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Sleep as an Occupation in College Students: A Mixed Method Study

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A Culminating Project Submitted in Partial Fulfillment of the Requirements for the

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San Rafael, CA

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This project, written under the direction of the candidate's faculty advisor and approved by the chair of the Master's program, has been presented to and accepted by the Faculty of the Occupational Therapy department in partial fulfillment of the requirements for the degree of Master of Science in Occupational Therapy. The content, project, and research methodologies presented in this work represent the work of the candidates alone.

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Abstract

Sleep is an emerging area of research and practice for occupational therapists. The purpose of this study was to identify and investigate how college students' cognitive perceptions and beliefs about sleep affect their quality of sleep. Four college students participated in qualitative interviews investigating their sleep beliefs and attitudes. The students also completed a two-week daily sleep diary to report their sleep beliefs, attitudes, and daily living patterns. Four emerging themes were identified from the interviews: beliefs about sleep patterns related to temporal structure of sleep, stress, daytime performance associated with sleep, and conflicting beliefs about sleep. Daily sleep diaries also revealed inconsistencies between idealized and actual sleep patterns. Based on the identified themes and sleep diary data, researchers concluded that college students do not have defined beliefs and attitudes about the value of sleep or consistent, routine sleep schedules. Occupational therapy interventions should strive to identify beliefs and attitudes about sleep in order to change non-adaptive beliefs and help clients develop routines to improve sleep quality and daytime performance.

Introduction

Occupational therapy recognizes sleep as one of the primary human occupations (Myers, A., 1922, AOTA, 2014). Sleep is one of the primary biological needs of human beings and is required in order to maintain optimal occupational performance. Current research explores multiple aspects of sleep including the biological stages and mechanisms of sleep, and the benefits of sleep on mind and body (U.S Department of Health and Human Services, National Institutes of Health [NIH], 2011). Investigators have also examined sleep across diverse cultures and populations, and have found that sleep patterns are constructed and shaped by cultural and personal beliefs (Green & Durant, 2015). These beliefs and patterns structure and define people's occupational engagement in sleep. Despite the growing research and interest in sleep, sleep quality remains difficult to define and measure due to the subjective nature of sleep. For this reason, a mixed methods research may help to capture the complexity.

College student's sleep patterns include later bedtimes and earlier rise times, thus creating a deficit in total sleep quantity (Lund, Reider, Whiting, & Prichard, 2010; Hershner & Chervin 2014; NIH, 2011). College students experience more daytime sleepiness, physical and mental health issues than their same-aged peers who are not students (Tsai & Li, 2004). Physical and mental health issues resulting from lack of sleep include: fatigue, physical complaints, chronic fatigue, irritation, anxiety, depression, and lack of motivation (Fukuda & Ishihara, 2001).

Brown, Buboltz, & Spencer (2002), found that practicing sleep interventions and hygiene practices, such as reducing environmental noise, reducing stress before bed, and maintaining a consistent sleep-wake schedule, positively correlates with improved overall

quality of sleep. Sleep hygiene is defined as the habits and patterns that facilitate restorative sleep. Sleep hygiene practices include environmental factors, stress management, consistent sleep times, and naps (Brown, Buboltz, & Soper, 2002; Irish, Kline, Gunne, Buysse, & Hall, 2015). However, Brown, Buboltz & Spencer (2002), also found that just knowing about sleep hygiene practices is not enough to promote the use of those habits in college students and 89% of college students do not adhere to sleep hygiene behaviors and practices. Those sleep interventions which have focused on modifying cognitive beliefs, such as cognitive behavioral therapy for insomnia (CBT-I), have shown the greatest improvement to sleep quality (Morgan, et al, 2012). Therefore, more research is needed to investigate how beliefs and attitudes about sleep may be impacting sleep quality and adherence to sleep hygiene habits.

This study investigated and explored college students' beliefs and attitudes about sleep participation, sleep quality, and the relationship between sleep and occupational performance. The study explored how such beliefs and attitudes may affect sleep quality in college students. By conducting in-depth one-on-one interviews and administering a daily sleep diary to four undergraduate students at Dominican University of California, we sought to learn how beliefs and attitudes about sleep support or hinder sleep quality, and whether sleep beliefs and sleep quality affect student's daytime occupations. Through increased understanding of how attitudes and beliefs may be avenues or barriers to effective sleep quality, future interventions may then be developed to address these attitudes and beliefs, and with the goal of improving sleep quality.

Background and Review of the Literature

Sleep Defined

Sleep is a common human experience, yet it can be defined or understood in a number of different ways. For the purpose of this study sleep will be defined as follows: sleep is a reversible behavioral and physiological state of disengagement from the environment (Carskadon & Dement, 2011). According to the National Institute of Neurological Disorders and Stroke [NINDS] (2014), sleep is comprised of multiple physiological stages. At the beginning of the sleep cycle the eyes relax and muscle activity starts to slow. As an individual moves deeper into sleep, brain waves become slower and individuals become harder to wake up (U.S Department of Health and Human Services, National Institutes of Health [NIH], 2011). After approximately 90 minutes of sleep, rapid eye movement (REM) sleep begins. REM sleep is important for memory formation and when an individual is deprived of this stage, the ability to learn decreases (NINDS, 2007). When REM sleep ends, the cycle starts over and continues throughout the night.

Benefits of Sleep

Some of the benefits of sleep include improved learning, memory and mood. REM sleep plays an essential role in the formation of declarative or explicit memory as well as procedural memory (Ellenbogen, Payne, & Stickgold, 2006). Decreased sleep can make it difficult for neurons to coordinate and function properly. This results in the brain losing the ability to focus and receive information, which leads to confusion and slows down reaction time (Ellenbogen et al., 2006 & NIH, 2011).

Sleep Patterns

Sleep patterns are largely a product of cultural and environmental norms. What is currently considered a typical or normal sleep pattern is primarily based on the biological and cultural premise of a monophasic sleep cycle, that is, a “single night-time period of sleep,” occurring once per day (Green & Durant, 2015). Eight hours is currently the normative and recommended amount of sleep for adults, although the amount of sleep required varies for each person, with the average nightly sleep ranging between four to ten hours per night (Coveney, 2014). This is neither the only sleep pattern available to people, nor is it the culturally popular or typical pattern of sleep before electric lighting (Green & Durant, 2015). Segmented sleep, or the pattern of two sleep cycles per night separated by a period of ‘quiet wakefulness,’ was the norm in traditional cultures throughout the world, as well as in pre-industrial England, France, and Italy (Green & Durant, 2015). Additionally, the well-known “Siesta,” or afternoon nap, is an example of yet another sleep pattern, biphasic sleep. Biphasic sleep is driven by the human circadian rhythm and a need to rest in the afternoon, but this sleep pattern is not seen to promote productivity in modern cultures and is therefore on the decline (Green & Durant, 2015). What is “normal” sleep is, therefore, defined not only by biological needs, but also by cultural influences and beliefs. The definition of sleep in the *Occupational Therapy Practice Framework, Domain and Process* specifically states that sleep patterns are indeed “often personally and culturally determined” (AOTA, 2014, p. S20).

Definition of Quality of Sleep

Measuring quantity of sleep has become fairly straightforward in sleep research, but defining and accurately measuring sleep quality continues to be a challenge. While

the notion of sleep quality drives many sleep studies, this key concept is poorly defined (Harvey et al., 2008). This is in part because quantity and quality are two distinct aspects of sleep that may not be correlated with one another. It is important to uncover a more complete understanding of the “subjective meaning of sleep quality” in order to produce a better measure for sleep quality. For example, Harvey et al. (2008) investigated the subjective nature of sleep by comparing the meaning of sleep quality in good sleepers with that of individuals with insomnia. Participants were asked to describe a good night’s sleep and a poor night’s sleep. They were also asked to rate the importance of sleep quality variables that had been used as measures in previous studies. Finally, participants kept a daily sleep diary to record daily sleep patterns. Results indicated that although some baseline standards of sleep quality exist between normal sleepers and persons with insomnia, persons with insomnia had more requirements to be met before judging sleep to be of good quality (Harvey et al., 2008).

For this study, sleep quality will be defined based on commonly cited standards of sleep quality in both good and poor sleepers using Harvey et al.’s (2008) definition: feelings of being rested upon waking in the morning and feelings of alertness throughout the day. Descriptions of sleep quality from the scientific literature point to one thing: it is the waking perception and daytime effects of sleep that are used to measure and create the personal meaning of sleep and to define its role in daily life. In other words, what we think and feel about our sleep while we are awake and engaged in our other daily occupations is what intrinsically defines sleep quality.

Sleep as an Occupation

The occupation of sleep has varied in importance in occupational therapy literature and treatment. Sleep was named as one of the “Big Four” essential occupations in early occupational therapy literature, along with work, rest, and play (Myers, 1922). However, in the years that followed this initial identification of sleep as a fundamental occupation, sleep was not significantly attended to in the occupational therapy literature or in occupational therapy practice. Rather, the focus of the profession moved toward investigating and attending to those occupations perceived to be productive rather than restorative (Green, 2015).

In the field of occupational therapy today, sleep is viewed as a valuable and essential occupation. In 2008, and again in 2014, the guiding document for the profession, *Occupational Therapy Practice Framework, Domain and Process*, included sleep preparation and sleep participation as occupations under the general category of “Rest and Sleep” (AOTA, 2008, 2014). Rest and sleep are further defined as “activities related to obtaining restorative rest and sleep to support healthy active engagement in other occupations” (AOTA, 2014, p. S20). Sleep preparation is defined as “routines that prepare the self for a comfortable rest” and “preparing the physical environment for periods of unconsciousness” (AOTA, 2014, p. S20). Sleep participation is defined as “taking care of personal needs for sleep” and “sustaining a sleep state without disruption” (AOTA, 2014, p. S20).

Sleep falls under the domain of occupational therapy because

- Occupational therapy strives to promote wellbeing (Christianson, 1999).
Sleep is a biological and behavioral requirement for wellbeing.

- The way people use their time is important to lifestyle balance and occupational engagement (Christiansen & Matuska, 2006). Therefore, when “occupation is defined in terms of use of time, sleep could be categorized as an occupation by virtue of the time spent engaged in it” (Green, 2008, p.6).
- Occupational therapy is concerned with occupational performance. There is little debate that performance in other occupations is fundamentally affected by sleep (Green, 2008).
- All occupations are inherently made up of “a unique mix of pleasure, productivity, and restoration” (Pierce, 2001, p.4). Sleep may be seen as restorative by some, while others may find it pleasurable, or view sleep as an essentially productive use of time.

Sleep in College Students

The total amount of sleep that individuals require decreases throughout the lifetime. At the beginning of life, newborns require sixteen to eighteen hours of sleep a day. This requirement decreases as the child moves into the toddler years to eleven to twelve hours per night, and continues to decrease as the child moves to school age, to ten hours a night (NIH, 2011). As children develop into teenagers, puberty starts to influence their biological clocks, resulting in a sleep schedule shift. For teens, bedtimes shift later into the evening, and rise times tend to be earlier. These later bedtimes combined with early rise times create a deficit in total sleep, resulting in chronically restricted sleep (NIH, 2011). This trend toward less sleep continues into college where, chronically restricted sleep is widespread (Lund, Reider, Whiting, & Prichard, 2010; Hershner &

Chervin 2014). Compared to non-students of the same age, college students have later bedtimes and more daytime sleepiness. Studies also report more physical and mental health issues that may be related to insufficient sleep in college students (Tsai & Li, 2004).

Multiple factors have been found to affect sleep in college students, including environmental contexts such as lighting and temperature, stress, and sleep schedules. Lund (2010) found that academic and emotional stress are responsible for the most sleep difficulties in college students, and that males in college reported significantly later bedtimes during the school week than females. Bubolz (2001) investigated student sleep patterns and found students often planned to get more sleep on the weekend, in order to “catch-up,” but in fact, failed to get this extra sleep. Even if the students did succeed in sleeping in on the weekends, such later rise times were actually correlated with a 0.132 decrease in student grade point average on a 4.00 scale (Trockel et al., 2000). These findings support the possibility that lack of sleep is negatively affecting college students’ academic performance.

