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The impact of psychological reactance and approach/avoidance motivation on the effectiveness of sleep interventions

Barbara Calvert

THE IMPACT OF PSYCHOLOGICAL REACTANCE AND APPROACH/AVOIDANCE MOTIVATION ON THE EFFECTIVENESS OF SLEEP INTERVENTIONS

by

Barbara Calvert, B.A., M.A.

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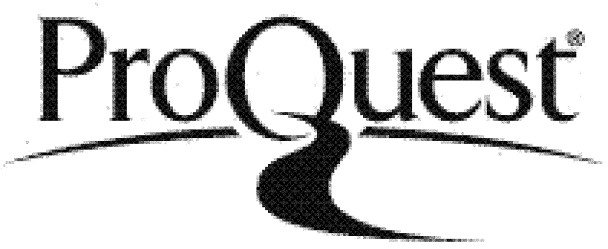

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Supervisor of Dissertation Research

Head of Department

Dept. of Psychology & Behavioral Sciences
Department

Recommendation concurred in:

Advisory Committee

Approved:
Director of Graduate Studies

Approved:
Dean of the Graduate School

Dean of the College

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ABSTRACT

Research has shown that college students experience sleep difficulties at a higher rate than the general population. Many factors contribute to the sleep difficulties of college students including lifestyle, stimulant use, alcohol use, physiological arousal, and cognitive factors. Sleep difficulties have been shown to have a significant negative impact on numerous aspects of an individual's life including cognitive/academic performance, physical health, and psychological functioning. College administrators and counselors need effective interventions for students experiencing sleep difficulties. It is also essential that individuals working with college students be aware of personal factors that may impact how an individual responds to a sleep intervention. Thus, the purpose of this study was twofold. The first purpose of this study was to examine the effectiveness of two sleep interventions: the Sleep Treatment and Education Program for Students and an enhanced version of the program. The second purpose of this study was to examine how approach/avoidance motivation and psychological reactance impact an individual's response to the sleep intervention. Results indicated no significant difference in sleep quality, sleep length, sleep hygiene awareness, or sleep hygiene practices due to participation in the sleep interventions. In addition, approach/avoidance motivation and psychological reactance were not found to impact an individual's response to an intervention to improve sleep. The implications of the findings as well as the limitations of the current study and suggestions for future research are discussed.

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Author Gaelan Cahut

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CHAPTER ONE

INTRODUCTION

Statement of the Problem

Research indicates that college students experience sleep difficulties at a higher rate than the general public (Lund, Reider, Whiting, & Prichard, 2010; Brown, Buboltz, & Soper, 2001; Vail-Smith, Felts, & Becker, 2009; Buboltz, Jenkins, Soper, Woller, Johnson, & Faes, 2009). Research also suggests that the consequences of sleep difficulties can be widespread and negatively impact an individual's cognitive/academic performance (Trockel, Barnes, & Egget, 2000; Kelly, Kelly, & Clanton, 2001; Medeiros, Mendes, Lima, & Araujo, 2001; Adeosun, Asa, Babalola, & Akanmu, 2008; Jenkins & Buboltz, 2002; American College Health Association, 2007), physical health (Bonnet & Arand, 1998; Asplund, 2000; Newman, Enright, Manolio, & Haponik, 1997; Apples & Mulder, 1984; Rosen, Palermo, Larkin, & Redline, 2002; Finn, Young, Palta, & Fryback, 1998), and psychological functioning (Asai et al., 2006; Hsu, Wang, Liu, Juang, Yang, & Hung, 2009; Tani, Lindberg, Wendt, von Wendt, Alanko, Appelberg, & Porkka-Heiskanen, 2003; Krystal, Thakur, & Ross, 2008). With sleep difficulties impacting college students in a multitude of ways it has become increasingly important that college administrators and college counselors be aware of the impact sleep difficulties have on college students. It is also important that college counselors have effective ways to address sleep difficulties to help alleviate these difficulties.

There are many factors that can contribute to sleep difficulties. The most common sleep interventions such as sleep hygiene, sleep restriction therapy, and stimulus control do not address all contributing factors. More specifically, they do not address cognitive factors such as ruminating thoughts and intrusive thoughts that may be impacting an individual's sleep.

