ounces of alcohol in the evening (e.g., mixed drinks, 3 beers, 3 glasses of wine) \_\_\_\_\_

## Appendix L. Sleep Hygiene Index

### **Sleep Hygiene Index** University of Arkansas at Little Rock • Biobehavioral

Laboratory

Sleep Hygiene Index						
Please rate all of the following statements using the scale below.						
<b>5 Always</b> <b>4 Frequently</b> <b>3 Sometimes</b> <b>2 Rarely</b> <b>1 Never</b>						
						<b>1=Never</b>
						<b>2=Rarely</b>
						<b>3=Sometimes</b>
						<b>4=Frequently</b>
						<b>5=Always</b>
<b>Sleep Hygiene Index</b>						
Please circle the letters or blacken the box by using the scale above.						
1.	I take daytime naps lasting two or more hours.	5	4	3	2	1
2.	I go to bed at different times from day to day.	5	4	3	2	1

3.	I get out of bed at different times from day to day.	5	4	3	2	1
4.	I exercise to the point of sweating within one hour of going to bed.	5	4	3	2	1
5.	I stay in bed longer than I should two or three times a week.	5	4	3	2	1
6.	I use alcohol, tobacco, or caffeine within four hours of going to bed or after going to bed.	5	4	3	2	1
7.	I do something that may wake me up before bedtime (for example: play video games, use the internet, or clean).	5	4	3	2	1
8.	I go to bed feeling stressed, angry, upset, or nervous.	5	4	3	2	1
9.	I use my bed for things other than sleeping or sex (for example: watch television, read, eat, or study).	5	4	3	2	1
10.	I sleep on an uncomfortable bed (for example: poor mattress or pillow, too much or not enough blankets).	5	4	3	2	1
11.	I sleep in an uncomfortable bedroom (for example: too bright, too stuffy, too hot, too cold, or too noisy).	5	4	3	2	1
12.	I do important work before bedtime (for example: pay bills, schedule, or study).	5	4	3	2	1
13.	I think, plan, or worry when I am in bed.	5	4	3	2	1
14.	I check e-mail, texts, or social media during my sleep time (between going to bed and waking up)	5	4	3	2	1

**Scoring: Higher scores are indicative of more maladaptive sleep hygiene status.**

David F. Mastin, Jeff Bryson and Robert Corwyn, Assessment of Sleep Hygiene Using the Sleep Hygiene Index, *Journal of Behavioral Medicine*, Vol. 29, No. 3, June 2006.

## Appendix M. Self-Efficacy for Sleep Hygiene Inventory (SESHI)

Please rate your degree of confidence in performing each of the behaviors listed by recording a number from 0 to 100.

<p>Example:</p> <p style="margin: 10px 0;">I am confident that I can brush my teeth in the morning when I am running late for class</p> <div style="display: flex; align-items: center; justify-content: space-between; margin: 10px 0;"> <span>0</span> <span style="font-size: 2em;">↓</span> <span>100</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <span>Cannot do at all</span> <span>Highly certain I can do</span> </div>	
--	--

I am confident that I can:	Confidence (0-100)
1. sleep when I feel sad/depressed	
2. sleep when I feel anxious/worried/stressed	
3. get 7-9 hours of sleep every night	
4. go to bed and wake up at a consistent time	
5. go to sleep with the television off	
6. put my cell phone on silent mode at bedtime	
7. go to sleep without using technology in bed	
8. sleep 5 hours the night before a major exam or assignment is due	
9. sleep 7 hours the night before a major exam or assignment is due	
10. sleep 9 hours the night before a major exam or assignment is due	
11. manage my schedule and activities to include at least 5 hours of sleep	
12. manage my schedule and activities to include at least 7 hours of sleep	
13. manage my schedule and activities to include at least 9 hours of sleep	
14. go to sleep when I have consumed caffeine or energy drinks within 4 hours of bedtime	
15. perform well on an exam without “pulling an all-nighter”	
16. go to sleep when I have exercised within 4 hours of bedtime	
17. go to sleep when I have consumed alcohol near bedtime	
18. go to sleep when I have consumed a large meal right before bedtime	
19. use my bed only for sleep	
20. go to sleep without reading or studying in bed	
21. go to sleep when my sleep environment is noisy	
22. go to sleep when I feel hot	
23. go to sleep when there is light in my room	
24. go to sleep without using medications (prescription or over the counter)	

## Appendix M (Continued)

### Scoring:

To calculate subscale scores, One Sleep Influences item is reverse scored. Other subscales are scored by adding the number of items answered and dividing by the number of items answered for that scale. In each instance, scores range from 0 – 100, with higher numbers indicating increased self-efficacy.

Time management subscale: items 3, 4, 9, 10, 11, 12, 13

Sleep influences subscale: items 5, 6, 7, 8, 15, 17 (reverse scored), 19, 20, 24

Disruptive influences subscale: items 1, 2, 14, 16, 18, 21, 22, 23



Appendix N. Pittsburgh Sleep Quality Index

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 _____
------------------------------------	--------------------------------	-------------------------------	-------------------------------------

# Appendix N (Continued)

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 more past month_____	Less than once a week_____	Once or twice a week_____	Three or times a week_____
---	-------------------------------	------------------------------	----------------------------------

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

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

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

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

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

## Appendix N (Continued)

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

Not during the more past month_____	Less than once a week_____	Once or twice a week_____	Three or 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 more past month_____	Less than once a week_____	Once or twice a week_____	Three or 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 roommate?

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

If you have a roommate or bed partner, ask him/her how often in the past month have you 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_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

## Appendix N (Continued)

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_____
-----------------------------------	-------------------------------	------------------------------	------------------------------------

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## Appendix O. Biographical Sketch

NAME Christine S Gipson	POSITION TITLE Doctoral Candidate, The University of Texas at Tyler
eRA COMMONS USER NAME (credential, e.g., agency login)	Clinical Instructor and RN-BSN Coordinator at The University of Texas at Tyler, School of Nursing, Tyler, TX

### EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE (if applicable)	MM/YY	FIELD OF STUDY
East Texas Baptist University, Marshall, TX	BS	07/08	University Studies
University of Texas at Tyler	BSN	12/08	Nursing
University of Texas at Tyler	MSN	05/13	Nursing Education
University of Texas at Tyler	PhD	05/16	Nursing
The University of North Texas	Certificate	In Progress	Public Health

#### A. Personal Statement

#### B. Positions and Employment

2015-Present	RN-BSN Coordinator, The University of Texas at Tyler
2012-Present	Clinical Instructor, The University of Texas at Tyler
2013-2014	Staff Nurse at Bethany Home Health, Tyler, TX
2012-2013	Staff Nurse at Hospice of East Texas, Tyler, TX
2009-2012	Field Supervisor at Girling Health Care, Tyler, TX
2009-2010	Staff Nurse at HealthSouth, Tyler, TX
2009-Present	On Call Health Screener with Health Fitness, Various Locations

### C. Professional Memberships

The National League for Nursing

Sigma Theta Tau International, Honor Society of Nursing

Association of Community Health Nursing Educators

Association for Prevention Teaching and Research

Graduate Student Nursing Academy

Sleep Research Society

National Consortium for Building Healthy Academic Communities

### D. Research Support

Research supported by the Institute for Integrated Healthcare