Sleep environment plays a critical role in minimizing sleep distractions and enabling engagement in restful sleep. With the near constant use of technology, and the connectivity of the world, it has become harder for an individual to “disconnect” and remove one’s self from bright lights, noises, TV, cellphones, and computers (NIH, 2011). Many college students share a single dorm room, not only with a roommate, but also with two computers, two cell phones and a television, all of which may create barriers to a positive sleep environment and good sleep quality.

Sleep Beliefs and Attitudes

Sleep beliefs are ideas that individuals hold pertaining to sleep such as, “I need 8 hours of sleep each night” or “I think that sleep is important to my health.” Evidence suggests that individuals are likely to behave based on their beliefs (Beck, 1967). Limited research exists regarding general beliefs and attitudes about sleep. Coveney (2014) conducted qualitative research investigating how college students’ sleep was affected by “the relationship between social context and subjective and embodied experiences of sleep” (Coveney, 2014, p. 3). Participants in the study believed that they could actively control their sleep and sleep patterns, and that sleep was not a priority. Despite believing that they could control their sleep or were active agents in sleep and wake habit construction, “all students interviewed reported difficulties in getting to sleep and staying alert” (Coveney, 2014, p.8). Furthermore, going to sleep and staying awake were seen as parts of the students’ social context (Coveney, 2014). Sleep was seen as an aspect of social life (i.e. being an active member of clubs and societies, nights out and spending time with friends) that could be meaningfully shaped to reflect the students’ values and priorities. Because many students did not find sleep to be a priority, they reported that they slept less in order to perform and accomplish other preferred activities. Sleep was seen as something that could be managed, negotiated and planned (Coveney, 2014). Managing sleep around school and social occasions then led students to report experiences of daytime sleepiness and difficulty falling asleep, thus indicating an inability to actually control sleep quality. Despite believing that they could control their sleep and sleep patterns, the participants could not ultimately control their sleep quality.

As with research investigating quality of sleep, research on sleep beliefs has focused on persons with insomnia. People with insomnia generally hold the same beliefs and attitudes of self-proclaimed “good sleepers” but have less realistic expectations about what is required for a good night’s sleep, as well as stronger beliefs that lack of sleep will negatively impact their daytime occupations (Harvey et al., 2008; Morin, Stone, Trinkle, Mercer, & Remsberg, 1993). Morin et al. (1993) described insomnia as a cycle; emotional distress is exacerbated by beliefs about losing control, the unpredictability of sleep, and by apprehensions of becoming physically or mentally ill as the result of sleep loss. Some individuals with insomnia appear to be more concerned about the consequences of lost sleep, than the sleep itself, which leads to perpetual feelings of helplessness and hopelessness. For some, the deficits that result from the cycle of insomnia are a direct result of cognitive processes rather than a central deficit in the sleep/wake cycle; the resulting anxiety and worry exacerbate the cycle. Thus, it is not the sleep/wake cycle that causes the problem; rather it is the cognitive processes and dysfunctional beliefs and attitudes that lead to the cycle of insomnia (Harvey, 2002). This points to the possibility of poor sleep quality relating more to negative sleep beliefs than to sleep patterns. This research is focused on the effects of insomnia. What remains to be investigated is whether a similar relationship exists between cognitive beliefs and sleep quality among individuals with poor sleep quality who do not meet the criteria for insomnia.

Sleep Interventions and Effectiveness

Interventions for improving sleep have focused on various aspects of sleep hygiene (Brown, et al., 2002; Irish, et al., 2015). Avoiding substances such as caffeine

and alcohol before bed tends to improve sleep. Regular exercise also helps individuals fall asleep faster and have better sleep quality. Reducing bedroom noise is another practice that helps to manage levels of arousal to improve sleep. Adopting regular bed and wake times also helps to improve sleep through establishing regular routines (NIH, 2011).

Brown, Buboltz, & Spencer (2002) did an in-depth examination of the relationship between sleep hygiene knowledge, sleep hygiene practices, and sleep quality in college students. The researchers found that having sleep hygiene knowledge did not necessarily foster good sleep practices. Even though many students knew what habits promoted quality sleep, those habits were not practiced. However, the researchers did find a correlation between sleep hygiene practices and overall sleep quality. These findings suggest that knowing about proper sleep hygiene habits does not necessarily influence sleep quality, whereas practicing proper habits is strongly related to good overall sleep quality. Great point.

Interventions that address beliefs about sleep have proven very effective for improving sleep quality for persons with insomnia. Cognitive Behavioral Therapy for Insomnia (CBT-I) targets insomnia by modifying dysfunctional perceptions of sleep and unsuitable sleep behaviors. Stimulus control (i.e., restricting activities in bed to sleep and sexual activity and adapting nightly routines by decreasing stimuli) and sleep restriction (i.e., complying with a predetermined sleep schedule) are core components of CBT-I (Leland, Marcione, Niemiec, & Fogelberg, 2014). By addressing multiple factors that affect sleep and further understanding college students' beliefs and attitudes about sleep, the use of CBT-I was found to significantly improve global sleep quality, reduce the

severity of sleep symptoms, and increase sleep efficiency in people with insomnia (Morgan, et al, 2012). Sleep is an ongoing problem for college students. Research to date has suggested the importance of beliefs, but more research is needed that focuses on sleep beliefs in college students

Statement of Purpose and Research Questions

Many college students are not getting enough sleep. There is a great deal of research on environmental, contextual and temporal factors affecting sleep quality. In spite of interventions attempting to address these factors, sleep in college students continues to be poor (Lund, Reider, Whiting, & Prichard, 2010; Hershner & Chervin 2014). Little research has been done to investigate or address underlying or fundamental beliefs and attitudes about sleep in college students. While there are a multitude of sleep interventions noted in the literature, those that focus on cognitive beliefs and attitudes about sleep have been most effective on overall sleep quality (Brown, Buboltz, & Spencer, 2002).

The occupation of sleep is a fundamental prerequisite for all other occupations. This concept is well characterized by Pierce who stated: “Until occupational therapists understand enough about sleep to assure that it is providing an adequate base for other occupations, efficacy in treating waking occupations will never reach its full potential” (Pierce, 2001, p. 5).

The purpose of this study was to investigate and identify how college students’ cognitive perceptions and beliefs about sleep affect their quality of sleep. There are an abundance of sleep interventions that target components of sleep hygiene such as time management, behavioral modification, and environmental modifications. Despite the

effectiveness of such sleep interventions there is a limited number of college students who follow sleep hygiene guidelines, and poor sleep quality remains high among college students. Poor sleep quality may also be negatively impacting college students' performance in their daily activities. This research study explored beliefs and attitudes about sleep, sleep quality and the impact of sleep on participation in valued occupations in college students.

Theoretical Framework

Cognitive Behavioral Theory (CBT) is a theory, frame of reference, and therapy approach that was developed in the 1970s as a response to the cognitive revolution (Beck, 1967). CBT evolved from the merging of cognitive therapy and behavioral therapy when therapists discovered that an individual's belief systems, expectancies, and assumptions exert a strong influence on his or her state of being and observable behaviors (Beck, 1970). The merging of the theories allowed therapists to look at both the underlying belief and the resulting observable behavior. By looking at both the triggering thoughts and resulting behaviors, therapists were able to work with patients to change their thoughts to produce appropriate, adaptive behaviors. The theory is based on the assumption that a person's thoughts and beliefs influence his or her behavior; through changing these beliefs and attitudes one can change his or her behavior. Thus, the main foci of CBT are the relationships between the client's thoughts, beliefs and behaviors (Bruce & Borg, 2002). If an individual holds strong beliefs about the outcome of an activity, these thoughts will likely influence whether he or she engages in the activity (Bruce & Borg, 2002).

In spite of the research and interventions that have focused on improving sleep, sleep quality continues to be poor for a large number of college students. Research and interventions have largely focused on sleep hygiene and sleep quantity, while sleep quality continues to be poorly defined. As a result, there is limited research and little is known about sleep quality in college students. CBT is an appropriate theoretical framework to use to investigate the influence that students' beliefs and attitudes may have on their sleep quality. CBT takes into account attitudes that will ultimately change one's behavior.

CBT is guided by a number of underlying assumptions that are relevant for guiding qualitative sleep research. The primary assumption of CBT is that when thoughts and beliefs are changed, behavior and occupational performance are impacted (Bruce & Borg, 2002). This is relevant to sleep quality in that it may be necessary to change thoughts, beliefs and attitudes about sleep before real change in sleep quality can take place. An additional assumption of CBT is that people make choices about their behaviors based on what they believe the outcome of such behaviors will be. Therefore, the expected outcomes of sleep and sleep quality or "a good night's sleep" may impact students' willingness to engage in sleep or sleep hygiene practices.

Another important assumption of CBT is that people have "rules for living" and life themes they may or may not be conscious of, that impact the way they engage in and approach occupations. For example, students may be found to have a "rule" that they will not go to sleep until their homework is completed. If certain beliefs and attitudes about sleep are impacting sleep performance, engagement, and quality, it may help students to become aware of these beliefs and attitudes, and their impact on their behavior choices,

as a foundational step to improving actual sleep quality. An important assumption for change of occupational performance outlined in CBT is that by increasing a person's beliefs of being capable of the desired occupational performance, the person's actual capability and willingness to try to change is increased (Bruce & Borg, 2002). Therefore, exploring underlying beliefs and attitudes about being able to influence the quality of sleep may be an important first step in changing behaviors to improve sleep performance.

Definitions of Key Terms

- Sleep: sleep is a reversible behavioral and physiological state of disengagement from the environment (Carskadon & Dement, 2011)
- Sleep hygiene: the habits and patterns that facilitate restorative sleep
- Sleep beliefs and attitudes: the subjective perceptions and cognitions one has towards sleep
- Sleep quality: the degree to which one feels rested upon waking in the morning, feelings of restoration upon waking in the morning, and feelings of alertness throughout the day (Harvey et al., 2008)

Methodology

Mixed Method Design

A mixed method approach was implemented for this study in order to investigate and uncover subjective beliefs and attitudes about sleep and how these beliefs and attitudes may affect sleep and daytime occupational performance. In-depth interviews were conducted to learn about participants' beliefs about sleep, their quality of sleep, and how sleep seems to influence daytime performance. The objective of the interviews was to explore ways that behavior and cognition work together to facilitate or hinder sleep

quality and daytime occupational performance. Quantitative data was gathered by having students complete a daily sleep diary over the course of two weeks to record daily sleep beliefs and attitudes and daily sleep and waking behavior.

The qualitative aspect of this research study was based on grounded theory. Grounded theory was an appropriate research design for the study because researchers sought to discover emerging themes about sleep quality and its effects on daily occupations based on participant beliefs. Furthermore, the procedures followed this theoretical method by gathering participant responses, reviewing them, and coding for emerging themes and ideas. The codes were grouped into concepts and categories to facilitate the emergence of new themes reflecting how beliefs and attitudes about sleep may affect sleep quality. Methods to control for bias included having two interviewers per participant, four coders for each interview, reviewing coding strategies during team meetings, and checking each other's work for consistency.

Participants

Recruitment consisted of two phases, the first phase included an invitation to participate in the study and consent follow by the second phase of screening for eligibility and participation.

Recruitment Phase One:

Second semester freshmen were recruited from the pre-occupational therapy (pre-OT) seminar, OT 1002, at Dominican University of California. Researchers attended the last ten minutes of the pre-OT class in order to invite students to participate in the research project. Students who volunteered for participation were provided with a consent form with study details. Students were provided the opportunity to consent to one or both

phases of the study (Appendix B). Upon providing consent, students were administered the Pittsburgh Sleep Quality Index (PSQI) and asked to provide their email for potential follow up for phase two.

Recruitment Phase Two:

Eligibility for the second phase of the study was based on willingness to participate and a PSQI global score range of 2-17. A PSQI score of a five or above is indicative of sleep dysfunction, and the range of 2-17 was chosen with the objective of including participants with and without potential sleep disturbances in order to obtain a representative sample of the population. The four students included in the study had a range of PSQI scores: 2, 5, 5, and 16 (Table 1).