Justification

The purpose of this study was twofold. The first purpose of this study was to compare the effectiveness of two psychoeducational sleep intervention programs for college students. The first program was the Sleep Treatment and Educational Program for Students (STEPS) developed by Brown, Buboltz, and Soper (2006). The second program evaluated was an enhanced version of the STEPS program. The enhanced version of the program included both relaxation techniques and cognitive techniques in addition to the sleep hygiene and sleep restriction techniques. These additions were expected to increase the effectiveness of the STEPS program because they would allow the program to address a larger number of reasons that individuals experience sleep difficulties.

The second purpose of this investigation was to examine psychological factors that may predict the effectiveness of a psychoeducational sleep intervention. The specific predictors examined were psychological reactance and approach/avoidance motivation. Research has shown that psychological reactance can affect an individual's responsiveness to messages regarding alcohol (Dillard & Shen, 2005; Quick & Stephenson, 2008), condom use (Quick & Stephenson, 2008) and exercise (Quick & Considine, 2008). An exhaustive literature review revealed no research examining reactance as it relates to messages regarding sleep.

The second predictor examined was approach/avoidance motivation. Research has shown that approach goals may impact intervention success though being a significant predictor of rehearsal, elaboration, organization, and critical thinking (Bartels, Magun-Jackson, & Ryan, 2010). Goal orientation also has been related to psychological health. Research (Bartels, Magun-Jackson, & Kemp, 2009) indicates that individuals with an approach orientation utilize self-efficacy enhancement and stress-reducing actions at a higher rate than avoidance motivated individuals. In a sample of 145 undergraduate students, approach goals mediated the relationship between an individual's need for achievement and metacognitive self-regulation (Bartels & Magun-Jackson, 2009). An exhaustive literature review revealed no research examining approach/avoidance motivation as it relates to sleep interventions.

Review of the Literature

In order to understand how sleep interventions change sleep it is first necessary to understand the stages and physiological processes of sleep. This section begins with an overview of the stages of sleep and the physiological processes that regulate sleep. This is followed by a discussion of sleep difficulties as they relate to college students and how a disturbance in sleep length or quality can impact an individual's physical health, cognitive/academic functioning, and psychological health are also discussed. A review of the treatments for sleep difficulties follows. Next, the impact that psychological reactance and approach avoidance motivation can have on an individual's response to an intervention are reviewed. This section concludes with the formulation of hypotheses for the current study.

Stages of Sleep

During sleep individuals continually go through a sleep cycle consisting of three stages of non-REM (Rapid Eye Movement) and REM sleep. Historically, when electroencephalogram (EEG) patterns are identified individuals cycle through non-REM (stages one-three) and REM sleep approximately every 90-100 minutes (Caldwell, 2003; Carlson, 2002). Each cycle of REM sleep lasts approximately 20-30 minutes, for a total of four or five cycles of REM sleep per night. During the second half of the night individuals experience longer periods of REM sleep. The changing pattern of sleep throughout the night makes it important that individuals get adequate sleep length and proper sleep throughout the entire night.

Stage one of sleep is a transition period between wakefulness and sleep. This stage usually begins when individuals become sleepy and close their eyes. Some theta waves (3.5-7.5 Hz) are registered on an EEG during stage one (Carlson, 2002). Theta waves are the second slowest form of brain waves (Carlson, 2002). Research indicates that individuals with insomnia often spend more time in stage one sleep than those without insomnia, and, thus, usually obtain more sleep than they realize, but they do not obtain restorative sleep (Carskadon & Dement, 2000).

Typically, after 10 minutes of stage one sleep individuals gradually enter stage two sleep (Carlson, 2002). Stage two of sleep is characterized by sleep spindles and K complexes. Sleep spindles are short bursts of EEG waves occurring between two and five times per minute during the stages of non-REM sleep, but predominantly in stage two of non-REM sleep. K complexes are abrupt, sharp waves. These two types of wave bursts are associated with keeping an individual in a sleeping state (Bowersox, Kaitin, &

Dement, 1985; Steriade & McCarley, 1990). When there is an irregularity with K complexes and sleep spindles individuals are likely to experience sleep difficulties.

After 10-25 minutes in stage two of sleep, a normal, healthy individual enters stage three (Carskadon & Dement, 2000). Stage three is defined by the presence of delta waves which are slow, high amplitude waves (less than 3.5 Hz) (Carlson, 2002) that constitute more than 50% of brain waves during stage three. Stage three is also known as slow wave sleep and is the deepest level of sleep.

After approximately 45 minutes of stage three sleep individuals typically go back through stage two (Carlson, 2002). During the second and subsequent times in stage two of sleep the K complexes and spindles give way to the rapid eye movements of REM sleep. REM sleep is the stage of sleep in which people dream. REM sleep is known as paradoxical sleep because beta waves are present, but the brain paralyzes muscular activity possibly to protect individuals from injury through acting out dreams. The rapid eye movements will return to K complexes and sleep spindles as the individual reenters stage two of sleep and repeats the cycle. When this cycle is disrupted individuals may experience numerous sleep disturbances. The interventions used in this study directly impact these stages of sleep and the physiological processes of sleep.

Physiological Processes of Sleep

Three main physiological processes regulate the sleep-wake cycle (National Institute of Health, 1998; Refinetti, 2000). They are 1) homeostatic drive for sleep, 2) autonomic nervous system regulation, and 3) the circadian rhythms (National Institute of Health, 1998; Refinetti, 2000). Sleep difficulties usually result from a disruption in one of

these three processes. Thus, individuals studying sleep need to be informed about all three processes. Each of the three processes is outlined in the next sections.

Homeostatic Drive. Research suggests that while individuals are awake biochemicals accumulate in the body (Porkka-Heiskamen, 1999). The buildup of these biochemicals induces sleepiness; thus, the longer we are awake the sleepier we become. These biochemicals accrue as our body metabolizes other biochemicals. One protein metabolized while we are awake is adenosine monophosphate (AMP). The primary derivative of AMP, adenosine, inhibits the basal forebrain (part of the brain involved in maintaining wakefulness). Research suggests a direct negative correlation between adenosine levels in the basal forebrain and wakefulness (Porkka-Heiskamen, 1999).

Another chemical that plays an important role in sleep is Prostaglandins type d2. This chemical is produced by immune system activity and inhibits the response of certain hypothalamic cells (Scamel, Gerashchenko, Urade, Onoe, Saper, & Hayaishi, 1998). Prostaglandins type d2 is implicated in increased sleepiness during illness as it is associated with increased immune system activity. Once an individual is asleep the level of these chemicals declines. For example, during sleep the metabolism of adenosine monophosphate decreases and the individual can gradually return to a normal state of alertness (Scamel et al., 1998). Immune system activity decreases during sleep and AMP breaks down slowly allowing individuals to return to alertness (Scamel et al.).

Autonomic Nervous System. The autonomic nervous system, a subsystem of the peripheral nervous system, is responsible for the individual's level of arousal to environmental and external stimuli. The autonomic nervous system is divided into two subsystems: the parasympathetic and sympathetic nervous systems. The sympathetic

nervous system arouses the body in times of perceived stress or danger and the parasympathetic nervous system calms the body allowing for needed restorative functions. During sleep there is an increase in parasympathetic activity and a decrease in sympathetic activity (Parmaggiani, 1994). The two subsystems cannot be activated simultaneously because the parasympathetic nervous system activation paralyzes some human functions.

The sympathetic nervous system can be activated equally by imagined stressors and real stressors. Therefore, the stress of not falling asleep or worries people ruminate on while trying to fall asleep can active the sympathetic nervous system and significantly impair their ability to fall asleep (Parmaggiani, 1994). The activation of the sympathetic nervous system while trying to fall asleep can lead to a generalization and cause the bedroom to become associated with stress over not being able to fall asleep. This chronic association of sleep difficulties and the bedroom may result in chronic sleep problems and even insomnia (Hauri, 1991). This study examined whether adding relaxation techniques and cognitive techniques to help decrease the activation of the sympathetic nervous system improves the effectiveness of the STEPS program.