Table 1

Demographics of Participants

Participants	Age	Gender	PSQI Score
Participant 1	College Sophomore	Female	16
Participant 2	College Sophomore	Female	2
Participant 3	College Sophomore	Female	5
Participant 4	College Sophomore	Female	5

A copy of the Research Subject's Bill of Rights (Appendix C) was provided to each participant at the time of recruitment. An informed consent form (Appendix B) was used to provide participants with an overview of the study. These forms included a description of the purpose and background of the study, the procedures of the study, the potential risks and areas that may cause discomfort, the potential benefits of the study, and contact information for the participants to reach the researchers and the Institutional Review Board for Protection of Human Subjects. All of the participants in the study were

capable of legally giving their own consent and understanding their stated rights, benefits and risks of participation.

To ensure that the students did not feel pressured to participate in either phase of the study, the PSQI was administered during the last minutes of class, after the professor left the room. Students were given a full description of the research proposal, risks, benefits, and time commitment. If they agreed, a screening telephone call (Appendix E) took place to ensure eligibility and consent. Students were excluded from the study if they were pregnant women, or reported being medically diagnosed as having one of the following conditions: narcolepsy, insomnia, sleep apnea, and cataplexy, ADHD, asthma, chronic obstructive pulmonary disorder, depression, epilepsy, gastroesophageal reflux disease, fibromyalgia, or multiple sclerosis.

Measures

Three measures were used to study sleep attitudes and beliefs in college students:

Pittsburgh sleep quality index.

The Pittsburgh Sleep Quality Index (PSQI) is a 19-item Likert scale self-report questionnaire that assesses sleep quality. The PSQI measures quality and patterns of sleep in addition to differentiating between good and poor sleep. Seven clinically derived component scores are added to give a global score ranging from 0-21, with a lower number indicating better sleep quality. A score of five or greater is indicative of sleep dysfunction. The PSQI has an internal consistency and reliability coefficient of 0.83. The PSQI has been translated into 48 languages and used on a wide range of populations and studies. Permission to use the PSQI was requested on November 2nd, 2015 (Appendix J) and obtained on November 10th, 2015 (Appendix K).

Interview.

The interview questions and a free speak portion of the interview were adapted from Harvey et al.'s (2008) qualitative sleep study. As in Harvey's free speak portion of the interview, participants were asked to speak freely about their thoughts on sleep. The goal was to provide them with the opportunity to describe their lived experience and perceptions of sleep, and then let the descriptions guide the interview and data collection process. Following the free speak portion, a semi-structured guide-driven interview was conducted that included questions about beliefs and attitudes regarding sleep, perception of quality of sleep and waking performance (Appendix F).

The researchers conducted pre and post interviews to determine if participants' sleep beliefs and attitudes had changed after the two-week sleep diary period. The interview questions for the pre and post interviews were the same, with the addition of questions in the post interview asking about any changes in beliefs or behaviors that had emerged during the two-week diary period.

Sleep diary.

The sleep diary was adapted from the NIH (2011) Sample Sleep Diary. This diary incorporated questions from Harvey et al.'s (2008) qualitative sleep study and utilized a Likert scale for the questions. The diary consisted of 12 questions to be answered in the morning, followed by 11 questions to be answered in the evening. Questions focused on duration of sleep, sleep environment, time in bed, and sleep satisfaction (Appendix H).

Data Collection and Procedures

Recruitment began on January 28th 2016. The PSQI was administered to 22 students, and of that pool, four potential participants were excluded due to missing survey

data, and three students were excluded due to medical conditions. From the remaining surveys, four students with PSQI scores ranging from 2-17 were recruited to participate. Researchers attempted to include both men and women in the participant sample but only female students responded to the invitation to participate.

After providing full disclosure and obtaining consent from each participant, initial interviews were scheduled. Each researcher conducted a semi-structured individual interview. To eliminate the need for note taking, the interviews were audio recorded by researchers. Researchers followed the general sequence of questions according to the interview script (Appendix F). Interviews included specific questions and a “free speak” session. The “free speak” session started the interview and was followed by the specific question and answer session. The free speak session began with the prompt: “Tell me about your sleep and how you feel about sleep.” The participants were given up to three minutes to answer the prompt in their own way. If the participant stopped talking before three minutes, additional prompts of “can you tell me more” and “anything else” were given until the three minutes were up or the participant stated they had nothing else to say. After the “free speak” session, a specific list of interview questions were asked (Appendix F).

Following the interview, each participant was briefed on the sleep diary portion of the study. The sleep diary was completed daily in the morning upon waking and before bed upon resting. The diary included questions about the quality and quantity of sleep and daytime functionality, routines and performance. The diary utilized a Likert scale with additional space provided to add comments. To ensure reliability, the participants were also given a detailed handout (Appendix G) with instructions for diary completion.

Once each initial interview had been completed, the sleep diary link was sent via Survey Monkey twice each day, once in the morning and once in the evening. There was no identifying information linked to the diary, in order to ensure participant confidentiality. At the end of the two weeks each participant was interviewed a final time by a different researcher than the one who had conducted her initial interview. Different researchers were used in the pre and post interviews in order to minimize potential bias. The final interview was similar to the first, and started with a “free speak” session followed by a semi-structured interview in which the participant answered similar questions to those in the initial interview. The participant was also given the opportunity to “add any new insights you may have gained or realized due to keeping the sleep diary over the last two weeks.” As before, each final interview was audio recorded by researchers. Following the second interview, coding and analysis of interviews took place.

Data Management and Analysis

The interview data was coded, with a focus on how participants described their attitudes and beliefs about sleep and sleep quality. Research assistants transcribed the interviews verbatim using digital transcription software. Next, the investigators read each interview in order to identify and define core themes, and then code the interview content accordingly.

To ensure credibility and dependability, analyst triangulation was utilized. Triangulation was employed by having one researcher conduct the intake interview, a second researcher conduct the exit interview, and a third researcher reviewed the transcriptions for accuracy. Additionally, all four researchers reviewed each interview

transcript to code for themes, and individual codes were compared to ensure inter-rater reliability. General themes for the diaries and interviews were highlighted, following a recode for more themes as they became apparent. Researchers coded each interview and compared results for consistency and bias during team meetings.

Analyses of sleep diary data was conducted in order to explore participant's sleep patterns and occupational performance. Two weeks of data was analyzed through Survey Monkey and Microsoft Excel Software. Data was not connected to individual participants rather analyzed across the participant pool.

Ethical and Legal Considerations

Using the AOTA Code of Ethics (AOTA, 2015) as a guide, this study took every precaution necessary to adhere to participant's rights and obtain necessary consent from faculty, participants, and tool developers involved.

Participants were recruited from Dr. Dressler's pre-occupational therapy OT seminar, OT 1002, at Dominican University of California. A meeting was held with Dr. Dressler in which we described the research project and obtained her permission to use her class to recruit students. A detailed email (Appendix A) was also sent to Dr. Dressler further explaining the amount of time needed from her students and the recruitment procedures.

The participants in the study were capable of legally giving their own consent, of understanding their stated rights, and understanding the benefits and risks of participation. To ensure that the students felt no pressure to participate, researchers attended the last 15 minutes of class time and Dr. Dressler left the room before the recruitment process began.

Maintaining the principle of veracity (AOTA, 2015), those students who choose to participate were given a copy of the Research Subject's Bill of Rights (Appendix C), and an informed consent form, which was used to provide participants with an overview of the study (Appendix B). These forms included a description of the purpose and background of the study, the procedures of the study, the potential risks and areas that may cause them discomfort, the potential benefits of the study, and contact information for the participants to reach the researcher or Institutional Review Board for Protection of Human Subjects. No one was permitted to participate in the study without full written informed consent.

Observing the principles of beneficence and nonmaleficence (AOTA, 2015), participants were informed that while there are no direct risks from participating in the study, dwelling on negative sleep beliefs or attitudes could create obsessive thoughts or stress, which could result in poor sleep. To minimize these potential risks, at the end of the study students were debriefed by the researchers to ensure they had not been triggered.

Following the principles of autonomy and fidelity (AOTA, 2015), multiple steps were taken to ensure participant confidentiality. Data was kept confidential by assigning a code number to each participant. The participant's name and corresponding code number were kept in a locked file in the supervising research professor's office, separate from the data collected. Collected electronic data was password protected and stored in the researcher's password-protected desktop computer. Additionally, all electronic files only used the participant's code numbers, and did not include any personal or identifying information. Paper data, such as copies of the initial consent forms and PSQI record

sheets and scoring forms were kept in a locked file in the research professor's office. All data and records will be destroyed after a period of one year following completion of the research project.

The PSQI is copyrighted material, and as such, appropriate steps were taken to obtain permission to use the instrument. An email was sent to Dr. Daniel Buysse of the University of Pittsburgh, explaining the nature of our research and requesting permission to use the PSQI (Appendix J). Dr. Buysse replied with his written permission and instructions to properly use the PSQI (Appendix K).

Results

The themes regarding beliefs and attitudes about sleep were identified by researchers based on the undergraduate interviews and sleep diaries. First, the theme of beliefs about sleep patterns were found to focus on beliefs related to the temporal structure of sleep. Second, a theme of stress was identified and categorized as feelings of mental or emotional strain, unease or worry resulting from demanding situations or adverse events. Third, beliefs about occupational performance addresses the ability of the person to engage in meaningful activities. This theme had two sub-themes based on waking and sleeping occupational performance. Performance in the occupation of sleep has been categorized as sleep quality. Performance in all other occupations has been categorized as daytime performance. Lastly, conflicting beliefs about sleep are defined as interview comments describing two opposing sleep beliefs simultaneously held by an individual, for example a participant might report that she has good sleep quality and then moments later report that she has trouble sleeping. These themes point to the specific components that make up students sleep beliefs and attitudes. Additionally, it is important

to note that attitudes and beliefs about sleep and reported sleep behavior did not significantly change from pre to post interview responses.

Beliefs about Sleep Patterns

Participants consistently mentioned sleep patterns, which included bedtime, amount of time it took to fall asleep, hours slept, naps, and habits and routines performed when going to sleep (sleep hygiene). Participants identified idealized beliefs about their individual sleep pattern performance, but also reported difficulties enacting these idealized patterns. For example, participant 1 reported that “having a consistent schedule will help me sleep better and feel better throughout the day.” This participant then reported that she tried to get eight hours of sleep each night, but that in actuality her average night of sleep was “probably about six” hours. She complained that she was dissatisfied with that amount of sleep. Additionally, she reported:

“I found that if I get to bed around 10 [P.M.] and fall asleep by 11 [P.M.] I feel pretty good the next day. But if I fall asleep around 1 [A.M], I have a bit more trouble falling asleep. I noticed that one day I slept for two hours during the day, unintentionally, I just knocked off and I couldn’t sleep at all that night.” Likewise, participant 2 reported, “I think getting the right amount of sleep is really important because when I know when I sleep too long, I feel more tired when I wake up. If I sleep too short, then I’m still pretty tired. So it’s finding the right amount of time to sleep.” She went on to explain that homework limits her ability to sleep when she wants: “If I start late I’ll end a lot later but if I start the homework a lot earlier, then I would be able to go to bed on time.”

Participant 2 also reported that she takes one and a half hour naps most days. She went on to explain that these naps are her attempt to get enough sleep. She reported, “I nap pretty

often. I think it's because I haven't been getting the full amount of sleep I need.” This participant also highlighted the importance of using technology to fall asleep: “It’s pretty easy for me to fall asleep, but I can’t really fall asleep on my own. I always need to be watching something or on my phone to help me start to feel sleepy.”

Participant 3 reported the importance of sleep and naps, stating: “I find it to be really refreshing and a source for me to really start off my day or finish my day, or if I need a break.” She reported getting six to eight hours of sleep per night and taking approximately 10 minutes to fall asleep at night. Finding a comfortable position and having her bedroom at the correct temperature were important factors in enabling her to fall asleep. Her weeknight and weekend bedtimes were consistently between 12:00 - 1:00 A.M. each night. Interestingly, participant 3 reported that when she did get less sleep she actually felt more energized: “I know that I get my full hours of sleep, but I find that I function better and I feel more awake when I get less sleep. So like five hours or less of sleep, I’m energetic I’m running and I’m fully functioning as opposed to when I get my full hours of sleep, I find that I’m a bit more tired when I get my full amount of sleep as opposed of getting less hours. It’s weird but that’s just how I function. As for getting full hours of sleep, my performance varies from being sluggish to being able to handle my days of work.”