Circadian Rhythm. Many of the instructions used in sleep interventions attempt to directly impact an individual's sleep-wake cycle. The human body has many rhythms and cycles. The circadian rhythm is a 24-hour endogenous biochemical/physiological cycle that regulates the human sleep-wake pattern. The circadian rhythm promotes an individual being awake during the daylight hours and asleep during the night. If an individual's circadian rhythm is abnormal then it can cause the individual to sleep during the day or be awake during the night.

In 1967, Richter conducted the first experiments to locate the circadian pacemaker and found that circadian rhythms were affected by large ventromedial lesions to the hypothalamus. It was later discovered the destruction of the bilateral suprachiasmatic nuclei in the anterior portion of the hypothalamus leads to the loss of the circadian rhythm (Stephan & Zucker, 1972). The hypothalamus is associated with hormone, temperature, and appetite regulation. The circadian rhythm also requires external cues. For example, when individuals were voluntarily isolated in a dark room they shifted from a 24 hour sleep-wake cycle to a 25 hour sleep wake-cycle known as a free running rhythm (Sulzman, Fuller, & Moore-Ede, 1982).

One external cue shown to be essential in maintaining the sleep-wake cycle is bright light (Ando, Kripke, Cole, & Elliot, 1999; Boivin, Duffy, Kronauer, & Czeisler, 1994; Daurat, Aguirre, Foret, Gonnet, Keromes, & Benoit, 1993; Duffy, Kronauer, & Czeisler, 1996; Lack & Wright, 1993; Trinder, Armstrong, O'Brien, Luke, & Matin, 1996). Information pertaining to levels of light is sent to the suprachiasmatic nucleus via the retinohypothalamic tract, a bundle of nerves extending from the non-visual photoreceptors in the retina of the eye to the suprachiasmatic nuclei.

The retinohypothalamic track receives input from sources other than the retina. This is evidenced by a sample of blind mole rats with skin fur covering their eyes that were still able to have their circadian rhythm reset by light (DeLong, Hendricks, Sanyal, & Nevo, 1990). There is also evidence of non-visual light receptors in human skin. One study kept a group of volunteers in dim light for four days and exposed another group of volunteers to bright light focused behind their knees (Campbell & Murphy, 1998). The circadian rhythm was reset in the group that had the light focused behind its knees.

The cells in the ventral (lower) portion of the suprachiasmatic nuclei synthesize neurochemicals that are light sensitive and the cells in the dorsal (upper) portion of the suprachiasmatic nuclei regulate the circadian rhythm. Melatonin and other neurochemicals in the suprachiamatic nuclei adjust their activity to account for the presence of light when the retinohypothalimic track communicates exposure to light (Inouye, 1996).

Melatonin is a hormone compound of hydrogen, oxygen, and nitrogen secreted by the pineal gland. Melatonin causes sleepiness when it is released into the blood stream and, in conjunction with the 24 hour rhythm, is the predominant way in which the suprachiasmatic nuclei controls the human sleep-wake pattern. Two to three hours before normal bedtime melatonin is released leading to a decrease in suprachiasmatic nuclei activity which causes sleepiness (Dijk & Cajochen, 1997). As morning approaches, suprachiasmatic nuclei activity increases and melatonin levels decrease. The decline in melatonin level is associated with increased alertness (Haimov & Lavie, 1996). Damage to the suprachiasmatic nucleus may lead to difficulty maintaining alertness because the loss of control of the release of melatonin leads to accumulation of melatonin (Cohen & Albers, 1991).

A normal sleep-wake cycle depends on the circadian rhythm set by the suprachiasmatic nucleus which is moderated by light exposure. The circadian rhythm is so integral that even sleep deprived individuals have difficulty sleeping outside of their normal sleep time. The circadian rhythm also contributes to difficulty sleeping when traveling to different time zones. Behaviors and environmental factors such as exercise (Youngstedt, Kripke, & Elliot, 1999), noise, meals, and temperature (Refinetti, 2000) can

induce changes in an individual's sleep-wake pattern. Late afternoon naps can have a dramatic effect on the sleep-wake cycle of individuals because one must be relaxed and sleepy in order to achieve asleep. In summary, the autonomic nervous system, homeostatic drive, and the circadian rhythm work together to maintain a normal sleep-wake cycle and a disruption to one of these processes can result in a sleep disorder or sleep difficulty.

Sleep Quality vs. Sleep Length

Sleep length is the total number of hours an individual sleeps per night. Sleep quality is a measure of sleep processes and whether or not an individual is getting restorative sleep. It is possible for an individual to have good sleep length but poor sleep quality. For example, an individual may get eight total hours of sleep but awaken frequently and experience a high degree of stage one sleep. When there is a significant disturbance in sleep quality or sleep length an individual may meet diagnostic criteria for a sleep disorder.

Sleep Disorders

The Diagnostic and Statistical Manual-Fourth Edition-Text Revised (DSM-IV-TR; American Psychiatric Association, 2000) divides sleep disorders into four categories. The first category of sleep disorders, Primary Sleep Disorders, encompasses sleep disorders that cannot be attributed to another mental disorder, medical condition, or substance use. Endogenous abnormalities in sleep-wake generating or timing mechanisms are presumed to be the cause of Primary Sleep Disorders, but environmental or conditioning factors are also frequently contributing factors. Primary sleep disorders are subdivided into Dysomnias and Parasomnias. Dysomnias are classified by disturbances in

sleep timing, amount, or sleep quality. Disorders classified as dysomnias are: Primary Insomnia, Primary Hypersomnia, Narcolepsy, Breathing-Related Sleep Disorder, Circadian Rhythm Sleep Disorder, and Dysomnia Not Otherwise Specified. Some dysomnias are characterized by a lack of sleep. One common dysomnia is Primary Insomnia which is diagnosed when an individual experiences difficulty initiating or maintaining sleep or of non-restorative sleep for a minimum of one month.

Other dysomnias are characterized by excessive sleepiness and above average sleep length. One example of this type of dysomnia is Primary Hypersomnia, which is characterized by excessive sleepiness for a minimum of one month. The individual may experience prolonged sleep episodes or daytime sleep episodes occurring almost daily. Another example of a dysomnia characterized by excessive sleepiness is Narcolepsy. Individuals with Narcolepsy experience repeated irresistible attacks of refreshing sleep, cataplexy (sudden bilateral loss of muscle tone), and recurrent intrusions of elements of REM sleep into the transition period between sleep and alertness. In order to meet the diagnostic criteria the individual's sleepiness must decrease after the attacks, and the attacks must occur almost daily for at least three months. Another dysomnia associated with excessive sleepiness is Breathing Related Sleep Disorder in which abnormalities in ventilation while sleeping (e.g., sleep apnea) lead to excessive sleepiness, or less common to insomnia. In addition, circadian rhythm sleep disorder is a constant or frequent pattern of sleep disturbance resulting from altered function of the circadian rhythm timing system from a mismatch between the individual's endogenous circadian sleep-wake system and exogenous demands regarding the timing and duration of sleep.

According to the DSM-IV-TR (American Psychiatric Association, 2000), parasomnias are diagnosed when an individual experiences abnormal behavioral or physiological events occurring in association with sleep, specific stages of sleep, or sleep-wake transitions. Parasomnias represent arousal in the physiological system at inappropriate times. More specifically, parasomnias involve the activation of the autonomic nervous system, motor system, or cognitive processes during sleep or sleep-wake transitions. Parasomnias include: Nightmare Disorder, Sleep Terror Disorder, and Sleepwalking Disorder.

Nightmare Disorder is characterized by repeated frightening dreams that lead to awakenings during REM sleep and the individual becoming fully alert. This disorder represents overactivity of the cognitive processing system at inappropriate times. Individuals with Sleep Terror Disorder experience repeated occurrence of sleep terrors which are abrupt awakenings from slow wave (stage 3) sleep usually beginning with a panicky scream or cry. This disorder represents overactivity of the autonomic nervous system at inappropriate times during sleep. Sleepwalking disorder is diagnosed when an individual experiences repeated episodes of complex motor behavior initiated during slow wave sleep, including rising from bed and walking about. During these periods the individuals display decreased alertness and responsiveness, a blank stare, and relative unresponsiveness to communication with others or efforts to be awakened by others. This disorder represents activation of the motor system at inappropriate times.