In addition to school responsibilities, participant 4 was on a college sports team and morning practice sessions shaped her sleep patterns to a great degree. She reported, “usually when I sleep it’s around 11:00 [P.M.] or 12:00 [A.M.] recently, and I’ll fall asleep and then I have 6:00 A.M. practices twice a week, and I’m very afraid that I’ll sleep through my alarm because it’s happened before. So I’ll just wake up throughout the

night every couple of hours, sometimes it will be one, two, three, four, five until I actually get up, but recently it's been every hour from 3:00 [A.M.] to around 5:00 [A.M.] and then I'll just wake up kind of look at my clock. Then I'm like, 'okay I have enough time to sleep still, it's nowhere near time to get up' so then I kind of just lay back down and go back to sleep pretty quickly."

Participant 4 echoed the sentiments of the other participants regarding the importance of sleep and naps but the current lack of time: "I love sleep. I really enjoy taking naps; I'm great at taking naps; I could pass out almost anywhere. But, I've been very busy right now especially in this part of the semester getting in the swing of things. So I've been doing a lot of papers, not as many naps." Interestingly, participant 4 did sleep longer on the weekends, getting nine or ten hours of sleep on those nights, but she reported that she did not view this sleep as a way to catch up on the weekday's sleep but as more of a reward: "it's just more for myself, you just feel better. Like 'okay I can do this week I guess.'" Reports of difficulties enacting idealized patterns were also supported by the data from sleep diaries which showed a wide range in actual sleep patterns, including rising and to bedtimes, and nap frequency (Figures 1-4).

Beliefs about Stress

All of the participants identified stress as a factor that negatively impacted their sleep. Stress and anxiety made both falling asleep and staying asleep difficult. Participants reported feelings of anxiety and worry specifically regarding school responsibilities and job prospects. Participant 1 said that school-related stress caused her to toss and turn throughout the night and that falling asleep "has been pretty hard, clearing my head from stuff that's been going on. I had interviews and applications to

deal with so that wasn't easy to ignore and fall asleep." Participant 2 reported feeling anxious, worried, and tense falling asleep "if I have a test the next day." According to participant 3, her school workload was causing her stress and affecting her sleep. "It's been more of a struggle for me to fall asleep mainly because of stress and generally just trying to get every assignment, homework and studying done before I go to sleep. So that tends to keep me up a little bit more and just generally I'm staying up more." Participant 4 said that falling asleep is often difficult because stress caused her mind to race and "constantly your mind is going and everything and when you're actually try to go to bed your body is sleeping, your mind just doesn't still." Participant 4 also complained that even after sleeping, stress caused her to feel less rested during the day, "I would wake up and it's kind of like that foggy headedness, where something could be totally going on next to me and I wouldn't really know."

While stress and anxiety were identified as factors that negatively impact sleep, participants also discussed sleep as a positive source of stress relief, and often cited naps as an enjoyable way to relieve stress. When asked about her thoughts on sleep, participant 2 said, "Sleep is something that I actually really enjoy because it makes you feel relaxed and takes away from all the stress from school and stuff." Participant 3 echoed this sentiment on sleep, stating "I find it to be really stress relieving, if I do see that I am stressed out." She also recommended naps for anyone dealing with stress and said she would take naps whenever she could because "I find it to be really refreshing and a source for me to really start off my day or finish my day... when it comes to stress, I over stress, so it's just a great source for me and a great solution for me to rely on sleep or

taking a nap.” While participants identified naps as a coping mechanism, sleep diary data did not reflect regular engagement in napping.

Beliefs about Occupational Performance

Interview participants identified differences in beliefs regarding performance in the occupation of sleep, classified by this study as sleep quality and beliefs about how sleep impacts daytime performance in other occupations.

Beliefs about sleep quality.

During the interviews, participants identified similar ideas about variables that promoted better nighttime sleep. Ease in falling asleep at night and the ability to sleep through the night were both identified as factors that described a “good” sleep.

Participant 3 reported, “If I immediately fall asleep and I don’t wake up with any disturbances, let it be the temperature of the room or my discomfort or stress, then I know for sure I had a good night’s sleep.” Participant 2 described a “good” night’s sleep as, “just sleeping throughout the whole night and [I] just wake up in a good mood.”

Participants also indicated that good performance the following day was seen to be a measure of the previous night’s sleep quality. Participant 1 reported, “I feel like I have a good night’s sleep when I can immediately get out of bed and have a good performance at least until five.” She also stated that a consistent sleep schedule lead to a “good” night’s sleep. Participant 2 identified “good” sleep as, “easily getting out of bed, waking up energized and in a good mood.” Lastly, participant 4 described a “good” night’s sleep as, “when you sleep all the way through the night and are able to fall asleep quickly.” Sleep behaviors, such as falling asleep quickly, sleeping through the night, and

waking up feeling energized and restored, were key factors when evaluating sleep quality.

A “bad” night’s sleep was described by participants as the inability to fall asleep and stay asleep through the night. Participant 1 described a “bad” night’s sleep as, “waking up at three or four o’clock in the morning with a drunk roommate stumbling everywhere. That’s a bad night’s sleep.” She also went on to describe a “bad” night’s sleep as waking up in the middle of the night sweating. Participant 2 reported, “Usually I would feel when I wake up with a headache, I had a bad sleep because it kinda just puts me in a bad mood to start off the day. Or if I wake up constantly, because usually if I wake up once, it’s fine. But if I’m waking up every hour, then yeah.”

Environment also appeared to be related to the quality of sleep. All four participants identified environment as a factor that impacted sleep quality. Participant 1 stated that she sleeps well unless, “my roommate barges in and wakes me up.” Participant 3 associated a “bad” night’s sleep with the environment of her room impeding her ability to fall asleep. “Having a bad night’s sleep would mean... mainly I detected based on the temperature of the room. Like if it’s too warm in a room that makes me struggle to actually fall asleep.” Likewise, participant 4 described a “bad” night’s sleep as the inability to fall asleep and associated it with environment. She stated that if her room was too hot then she could not fall asleep and that she preferred to sleep in a cold room. Participants associated a “bad” night’s sleep with environmental factors, such as temperature and roommate interferences, as well as the inability to fall asleep and sleep through the night as causing a “bad” night’s sleep.

Beliefs about daytime performance.

From the sleep interviews, participants noted that sleep directly affects their daytime performance. If a “good” night’s sleep was achieved, participants believed their daytime school performance improved. Participant 1 noted, “On the nights that I sleep pretty well without any disturbances, I do pretty well during the day.” Participant 2 reported: “I think I perform pretty well. Usually in the morning I’m still pretty groggy and I feel really tired. Once it hits 10:00 [A.M] or 11:00 [A.M] I’m pretty energized.” Participant 3 stated, “I feel pretty rested. I could definitely feel more rested throughout the day, but even though if I am tired, I will still perform my daily activities pretty well.” Participant 4 stated, “[During lecture] I really want to go back to sleep. But I’m a still a good student and I still pay attention and involve myself in class when I can. So it’s not like I shut down.”

Conversely, participants believed that a “bad” night’s sleep did not directly affect their daytime occupational performance. “If I wake up having a bad night’s sleep I don’t really think about how that will affect my day.” Participant 2 echoed these sentiments, stating that if she had a “bad” night’s sleep “I don’t really think about it throughout the day.” Participant 3 noted, “when I get my full six to eight hours, I find myself dozing off more as opposed to getting less sleep. Getting less sleep just generally keeps me more awake.” Participant 4 reported after having a “bad” night’s sleep, “around lunch, you’re kind of tired, but then you go to class and it’s kind of interesting, so you’re more peppy I guess,” and that she has been “in the same routine of being tired but staying awake...My bad sleep won't affect my day because it is a habit.”

Conflicting Sleep Beliefs

Finally, a pervasive theme to emerge from the interviews and data was that of conflicting beliefs. Participants demonstrated conflicts in self-reporting, priorities, and beliefs about sleep quantity, quality, and daytime performance. Sleep was seen as a valued and important occupation, however, schoolwork and socializing were consistently prioritized above sleep. At the beginning of the initial interview with participant 1, she said, “Sleep is very important to me, and I try the best I can to get as much sleep as I can throughout the day. In the off chance that I can’t sleep a full eight hours at night, I’ll try and nap during the day.” She then stated further, “I don’t think I have time to nap anymore, and I don’t even get eight hours of sleep.” Further she reported that she would “choose school over sleep because it dictates most of my life.” She also reported that her sleep quality was generally good, but stated later, “lately it has been pretty hard, clearing my head from stuff that’s been going on. I had interviews and applications to deal with so that wasn’t easy to ignore and fall asleep.” Participant 1 expressed interest in changing her sleep patterns and beliefs but stated she was unable to due to the amount of school work she had, the major she was pursuing, and an RA interview she was preparing for, “sleep can get pushed aside because the interview is more important.”

Participant 2 reported generalized inconsistencies regarding her sleep, stating, “In general, overall I feel like I sleep good” and that “I’m pretty satisfied with how I sleep,” but she also reported, “I haven’t been getting the full amount of sleep that I need to” and “it’s rare when I have a very good [night’s] sleep.” Further, this participant had conflicting beliefs about the quality of her sleep and reported that her sleep is “pretty restless...because I move around a lot when I sleep,” but she also reported that her sleep

“feels pretty deep, it takes a lot for me to wake up throughout the middle of the night.”

When asked how likely she would be to give up sleep for other activities, participant 2 reported “if it’s for homework, it’s highly likely. Sometimes I like to hang out with friends, I’d give up sleep to hang out,” yet she also reported, “I think sleep is really important.” This participant did not report any inconsistencies in the way that stress impacted her quality of sleep.

Participant 3 had various inconsistent beliefs. Regarding her sleep pattern, she stated “I’m not likely to give up sleep for other activities” but then went on to say “as for homework I put that, and work, first before my sleep.” As for her sleep quality, initially she felt that she slept well and had good general sleep quality, but then went on to say that she could be more satisfied with her sleep. At another point she said that she felt that her sleep quality was just average, but also said, “overall, I have had trouble sleeping because of finding a comfortable position to sleep in... but mainly overall I feel my sleep is, minus all the problems, pretty good.” She also had conflicting beliefs about her daytime performance, and felt that she functioned better and felt more awake when she got five hours of sleep or less. Despite the belief that she performed better with less sleep, she also reported that she felt that if she slept more her daily performance would improve. She reported that she typically felt restored after sleeping but frequently fell asleep in class. Interestingly, while she did not worry that a “bad” night’s sleep would affect her day, she did believe having a bad day could be attributed to having a “bad” night’s sleep. These contradictions highlight conflicting and complex nature of participants’ sleep beliefs.

Participant 4 also reported inconsistencies with her sleep beliefs. She stated sleep was important and she loved sleep, but it was something she would give up for school and soccer. “I’d give it up when things are due early the next morning, like I have absolutely no other time. You just got to go through it... and then, soccer. Definitely, [I have] given it up for soccer in the past.” Participant 4 also stated she generally had “good” sleep, “I’ll sleep pretty hard throughout the night. Even [when] I wake up a couple times I still go back to sleep and get pretty good sleep,” yet she also reported that she often woke up hourly throughout the night, worried that she may miss her alarm for soccer practice the next morning.

Sleep Diary Findings

The sleep diaries revealed wide variability of sleep schedules on a day-to-day basis. Figure 1 presents frequencies of wake-up times recorded over the two-week period across the 4 subjects. Participants reported a range of wake up times between 5:25 A.M and 12:15 P.M. The most frequently cited wake up time was 8:00 A.M. (7) and 9:00 A.M. (10). As noted in Figure 2, the earliest bedtime was 10:00P.M. (1). and the latest was 3:00A.M (1). Participants frequently cited 11:30 P.M. (8), 12:30 A.M. (5) and 1:00 A.M. (7) 2:00 A.M. (5) as common bedtimes in their sleep diaries.