The second DSM-IV-TR (American Psychiatric Association, 2000) category of sleep disorders is Sleep Disorders Related to Another Mental Disorder. This category encompasses sleep disorders prominent enough to warrant a diagnosis but resulting from

another diagnosable mental disorder. In order to be diagnosed individuals must complain of sleep disturbances as the main symptom causing them distress. It is assumed that the same pathophysiologal mechanisms are causing both disorders. The specific diagnoses are Insomnia Related to Another Mental Disorder and Hypersomnia Related to Another Mental Disorder. Numerous mental disorders cause sleep disturbances including mood disorders such as Major Depressive Disorder, Dysthymic Disorder, and Bi-polar Disorder. Anxiety disorders may also lead to sleep disturbances. Individuals with Generalized Anxiety Disorder may experience difficulty falling asleep or awaken with anxious ruminations. Individuals suffering from Panic Attacks may experience nocturnal panic attacks leading to insomnia. Other disorders which can lead to sleep disturbances include Schizophrenia, Adjustment Disorders, Somatoform Disorders, and Personality Disorders.

The third DSM-IV-TR (American Psychiatric Association, 2000) classification of sleep disorders is Sleep Disorder Due to a General Medical Condition. These disorders are not caused by another psychological disorder, but by a medical condition. Several medical conditions can cause sleep disturbances including hypersomnia, insomnia, and parasomnias. These include neurological disorders such as Parkinson's Disease and Huntington's Disease, cerebrovascular disease such as lesions to the upper brain stem, and endocrine disorders such as hyper or hypo thyroidism. Viral and bacterial infections such as encephalitis, coughing related to pulmonary disease such as chronic bronchitis, and pain from musculoskeletal disease such as rheumatoid arthritis can also lead to sleep disturbances.

The fourth DSM-IV-TR (American Psychiatric Association, 2000) classification of sleep disorders is Substance-Induced Sleep Disorders. This category encompasses sleep disorders caused by current use or recent discontinuation of a substance. Insomnia and hypersomnia are the most common types of sleep disorders experienced as a result of substance use or withdrawal, but parasomnias are also possible. The most common substances associated with sleep disorders are: caffeine, alcohol, amphetamines and related substances, cocaine, opiates, sedatives, hypnotics, and anxiolytics. Symptoms can occur during intoxication of the substance or withdrawal from the substance. Sleep difficulties not meeting diagnostic criteria for a sleep disorder are also prominent.

Sleep Problems in College Students

A growing body of research suggests that college students experience sleep difficulties more frequently than the general population (Lund et al., 2010; Brown et al., 2001; Vail-Smith et al., 2009; Buboltz et al., 2009). In one study of U.S. residents 18 and over, 71% reported sleeping less than 8 hours a night on weekdays and 40% reported sleeping less than 7 hours a night (National Sleep Foundation, 2005). In a recent study of 125 students ages 17-24 at an urban Midwestern university, only 34% reported good sleep quality and 38% of participants endorsed poor sleep quality (Lund et al., 2010).

Another sample of U.S. college students reported a higher prevalence of Delayed Sleep Phase Syndrome than seen in the general population (Brown et al., 2001). In this sample the symptoms most commonly reported as experienced "frequently" or "almost always" were early morning awakenings (25.5%), general sleep difficulties (21.9%), difficulty falling asleep (19.5%), daytime napping (15.1%), and difficulty staying asleep (10.9%). Students in this sample also went to bed later on the weekends and slept less

during the work week. Difficulty falling asleep and staying asleep were more frequently reported by female students.

In another investigation of 959 undergraduate students, 76.6% of the students reported occasional sleep difficulties and 11.8% reported poor sleep quality (Vail-Smith et al., 2009). The most commonly reported sleep difficulties were "general morning tiredness" and "insomnia". The study's results also indicated that the students experienced a variety of problems related to poor sleep quality. These problems included: physical aggression, suicide ideation, smoking, and alcohol use. In another study, occasional sleep difficulties were reported by 65.9% of undergraduate students, 22.6% of the college students reported poor sleep quality, and 54% of the participants reported feeling "mostly tired" in the morning (Buboltz el al., 2009). Poor sleep quality has also been found to be most significant for individuals aged 20-29 (Doi, Minowa, & Tango, 2003), which is a time frame in which many individuals are enrolled in college.

Research also shows that sleep difficulties among college students transcends cultures. In a sample of 36 medical students in Brazil, 14 reported poor sleep quality and 15 reported an irregular sleep-wake cycle (Medeiros et al., 2001). In a group of 1,629 adolescents in Hong Kong, the most commonly reported sleep difficulties were difficulty falling asleep, waking during the night, and waking up too early in the morning (Chung & Cheung, 2008). Results also indicated that 16-19 year olds had the most frequent sleep disturbances, and were sleepier during the day than 12-14 year olds (Chung & Cheung, 2008). In a sample of South African adolescents, later bed time was significantly related to medication use, napping, and male gender (Reid, Maldonado, & Baker, 2002). A later wake up time was related to caffeine consumption the previous day (Reid et al., 2002).

There has been an apparent decrease in sleep quality among college students in recent years. In 2001, 11% of college students reported having good sleep quality and 73% reported occasional sleep difficulties (Buboltz, Brown, & Soper, 2001). College students reported 60% more incidents of poor sleep quality compared to the original standardization sample of the Sleep Quality Index (SQI; Brown et al., 2001). In 2001, approximately 15% of undergraduate students reported poor sleep quality as measured by the Sleep Quality Index compared to almost 23% in 2009 (Buboltz et al., 2009). Women endorsed difficulties in falling asleep, disturbed night sleep, frequent nocturnal wakefulness, and poorer overall sleep quality significantly more than men (Buboltz et al., 2009). Sleep deprivation can have an adverse impact on many areas of an individual's life such as cognitive/academic performance, physical health, and psychological functioning. For these and other reasons it is imperative to examine the impact of sleep on college students, the ways to intervene for individuals experiencing sleep difficulties, and the types of individuals that may benefit from interventions.

Many factors contribute to the sleep difficulties experienced by college students; lifestyle is perhaps the most important factor. Students often experience high levels of stress from classes, extra-curricular activities, family responsibilities, and financial responsibilities. In one study, 20.1% of college students reported stress interfering with sleep at least once a week (Lund et al., 2010). Results also indicated that 21% of the variance in sleep quality was explained by tension and 3% of the variance in sleep quality was explained by stress. Another study found that 9% of the variance of sleep quality was explained by anxiety and that another 14% of the variance in sleep quality was explained by stress (Hoffmann, Calvert, & Buboltz, 2010). The majority of students experience

some level of stress because of the demands of college life, even if the stress is minimal (Darlaston-Jones, Cohen, Pike, & Drew, 2003).

The typical college student's lifestyle is not conducive to good quality sleep. Intramural sports programs at some universities have games that occur at approximately 10PM or 11PM requiring college students to have to stay up late if they want to participate. If students want to socialize with their friends they often have to stay up late because with their different class and extra-curricular activity schedules late night is often the only time that they all have free. Many college students are on meal plans and not in control of their own diet, which contributes to their level of alertness and energy. College students may not get a balanced diet of proper nutrients, vitamins, and proteins required for them to be able to function at their optimal level.

Research has shown that as the academic term progresses (which is likely correlated with an increase in work) the rate of sleepiness increases (Brown & Buboltz, 2000). Sleep length also declined as the academic term progressed (beginning: $M = 8.26$ hours, $SD = 1.95$; end: $M = 6.81$ hours, $SD = 1.91$). In this study, 16.7% of participants were classified as poor sleepers, 12% had symptoms consistent with Delayed Sleep Phase Syndrome, and only 8.9% reported not experiencing sleep difficulties.