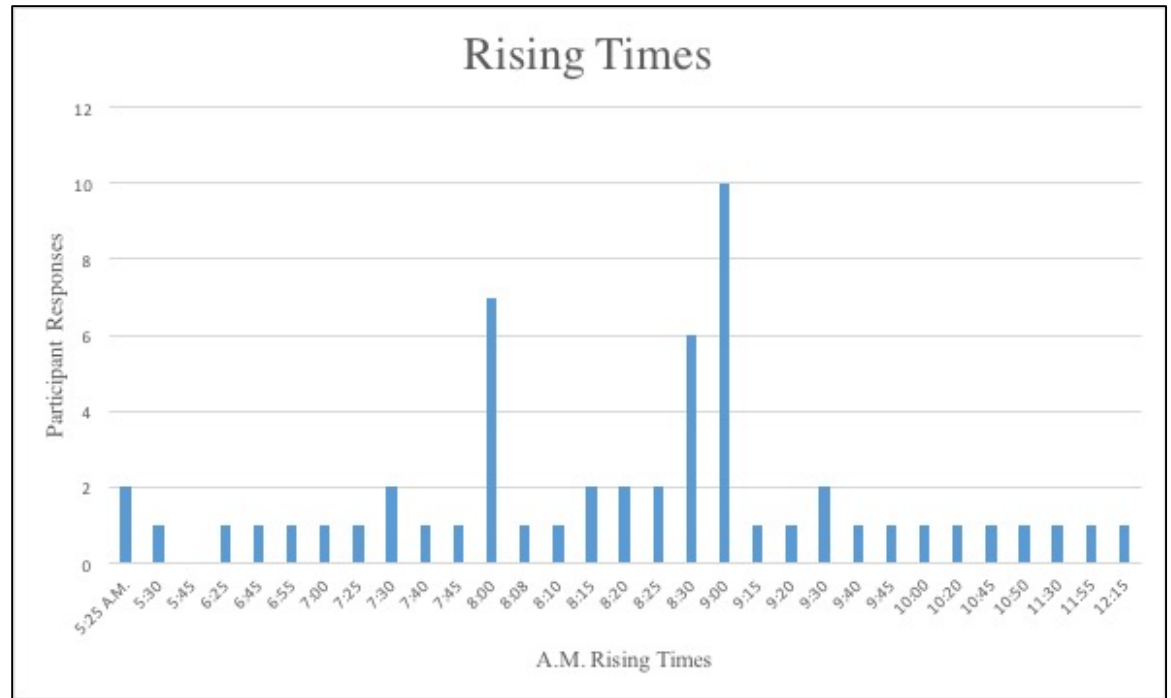


Figure 1. Frequency of participant rising times.

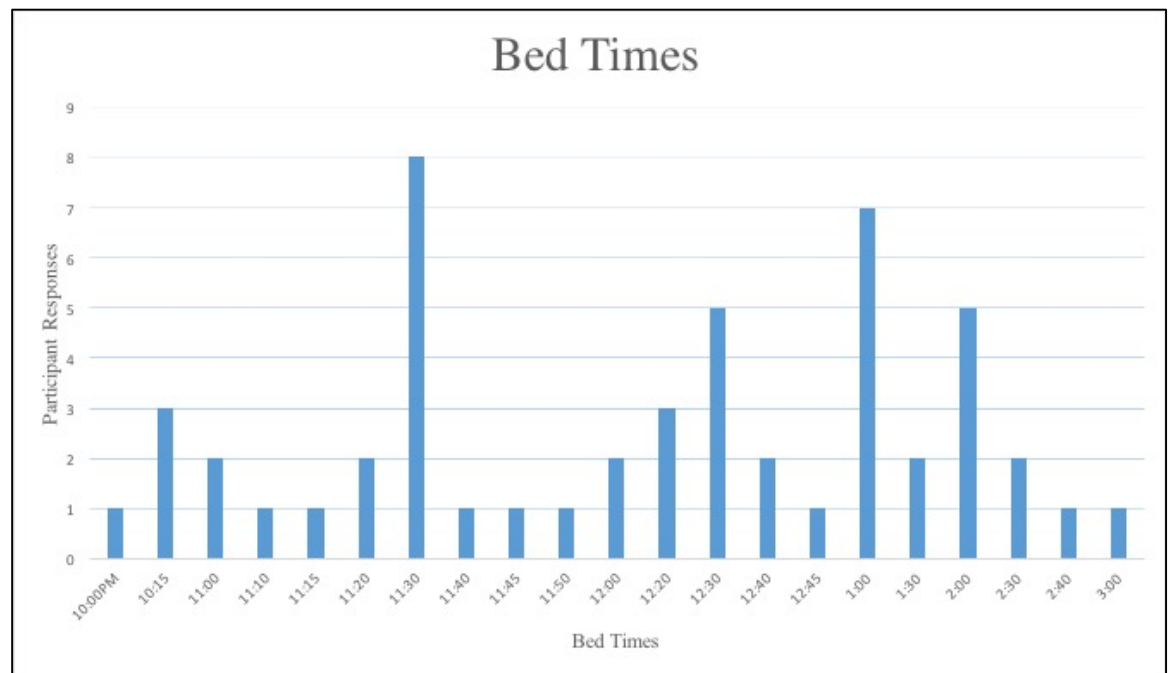


Figure 2. Frequency of participant sleep times.

Morning and evening survey data.

As noted in Table 2, 47% of the participant responses cited feeling Fair and Poor upon waking in the morning. In diary measures of daytime alertness, feelings of being rested and restored and performance of daily activities, the most common responses was Good (3 out of 5 on the Likert scale), with (53%) on feelings of being rested and restored and (49%) for performance of daily activities. Overall 33% of participant responses rated their quality of sleep as Poor or Fair.

Table 2

Selected Sleep Diary Responses

Question	Poor (1)	Fair (2)	Good (3)	Very Good (4)	Excellent (5)
How rested and restored did you feel today?	1	14	25	4	3
How well did you perform your daytime activities?	3	11	23	8	2
When I woke up today I felt:	4	21	18	8	2
How would you rate your quality of sleep?	3	15	24	8	4

Figure 3, reflects participants' evening reflections about specific aspects of daytime performance. Participants reported nodding off during the day 10 out of 41 times. Participants also reported napping 13 out of 47 times. Participants also reported finishing everything they wanted to or needed to before going to bed 37 out of 47 times.

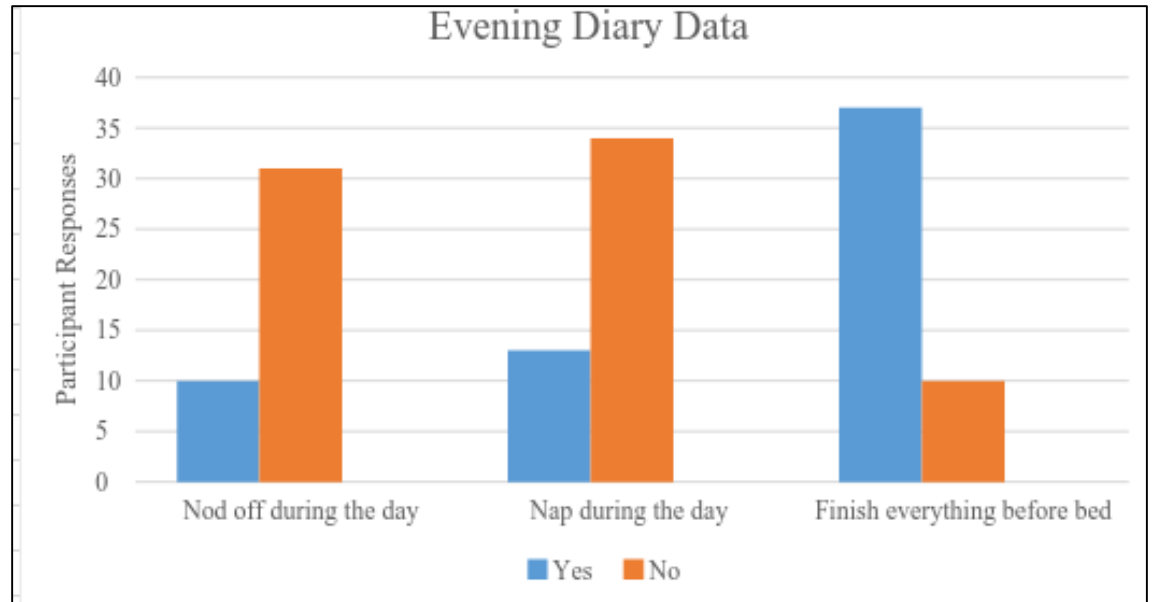


Figure 3. Evening diary data regarding nodding off, napping, and completing tasks before bed.

Discussion

This mixed method study sought to identify and investigate how beliefs and attitudes about sleep affected sleep quality in college students. For the purposes of this study, sleep quality was defined as feelings of being rested upon waking in the morning and feelings of alertness throughout the day. Through in-depth subjective interviews and sleep diary collection from four undergraduate college students, their general beliefs and attitudes about sleep and sleep's relationship to occupational performance were identified.

Analysis of the qualitative interviews and sleep diaries revealed emerging themes regarding how college student's beliefs and attitudes about sleep affected their quality of sleep. These themes included: beliefs about sleep patterns, stress, sleep quality and daytime performance. Additionally, conflicting beliefs about sleep were noted in many of these themes and prolific throughout the data. That participants held beliefs that

conflicted, or in some cases cancelled out each other, lead researchers to infer that participants did not have clearly defined ideas about the importance of sleep or the value of participating in sleep hygiene behaviors that are likely to improve sleep. Participants' lack of defined sleep beliefs may have affected poor daytime occupational performance and nighttime sleep. Additionally, many sleep beliefs cited in the interviews were not supported by the daily sleep diary data. During the interviews participants reported specific sleep patterns, beliefs, and behaviors, but the more specific input from daily diaries did not support the participants follow through with their reported sleep beliefs, routines, and sleep hygiene behaviors.

Beliefs about sleep patterns included specific ideas regarding how much nighttime sleep and napping students thought they needed, as well as beliefs about the ideal time to sleep. Ideal sleep patterns were frequently described as unattainable. For example, participant 1 believed there was a correct amount of sleep for her to get each night, but stated that she was not meeting this ideal amount. Naps were not seen to be included in her ideal sleep pattern, but were instead used as a tool to increase sleep quantity when nighttime sleep ideals had not been met. All four participants reported specific beliefs about the ideal quantity of sleep and napping they would like to get, and about how much they enjoyed doing both. However, all four participants also reported that they were unable to meet those ideals due to perceived school workload or other commitments. Likewise, sleep diary data reveals that the actual amount of naps taken was lower than reported in the interviews, with 13 naps reported in total by participants during the two-week period.

Each of the participants held the belief that stress and anxiety negatively impacted the quantity and quality of their sleep. Many reported that falling asleep was difficult due to school and work related anxiety, that stress caused them to wake up throughout the night, and that worry caused them to feel less rested after sleeping. Half of the participants also believed that sleeping and napping were positive and enjoyable ways to relieve stress. While the participants identified stress as negatively impacting their sleep, in some cases making it harder to fall asleep, no one mentioned the idea that sleeping enough might reduce the stress and anxiety felt during the day.

Participants identified sleep quality in terms of a “good” night’s sleep and a “bad” night’s sleep. “Good” nighttime sleep was identified as falling asleep quickly at night and sleeping the whole night through, whereas “bad” nighttime sleep was described as the inability to fall asleep and stay asleep through the night. Sleep quality was also described by participants as feelings of being rested and restored upon waking and the ability to perform daytime activities. This is important as students’ primary occupation is engaging and participating in their educational studies. A lack of REM sleep inhibits one’s ability to focus and retain information (Ellenbogen et al., 2006 & NIH, 2011), thereby limiting the student’s optimal performance in educational activities. These descriptions highlight the fact that sleep quality is, in part, defined by the beliefs individuals have while they are awake. This supports the use of CBT as both a theoretical framework for investigating sleep quality and as an intervention approach targeted at changing students’ beliefs about their sleep quality in an effort to improve perceived sleep quality.

Participants connected good sleep with good daytime performance but did not connect bad sleep with inadequate or poor daytime performance. Participant 1 stated, “If

I wake up having a bad night's sleep I don't really think about how that will affect my day." The fact that students only connected daytime performance to a good night's sleep warrants further investigation. The participants appeared to see no connection between poor sleep quality and poor daytime performance. This lack of connection may be a barrier to improving sleep hygiene practices that may support improved sleep quality. Research findings show that practicing sleep hygiene is strongly related to good sleep quality. The goal must then be to provide interventions that help college students make cognitive connections between sleep hygiene practices and behaviors, sleep quality, and resultant daytime occupational performance.

Conflicting sleep beliefs were pervasive throughout the interviews. Each of the participants reported beliefs that were in direct conflict with other reported beliefs. All participants repeatedly stressed the importance of sleep, but prioritized homework, projects, and socializing over sleep. Sleep diary data shows the majority of participants finished everything they wanted and needed to do before going to bed, often resulting in late bedtimes as seen in Figure 2. This further highlights the participants' "rule of living" that sleep must be forfeited for occupations deemed more urgent. Many of the participants also demonstrated conflicting beliefs about the quality of their sleep, and the impact of sleep on their daytime performance. The vague and contradictory nature of the students' beliefs and attitudes regarding sleep and the role sleep plays in their occupational performance may be a formidable barrier to improving sleep quality.

CBT interventions that help define and clarify sleep beliefs, attitudes, and resultant performance may serve to improve sleep quality in college students. For example, participants consistently identified a "rule" that they must finish all of their

homework before going to sleep but failed to acknowledge any correlation between the effects of staying up late to accomplish that “rule” and poor daytime performance the following day. Further research should investigate whether occupational therapists can provide an intervention focused on exploring “rules for living” and other cognitive beliefs and how such beliefs may be impacting sleep quality and occupational performance. Future studies should investigate the effectiveness of using CBT to clarify sleep beliefs and improve sleep quality. The relationship between stress and sleep in college students warrants further investigation as well.

Potential Limitations

Potential limitations of this study include the relatively small sample size and the fact that all four participants were women. The researchers had a small sample of potential participants to recruit from due to the lack of willingness of students to participate, exclusionary criteria further limiting the participant pool, and time constraints. Additionally, this research study sought to explore concepts but did not address causal relationships, limiting its application to interventions. Further, specific data on beliefs about sleep hygiene were not collected. Such data may have furthered the understanding of the relationship between sleep quality and sleep beliefs.

Sleep diary data was not linked to participants, thereby limiting analysis between specific daytime patterns and performance with specific beliefs. This study was therefore only able to gather general sleep beliefs and behaviors of college students. Future studies should examine the relationship between participants’ individual beliefs and actual daytime performance.

In hindsight the researchers realized that when completing the sleep diaries, the participants might have chosen 3, the middle number on the Likert scale, as a neutral response. Therefore, it is unclear whether responses of Good (3) were intended to reflect a positive response or a neutral or average response. Future studies should ensure that there is a neutral or average response option when using a Likert scale.

Implications for Occupational Therapy

The findings of this study can be used to further guide the approach occupational therapists utilize to improve the occupation of sleep. While there are a number of interventions targeting sleep hygiene practices, little has been done to address one's beliefs and attitudes about sleep. The findings of this study imply that people, specifically college students, do not have concrete, defined beliefs about sleep. Ideas that warrant further investigation are that perhaps occupational therapists could utilize CBT interventions to help facilitate changes in client's thoughts and beliefs about sleep and thereby improve one's sleep quality through the development of adaptive sleep routines. Reviewing sleep diary responses with clients may provide insight into conflicting sleep beliefs and sleep behaviors and highlight how these cognitive distortions affect overall sleep quality and performance in daytime occupations, thereby promoting a willingness to change in clients.

College is a transitional time in a student's life and it is typically the first time many students have ever lived independently. This new independence provides a challenge to establishing and adhering to a new routine, thus creating inconsistent sleep schedules and sleep problems. This study has highlighted the importance of addressing students underlying attitudes and beliefs about sleep, in order to ensure that such attitudes

and beliefs support a willingness to prioritize sleep and change behaviors. OTs can provide interventions to address cognitive beliefs about sleep as well as interventions targeting behavior. Once cognitive beliefs and attitudes become more supportive and defined regarding the importance of sleep in one's life, occupational therapists can work with clients in developing and establishing routines such as teaching sleep hygiene practices to clients and evaluating how confident the client feels at performing these practices.

Furthermore, OTs can help students adjust their sleeping environment to promote better sleep. Several participants identified environmental barriers as impacting their sleep. The environments created in dorm rooms are not always conducive to good sleep quality, as students may share a room for the first time and sleep in close proximity to electronics, among other barriers. Once a student has attitudes and beliefs that are sleep positive, OTs may be able to help students set up their room and establish a routine, thereby promoting better sleep quality and ultimately occupational performance. While this study investigated college students, the results of the study could also serve to improve sleep quality and increase functionality with other populations.

Conclusion

The need for sleep is something that all people share. Regardless of cultural, socioeconomic, or biological factors, every human being must sleep to survive. The benefits of sleep are well documented, as are the detrimental effects of too little sleep. Measuring the quantity of sleep is now a fairly conventional practice, and countless studies have been conducted trying to quantify the ideal amount of sleep individuals should get throughout a lifespan. Much has been written about the effectiveness of

various sleep interventions, and sleep hygiene practices, such as avoiding caffeine in the evenings and having a routine bedtime, have become well known interventions for improving sleep quality. An abundance of information is available regarding the importance of sleep and the actions needed to sleep better, yet for many college students sleep quality continues to be a problem.

The purpose of this study was to investigate and identify how college students' beliefs and attitudes about sleep affect their quality of sleep. Of the various sleep interventions available, those that address the cognitive aspects of sleep have proven very effective for improving sleep quality (Brown, Buboltz, & Spencer, 2002). Therefore, if certain beliefs and attitudes about sleep are impacting sleep performance, engagement, and quality for college students, helping students to become aware of these beliefs and attitudes may serve as a foundational step to improving actual sleep quality. By exploring students' underlying beliefs and attitudes about sleep, we sought to learn whether they held non adaptive beliefs about sleep quality that may influence behavior. Our aim was to identify non adaptive thoughts and behaviors as a potential therapeutic target to improve sleep quality in college students, which could lead to overall improvements in occupations performance of college students.

Results from our study found college students' beliefs about sleep are conflicted and undefined which limits their ability to participate in sleep hygiene practices. Although college students state that sleep is important, in practice, sleep seems to be deprioritized and repeatedly delayed for school work and socializing. Future areas of research should focus on examining is there is a relationship between these non-adaptive thoughts and actual sleep quality, since this study was primary qualitative. Research

should also address the cognitive beliefs and attitudes (i.e. that sleep can easily be postponed for other activities) that negatively impact sleep in college students.

Occupational therapy strives to help people achieve meaning and satisfaction in all aspects of their lives. Sleep has been neglected as an area of occupational performance for far too long. As occupational therapy continues to research and provide sleep interventions, it will be important to address the underlying fundamental beliefs and attitudes about sleep that participants have, in order to best provide relevant, meaningful, and effective interventions to improve sleep quality, and thereby to improve daily performance in other valued occupations.

References

- American Occupational Therapy Association. (2014). *Occupational therapy practice framework: Domain & process*. 3rd ed. Amer Occupational Therapy Assn.
- American Occupational Therapy Association. (in press). Occupational therapy code of ethics (2015). *American Journal of Occupational Therapy*, 69 (Suppl. 3).
- Beck, A. T. (1970). Cognitive therapy: Nature and relation to behavior therapy. *Behavior Therapy*, 1, 184- 200.
- Beck, A. T. (1967). *Depression: Clinical, experimental, and theoretical aspects*. New York: Hoeber Medical Division, Harper & Row.
- Brown, Franklin C., Walter C. Buboltz Jr, and Barlow Soper. "Relationship of sleep hygiene awareness, sleep hygiene practices, and sleep quality in university students." *Behavioral medicine* 28.1 (2002): 33-38.
- Bruce, M.A., & Borg, B. A. (2002). *Psychosocial Frames of Reference: core for occupation-based practice*. Thorfare, NJ: Slack.
- Buboltz Jr, W. C., Brown, F., & Soper, B. (2001). Sleep habits and patterns of college students: a preliminary study. *Journal of American College Health*, 50(3), 131-135.
- Buysse, D., Reynolds, C., Monk, T., Berman, S., & Kupfer, D. (1988). The pittsburgh sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Research*, 28, 192-213.
- Carskadon, M.A., Dement, W.C. (2011). Monitoring and staging human sleep. In Kryger, M.H., Roth, T., Dement, W.C. (Eds.), *Principles and practice of sleep medicine*, 5th edition, p16-26. St. Louis: Elsevier Saunders.

- Christiansen, C. H. (1999). Defining lives: Occupation as identity: An essay on competence, coherence, and the creation of meaning. *American Journal of Occupational Therapy*, 53(6), 547-558.
- Christiansen, C. H., & Matuska, K. M. (2006). Lifestyle balance: A review of concepts and research. *Journal of Occupational Science*, 13(1), 49-61.
- Coveney, C. M. (2014). Managing sleep and wakefulness in a 24- hour world. *Sociology of health & illness*, 36(1), 123-136.
- Ellenbogen J., Payne J., & Stickgold R. (2006). The role of sleep in declarative memory consolidation: passive, permissive, active or none? *Curr Opin Neurobiol* 16(6):716-22. Epub 2006 Nov 7.
- Fujii, H., Fukuda, S., Narumi, D., Ihara, T., & Watanabe, Y. (2015). Fatigue and sleep under large summer temperature differences. *Environmental Research*, 13817-21.
doi:10.1016/j.envres.2015.02.006
- Fukuda, K., Ishihara, K. (2001). Age-related changes of sleeping pattern during adolescence. *Psychology and Clinical Neuroscience*, 55, 231-232.
- Green, A. (2008). Sleep, occupation and the passage of time. *The British Journal of Occupational Therapy*, 71(8), 339-347.
- Green, A. (2015). Sleep and occupation. In A. Green & C. Brown (Eds.), *An occupational therapist's guide to sleep and sleep problems*. (pp. 56-76) London: Jessica Kingsley Press
- Green, A. & Durant C. (2015). Time for bed: historical and cultural factors and time use. In A. Green & C. Brown (Eds.), *An occupational therapist's guide to sleep and sleep problems*. (pp. 56-76) London: Jessica Kingsley Press

- Harmat, L., Takács, J., & Bódizs, R. (2008). Music improves sleep quality in students. *Journal Of Advanced Nursing*, 62(3), 327-335. doi:10.1111/j.1365-2648.2008.04602.x
- Harvey, G. A. (2002). A cognitive model of insomnia. *Behaviour Research and Therapy*, 40, 869-893.
- Harvey, A. G., Stinson, K., Whitaker, K. L., Moskowitz, D., & Virk, H. (2008). The subjective meaning of sleep quality: a comparison of individuals with and without insomnia. *Sleep*, 31(3), 383.
- Hershner, S. D., & Chervin, R. D. (2014). Causes and consequences of sleepiness among college students. *Nature and Science of Sleep*, 6, 73–84.
<http://doi.org/10.2147/NSS.S62907>
- Irish, L. A., Kline, C. E., Gunn, H. E., Buysse, D. J., & Hall, M. H. (2015). Clinical review: The role of sleep hygiene in promoting public health: A review of empirical evidence. *Sleep Medicine Reviews*, 2223-36.
doi:10.1016/j.smr.2014.10.001
- Kotronoulas, K., Stamatakis, A., & Stylianopoulou F. (2009). Hormones, hormonal agents, and neuropeptides involved in the neuroendocrine regulation of sleep in humans. *Hormones*, 8(4), 232-248. <http://www.hormones.gr/527/article/article.html>
- Leland, N. E., Marcione, N., Niemiec, S. L. S., & Don Fogelberg, K. K. (2014). What is occupational therapy's role in addressing sleep problems among older adults? *OTJR : Occupation, Participation and Health*, 34(3), 141–149.
<http://doi.org/10.3928/15394492-20140513-01>

- Lund, H. G., Reider, B. D., Whiting, A. B., & Prichard, J. R. (2010). Sleep patterns and predictors of disturbed sleep in a large population of college students. *Journal of adolescent health, 46*(2), 124-132.
- Meyer, A. (1922). The philosophy of occupational therapy. *Archives of Occupational Therapy* 1, 1–10.
- Morgan, K., Gregory, P., Tomeny, M., David, B. M., & Gascoigne, C. (2012). Self-Help Treatment for Insomnia Symptoms Associated with Chronic Conditions in Older Adults: A Randomized Controlled Trial. *Journal Of The American Geriatrics Society, 60*(10), 1803-1810. doi:10.1111/j.1532-5415.2012.04175.x
- Morin, M. C., Stone, J., Trinkle, D., Mercer, J., & Remsberg, S. (1993). Dysfunctional beliefs and attitudes about sleep among older adults with and without insomnia complaints. *Psychology and Aging, 8* (3), 463-467.
- Morin, M. C., Vallieres, A., Ivers, H. (2007). Dysfunctional beliefs and attitudes about sleep (DBAS): validation of a brief version (DBAS-16). *Insomnia, 30* (11). 1547- 1554.
- Natale V., Leger D., Bayon, V., Erbacci, A., Tonetti, L., Fabbri, M., & Martoni M. (2015). The consensus sleep diary: quantitative criteria for primary insomnia diagnosis. *Psychosom Med, 77*(4), 412-8. doi: 10.1097/PSY.000000000000177.
- Pierce, D. (2001). Occupation by design: Dimensions, therapeutic power, and creative process. *American Journal of Occupational Therapy, 55*(3), 249-259.
- Rupp, T., Acebo, C., Van Reen, E., Carskadon, M. (2007). Effects of moderate evening dose of alcohol. *Alcohol Clin Exp Res, 31*(8), 1358-1364.

- Singleton, R., & Wolfson, A. (2009). Alcohol consumption, sleep and academic performance among college students. *Journal of Studies on Alcohol and Drugs*, 70, 355-363.
doi:10.1053/smr.2002.0248
- Stasio, M. J., Curry, K., Wagener, A. L., & Glassman, D. M. (2011). Revving up and staying up: energy drink use associated with anxiety and sleep quality in a college sample. *College Student Journal*, 45(4), 738-748.
- Trockel, M. T., Barnes, M. D., & Egget, D. L. (2000). Health-related variables and academic performance among first-year college students: implications for sleep and other behaviors. *Journal of American college health*, 49(3), 125-131.
- Tsai, L. L., & Li, S. P. (2004). Sleep patterns in college students: Gender and grade differences. *Journal of psychosomatic research*, 56(2), 231-237.
- U.S Department of Health and Human Services, National Institutes of Health. (2011). *Your Guide to Healthy Sleep* (NIH Publication No. 11-5271). Washington, DC: U.S. Government Printing Office.

APPENDIX A
PERMISSION TO USE OT 1002 CLASS

Jane Dressler, JD., OTR/L
Assistant Professor, Occupational Therapy
Dominican University of California

RE: PRESENTATION OF RESEARCH PROJECT

Dear Jane:

This email confirms that you have been provided with a brief description of our capstone research project, which examines Dominican University undergraduate students' attitudes and beliefs about sleep, and that we have your permission to recruit participants for this project from your OT 1002 class, within the first two weeks of the semester. We would only need 10-15 minutes at the end of class time to summarize the project, provide a copy of the Research Subject's Bill of Rights, and administer the Pittsburgh Sleep Quality Index.

This research is an important part of Rhianna, Savannah, Charlotte, and Jackie's graduate capstone project at Dominican University of California. Dr. Susan Morris, assistant professor of occupational therapy, is supervising this research project. If you have questions about the project you may contact me, or you may contact Dr. Morris at Susan.Morris@Dominican.edu.

If this request to contact the students in your class meets with your approval, please respond to this email as soon as possible. We will then contact you to arrange a convenient time for visiting your class.

Thanks for your assistance.

Sincerely,

Rhianna Wallace, Savannah Hancock, Charlotte Sally, and Jackie Bloom

APPENDIX B
PARTICIPANT CONSENT FORM



Dominican University of California Consent Form

Purpose and Background:

Savannah Hancock, Rhianna Wallace, Charlotte Sally, and Jackie Bloom are conducting a research study on Dominican University of California students' beliefs and attitudes toward sleep.

I am being asked to participate because I am an undergraduate student at Dominican University of California.

Procedures:

If I agree to be a participant in this study, the following will happen:

Phase One

1. I understand that I am being asked to participate as a Participant in a research study designed to assess certain personal attitudes related to sleep and sleep beliefs. This research is part of Savannah Hancock, Rhianna Wallace, Charlotte Sally, and Jackie Bloom's graduate capstone project at Dominican University of California, California. Dr. Susan Morris, Assistant Professor, Occupational Therapy Department, Dominican University of California is supervising this research project.
2. I understand that I will complete a Pittsburgh Sleep Quality Index questionnaire, self-reporting on my sleep quality.
3. I understand that my choice to complete the Pittsburgh Sleep Quality Index is completely voluntary and I am free to withdraw my participation at any time. I also understand that withdrawing from the study will not impact my class grade or standing within the occupational therapy department.

Phase Two

1. I understand that after completing the Pittsburgh Sleep Quality Index questionnaire I may be chosen to participate in Phase Two of the study.
2. I understand that participation in this research will involve taking part in face-to-face meetings, which will include personal beliefs, attitudes, and thoughts on sleep.

3. I understand that my participation in this phase of the study is also completely voluntary and I am free to withdraw my participation at any time and withdrawing from the study will not impact my class grade or standing within the occupational therapy department.
4. I understand that as a participant in this study I will be expected to complete an electronic sleep diary, once in the morning and once in the evening, every day for two weeks. The diary will ask questions focused on sleep factors such as duration of sleep, sleep environment, sleep quality, etc.
5. I understand that my participation in this study is completely voluntary and I am free to withdraw my participation at any time and withdrawing from the study will not impact my class grade or standing within the occupational therapy department.
6. I understand that as a participant in this study I will be expected to complete an electronic sleep diary, once in the morning and once in the evening, every day for two weeks. The diary will ask questions focused on sleep factors such as duration of sleep, sleep environment, sleep quality, etc.
7. I have been made aware that I will receive daily emails with a link to complete the diary that day.
8. I have been made aware that I will be interviewed by a research member and will be asked questions pertaining to my thoughts on sleep.
9. I have been made aware that the interviews will be recorded. All personal references and identifying information will be eliminated when these recordings are transcribed, and all Participants will be identified by numerical code only; research advisor, Susan Morris, will keep a master list of these codes in a locked file separate from the transcripts. One year after the completion of the research, all written and recorded materials will be destroyed.
10. I am aware that all study participants will be furnished with a written summary of the relevant findings and conclusions of this project. Such results will not be available until October 2016.
11. I understand that I will be discussing topics of a personal nature and that I may refuse to answer any question that causes me distress or seems an invasion of my privacy. I may elect to stop the interview at any time and withdrawing from the study will not impact my class grade or standing within the occupational therapy department.
12. I understand that my participation involves no physical risk, but may involve some psychological discomfort, given the nature of the topic being addressed in the interview. If I experience any problems or serious distress due to my participation, Susan Morris will provide, at no cost to me, a one-time consultation with a licensed therapist. Susan Morris may be contacted at Susan.Morris@dominican.edu
13. I understand that if I have any further questions about the study, I may contact Charlotte Sally at Charlotte.Sally@students.dominican.edu or the research supervisor, Susan Morris. Additionally, if I have further questions or comments about participation in this study, I may contact the Dominican University of California Institutional Review Board for the Protection of Human Participants (IRBPHP), which is concerned with the protection of volunteers in research

projects. I may reach the IRBPHP Office by calling (415) 482-3547 and leaving a voicemail message, by FAX at (415) 257-0165 or by writing to the IRBPHP, Office of the Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901.

14. All procedures related to this research project have been satisfactorily explained to me prior to my voluntary election to participate. I HAVE READ AND UNDERSTAND ALL OF THE ABOVE EXPLANATION REGARDING THIS STUDY. I VOLUNTARILY GIVE MY CONSENT TO PARTICIPATE. A COPY OF THIS FORM HAS BEEN GIVEN TO ME FOR MY FUTURE REFERENCE.

Risks and/or Discomforts:

1. I understand that while my participation carries no direct risks there is a potential for psychological distress, and dwelling on negative sleep beliefs or attitudes could create obsessive thoughts or stress, which could result in worse sleep.
2. I may elect to stop participating in the study at any time and may refuse to participate before or after the study is started without any adverse effects.

Benefits:

The primary potential benefit is that I gain a better understanding of my sleep beliefs and attitudes and/or improve my sleep engagement. The study could also result in improved sleep quality and increased functionality. Additionally, the information gathered from this study may help to improve my understanding of sleep. I may also benefit from exposure to the capstone experience that is an integral part of the occupational therapy program at Dominican University of California.

Questions:

I have discussed this study with the occupational therapy students conducting the study and have had all my questions answered. If I have further questions about the study, I may contact the primary researcher, Charlotte Sally at Charlotte.Sally@students.dominican.edu.

Consent:

I have been given a copy of this consent form, signed and dated, to keep.

PARTICIPATION IN RESEARCH IS VOLUNTARY. I am free to decline to be in this study or withdraw my participation at any time without fear of adverse consequences.

My signature below indicates that I agree to participate in **Phase One** of this study by completing the PSQI.

PARTICIPANT'S SIGNATURE

DATE

My signature below indicates that I agree to participate in **Phase Two** of this study, including the one-on-one interviews and completion of the sleep diary.

PARTICIPANT'S SIGNATURE

DATE

PARTICIPANT'S NAME (PRINT)

APPENDIX C

IRBPHS RESEARCH PARTICIPANT'S BILL OF RIGHTS

Research Participant's Bill of Rights Dominican University of California

Every person who is asked to be in a research study has the following rights:

1. To be told what the study is trying to find out;
2. To be told what will happen in the study and whether any of the procedures, drugs or devices are different from what would be used in standard practice;
3. To be told about important risks, side effects or discomforts of the things that will happen to her/him;
4. To be told if s/he can expect any benefit from participating and, if so, what the benefits might be;
5. To be told what other choices s/he has and how they may be better or worse than being in the study;
6. To be allowed to ask any questions concerning the study both before agreeing to be involved and during the course of the study;
7. To be told what sort of medical treatment is available if any complications arise;
8. To refuse to participate at all before or after the study is stated without any adverse effects. If such a decision is made, it will not affect his/her rights to receive the care or privileges expected if s/he were not in the study.
9. To receive a copy of the signed and dated consent form;
10. To be free of pressure when considering whether s/he wishes to be in the study.

If you have questions about the research you may contact me at Charlotte.Sally@dominican.students.edu. If you have further questions you may contact my research supervisor, Susan Morris at Susan.Morris@dominican.edu or the Dominican University of California Institutional Review Board for the Protection of Human Subjects (IRBPHS), which is concerned with protection of volunteers in research projects. You may reach the IRBPHS Office by calling (415) 482-3547 and leaving a voicemail message, or FAX at (415) 257-0165, or by writing to IRBPHS, Office of Associate Vice President for Academic Affairs, Dominican University of California, 50 Acacia Avenue, San Rafael, CA 94901

APPENDIX D

SAMPLE EMAIL INVITATION TO PARTICIPATE

Hello (name),

Based on your PSQI questionnaire results you have been selected to potentially participate in our study regarding the sleep beliefs and attitudes of Dominican college students. If you are willing to participate, please include your phone number and best time to call so that we may contact you with additional questions to ensure that you are an appropriate candidate for our study. If you have any further questions before the call, please feel free to email me at charlotte.sally@students.dominican.edu. Thank you for your time and we look forward to hearing from you.

Thank you,
Charlotte Sally and the sleep group

APPENDIX E

PRE-SCREEN CALL SCRIPT

Hello (name), this is (researcher) calling you in regards to the Sleep Group study. You have been selected to participate in this study and I have a couple of questions to clarify with you to make sure that you are an appropriate candidate. Please answer the following questions with yes or no:

1. Do you have any of the following doctor diagnosed medical conditions:
 - a. Narcolepsy, Insomnia, Sleep Apnea, and Cataplexy
 - b. ADHD, Asthma, Chronic Obstructive Pulmonary Disorder, Depression, Epilepsy, Gastroesophageal Reflex Disease, Fibromyalgia and Multiple Sclerosis

(If No, proceed to question 2, if Yes proceed to exit script)

1. Are you pregnant?

(If No, proceed to the invitation to participate, if Yes proceed to exit script)

Exit Script:

Thanks so much for your time. At this point we will not be asking you to participate in the interview section of this study because you answered yes to one of the above questions. The information you've provided is very much appreciated and if you have any additional questions please contact charlotte.sally@students.dominican.edu

Invitation to participate:

If you answered no to all questions, then we would be happy to use you as a participant for the study. We estimate that this will take a total of 6.5 hours, including two interviews and completion of a short, 2 week sleep diary that you will need to fill out twice a day. This study will provide a background on the sleep beliefs and attitudes of

college students and it will identify attitudes and behaviors that impact sleep. In the future, the results from this study may be used to create a sleep intervention specifically for college students to help improve their quality of sleep. Are you still interested in participating?

(If yes) We will contact you on (date) with further information regarding your interview.

(If no) We thank you and appreciate your time and information. If you change your mind, please contact us and we will set up a time to interview you. If you don't then we will not contact you further.

Thank you so much for your time!

APPENDIX F

SAMPLE INTERVIEW QUESTIONS

Sleep as an Occupation in College Students Interview Script and Sample Questions

Hello My name is _____

Thank you so much for participating in our sleep study. To start, I want to go over the consent form that you signed, to see if you have any questions about that. I just want to reiterate that all your identifying information will be kept in locked files and will be coded so that only a number will be attached to your personal data.

We are going to start the interview with a three-minute period during which I just want you to tell me about sleep in general, about your own sleep, and about how you feel about sleep. After that I will ask you some specific questions. If there is any question that you do not feel comfortable answering, please indicate that you would like to pass on that question by saying “pass.”

Ok, please tell me about your thoughts on sleep in general, tell me about your own sleep, and how you feel about sleep. (Let participant freely speak for 3 minutes, prompting him or her as needed)

..... Can you tell me more?

..... What else?

Ok, thank you very much! Now I am going to ask you some specific questions, first about sleep and then about daytime performance.

(General Sleep Quality)

First I am going to ask you some questions about your general sleep quality:
(Probing questions will only be used until sufficient information has been gathered, as indicated by participant’s repetition of answers etc.)

How well do you feel you sleep in general?

How well do you feel you slept last night?

How satisfied are you with your sleep?

Do you feel that you get enough sleep?

How easy is it for you to fall asleep?

Do you feel calm and relaxed as you are falling asleep?

Do you feel anxious, worried or tense as you are trying to get to sleep?

Do you usually sleep solidly through the night?

If you wake up at night, what is it that wakes you up?

How restless are you during the night?

How deep does your sleep feel to you?

Do you wake earlier than you need to and then have trouble falling back asleep?

How many hours of sleep do you normally get?

What time do you normally go to bed at night? How soon after that do you fall asleep?

(Daytime Performance)

OK, now I am going to ask you some questions about your daytime performance: (Again, probing questions will only be used until sufficient information has been gathered, as indicated by participant's repetition of answers etc.)

How rested do you feel during the day?

How restored do you feel after a night's sleep?

How tired do you feel during the day?

When you wake up, how do you feel immediately?

Do you feel excited about the day to come?

How easy is it for you to wake up in the morning?

What kind of body sensations do you feel when you wake up?

Do you feel clear headed and/or alert when you wake up? Throughout the day?

How energetic do you feel upon waking? Throughout the day?

How well do you perform during the day?

(Beliefs About Sleep)

OK, finally I am going to ask you some questions about your beliefs about sleep:

(Again, probing questions will only be used until sufficient information has been gathered, as indicated by participant's repetition of answers etc.)

Is sleep important to you?

Do you like to sleep?

How likely are you to give up sleep for other activities?

What makes you feel that you had a "bad" night's sleep?

What makes you feel that you had a "good" night's sleep?

If you wake up feeling that you had a "bad" night's sleep do you worry about how it will affect your day?

If you have a "bad" day do you tend to think it's because of a "bad" night's sleep the night before?

If you slept more or slept "better" do you think your daily performance would improve?

What stops you from changing or modifying your sleep habits or routines?

Ok, that is about all the time we have.

(for first interview)

Ok, now we will go over the sleep diary that you will be completing for the next two weeks (see appendix G Sleep diary)

(for second/exit interview)

Is there anything else that you would like to tell me about this experience of keeping the sleep diary and thinking and talking about sleep over the last couple weeks? Or anything else related to your sleep?

Thank you so much for participating in this study!!
(give them the gift card)

Sleep interview questions adapted from:

Harvey, A. G., Stinson, K., Whitaker, K. L., Moskowitz, D., & Virk, H. (2008). The subjective meaning of sleep quality: a comparison of individuals with and without insomnia. *Sleep*, 31(3), 383.

APPENDIX G

SLEEP DIARY INSTRUCTIONS

Instructions for filling out the Sleep Diary

Part One

1. Fill out “Complete in Morning” section upon waking up.
2. Fill in current date.
3. Fill in day of week.
4. Circle the number that best fits “when I woke up today I felt.”
5. Fill in how many minutes or hours it took for you to fall asleep.
6. Fill in how many times, quantified in minutes or hours you woke up during the night.
7. Circle the number that correlates to how disturbed your sleep was, then check any of the boxes that affected your sleep.
8. Check the boxes that correspond to how you spent the last hour before you went to sleep.
9. Fill in the time you woke up.
10. Fill in the time you got out of bed.
11. Fill in the range from getting into bed and getting out of bed (example: 8:00pm – 5:00am).
12. Circle the number that corresponds to “How would you rate the quality of your sleep last night?”

Part Two

1. Fill out “Complete at End of Day” section before going to bed.
2. Fill in current date.
3. Fill in day of week.
4. Circle the number that corresponds to “How rested and restored did you feel today.”
5. Circle the number that corresponds to “How tired were you.”
6. Circle the number that corresponds to “How well did you perform your daily activities.”
7. Circle the number that corresponds to “Did you feel clear headed and alert.”
8. Circle Yes or No if you exercised. If Yes write in what you did and how long you exercised.
9. Circle Yes or No if you consumed caffeine. If Yes write in what you consumed and how much.
10. Circle Yes or No to the following question “Did you nod off during any of your daily activities.”
11. Circle Yes or No if you took a nap. If yes write in how many naps you took and how long each nap was.
12. Circle Yes or No if you finished everything you needed/wanted to do before you went to bed, then explain why or why not.

APPENDIX H

SAMPLE SLEEP DIARY

Complete in Morning	
Date:	Day of Week:
When I woke up today I felt: (Poor) 1 2 3 4 5 (Excellent)	
What time did you go to bed last night? AM/PM	
After settling down, how long did it take you to fall asleep? Minutes/Hours:	
After falling asleep, about how many times did you wake up in the night? Minutes/Hours:	
My sleep was disturbed: (Not at all) 1 2 3 4 5 (Constantly)	
<p>Check the following boxes that disturbed your sleep:</p> <ul style="list-style-type: none"> • Noise • Lights • Pets • Temperature • Discomfort • Stress • Allergies • Sleep Partner • Other: _____ 	
<p>How did you spend the last hour before you went to sleep?</p> <ul style="list-style-type: none"> • Homework • Television or Phone • Reading • Bathing • Socializing • Sex • Eating • Working • Other: _____ 	
What time did you wake up today? AM/PM	

What time did you get out of bed today? AM/PM
How long did you spend in bed last night? (From first getting in, to finally getting up):
How would you rate the quality of your sleep last night? Circle one: (Poor) 1 2 3 4 5 (Excellent)

Complete at End of Day	
Date:	Day of Week:
How rested and restored did you feel today? (Poor) 1 2 3 4 5 (Excellent)	
How tired were you? (Very tired) 1 2 3 4 5 (Not tired at all)	
How well did you perform your daily activities? (Poor) 1 2 3 4 5 (Excellent)	
Did you feel clear headed and alert? (Not at all) 1 2 3 4 5 (Extremely alert)	
Did you exercise? Circle: Yes No If yes, what and how long:	
Did you consume any caffeine? Circle: Yes No If yes, what and how much:	
Did you nod off during any of your daily activities? Circle: Yes No	
Did you take a nap? Circle: Yes No If so, how many and how long?	
Did you finish everything you needed/wanted to do before you went to bed? Circle: Yes No Why or why not:	

APPENDIX I

RESEARCH ASSISTANT CONFIDENTIALITY FORM

**DOMINICAN UNIVERSITY of CALIFORNIA CONFIDENTIALITY
AGREEMENT FOR HUMAN SUBJECT RESEARCH ASSISTANTS**



Confidentiality Agreement for Human Subject Research Assistants

Human subject research includes confidential and personal matters, some of which may involve a subject's rights of privacy protected by law, attorney-client privileged communications, and proprietary information. I agree to maintain confidentiality with respect to any private or personal information that I become aware of, or have access to, during the course of my activity as a research assistant. In providing support to the research project, I am considered a "confidential employee." I am prohibited from releasing information to or discussing information with anyone not employed in this specific research project, except as I am directed by the primary investigator or as is necessary in the ordinary course of performing my duties in the research activity.

I agree to maintain confidentiality of these matters while I am working on the research project and following the completion of my work association on this activity.

At all times during my participation, I shall promptly advise the primary investigator of any knowledge that I may have of any unauthorized release or use of confidential or personal information, and shall take reasonable measures to prevent unauthorized persons from having access to, obtaining, or being furnished with any such information.

Print Name: _____

Signature: _____ Date: _____

The policies were explained to me by:

Name

Title

APPENDIX J

PERMISSION TO OBTAIN PSQI QUESTIONNAIRE

November 2, 2015

Dr. Daniel J. Buysse
University of Pittsburgh
Sleep Medicine Institute
3811 O'Hara Street; E-1127
Pittsburgh, PA 15213
415-246-6413

RE: PITTSBURGH SLEEP QUALITY INDEX

Dear Dr. Buysse,

I am writing to request written permission to use the Pittsburgh Sleep Quality Index in my graduate research project relating to sleep quality and sleep beliefs and attitudes in undergraduate college students. This project is part of a graduate thesis requirement in occupational therapy at Dominican University of California.

We will plan to use the link for the Pittsburgh Sleep Quality Index posted on the University of Pittsburgh Sleep and Chronobiology Center website.

My research is being supervised by Dr. Susan Morris, OT/L, Assistant Professor in occupational therapy at Dominican University of California, San Rafael, CA, 94901, 415-482-2486.

If this request meets with your approval, please email me, Charlotte Sally, with a scanned copy of your permission with your signature and the date.

If you have any questions, please contact do not hesitate to contact me or Dr. Susan Morris.

Thank you for your help.

Sincerely,

Charlotte Sally
Charlotte.sally@students.dominican.edu

Jacqueline Bloom
Jacqueline.bloom@students.dominican.edu

Savannah Hancock
Savannah.hancock@students.dominican.edu

Rhianna Wallace
Rhianna.wallace@students.dominican.edu

APPENDIX K PERMISSION TO USE PSQI QUESTIONNAIRE

	Charlotte Sally <charlotte.sally@students.dominican.edu>
---	--

Permission to use Pittsburgh Sleep Quality Index for graduate research study

Gasiorowski, Mary <GasiorowskiMJ@upmc.edu>	Tue, Nov 10, 2015 at 11:23 AM
--	-------------------------------

To: "charlotte.sally@students.dominican.edu" <charlotte.sally@students.dominican.edu>

Sent on behalf of Dr. Buysse

Dear Charlotte,

You have my permission to use the PSQI for your research study. However, we do not send out separate signed letters due to the volume of requests. You can find the instrument, scoring instructions, the original article, links to available translations, and other useful information at www.sleep.pitt.edu under the Research/Instruments tab. Please ensure that the PSQI is accurately reproduced in any on-line version (including copyright information). We request that you do cite the 1989 paper in any publications that result.

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

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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

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From: Buysse, Daniel

Sent: Tuesday, November 10, 2015 6:07 AM

To: Gasiorowski, Mary

Subject: Fwd: permission to use Pittsburgh Sleep Quality Index for graduate research study

We don't do separate signed letters due to the volume of requests.

----- Original Message -----

Subject: permission to use Pittsburgh Sleep Quality Index for graduate research study

From: Charlotte Sally <charlotte.sally@students.dominican.edu>

Sent: Monday, November 9, 2015, 7:36 PM

To: "Buysse, Daniel" <BuysseDJ@upmc.edu>

CC:

November 9, 2015

Dr. Daniel J. Buysse

University of Pittsburgh

Sleep Medicine Institute

3811 O'Hara Street; E-1127

Pittsburgh, PA 15213

[415-246-6413](tel:415-246-6413)