Some college students use illegal substances (e.g., marijuana) to facilitate sleep. Some students have even likened marijuana to a "magic sleeping pill." Research found that 34% of a sample of college students reported cocaine or methylenedioxymethamphetamine (MDMA) use in the past year, and 8% reported using cocaine or MDMA at least once weekly (Low & Gendaszek, 2002). Illicit stimulants have a potentially greater impact on sleep than legal stimulants because of their longer

lasting effects. Illicit recreational drug use has direct effects on sleep (Schierenbeck, Riemann, Berger, & Hornyak, 2008). Individuals who use cannabis often experience a decrease in sleep latency. While findings are contradictory, it appears that cannabis use decreases REM sleep. Cannabis withdrawal has also been linked to difficulty in sleeping and strange dreams.

Cocaine use increases wakefulness and suppresses REM sleep (Schierenbeck et al., 2008). During cocaine withdrawal, decreased sleep length and efficiency are often experienced and sleep latency is prolonged. There is also an increase in REM sleep percentage and reduced REM latency associated with cocaine use.

Ecstasy users often report restless and disturbed sleep (Schierenbeck et al., 2008). Ecstasy users experience an increase in restlessness and an almost complete suppression of REM sleep as well as reduced stage two sleep and total sleep time. Stage one sleep is increased in ecstasy users. Ecstacy users and non-users did not differ in sleep in one sample which had a mean age of 21 for the ecstasy users and 26 for the non-ecstasy users (Montgomery, Fisk, Wareing, & Murphy, 2007).

Some students also use over the counter or prescription stimulants (e.g., Adderall) to stay awake. Those who reported poor sleep quality were more than twice as likely to use over the counter or prescription stimulants to stay awake (Lund et al., 2010). In a sample of college students, 35% reported using prescription amphetamines without a prescription at least once during the past year (Low & Gendaszek, 2002). Some legal stimulants (e.g., nicotine and caffeine) have been negatively associated with sleep in college students. Wechsler, Rigotti, Gledhill-Hoyt, and Lee (1998) found that 28% of college students who smoke report beginning once they reached college age. The way in

which smoking affects sleep is not what may be expected. Light smoking has been linked to insomnia, and heavy smoking (>15 cigarettes/day) has not been shown to affect sleep (Riedel, Durrence, Lichstein, Taylor, & Bush, 2004).

Caffeine is a stimulant commonly used among college students. Mathieson, Faris, Stam, and Egger (1992), 42% of college students reported being frequent coffee drinkers, and 29% of college students reported being regular tea drinkers (). Consuming caffeinated beverages reduced both the perceived ease of getting sleep and perceived sleep quality (Hindmarch, Rigney, Stanley, Quinlan, Rycroft, & Lane, 2000). The more caffeine that was ingested, the greater the perceived difficulties became. These results also showed that as the dose of caffeine increased the more sleep time, as measured by ActiGraphs, decreased. Mild doses (100-150mg., about a cup of brewed coffee) of caffeine have been associated with many sleep difficulties including delayed sleep onset, increased light sleep, increased spontaneous awakenings, and reduced sleep time (Caldwell, 2003; Pressman & Orr, 1997). Compared to non-users, frequent caffeine users tend to exhibit more sleep disruptions (Roehrs & Roth, 1997). The effects of caffeine intake can be long lasting. Depending on an individual's caffeine sensitivity, individuals can experience the effects of caffeine for up to 10 hours (Nehlig, Daval, & Debry, 1992).

Alcohol may also impact college student's sleep quality. Students may use alcohol to self-medicate when experiencing stress. Research indicates that approximately 40% of college students have engaged in binge drinking (five or more drinks in a row for men; 4 or more drinks in a row for women) and that binge drinking peaks between ages 18-22 (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). Alcohol can facilitate sleep onset, increase slow wave sleep, reduce REM sleep, and is related to

insomnia (Roehrs & Roth, 1997), especially for male students (Pillitteri, Kozlowski, Person, & Spear, 1994). Moreover, students reporting higher rates of drinking fell asleep more often in class than students reporting lower rates of drinking (Jean-Louis, von Gizycki, Zizi, & Nunes, 1998), indicting disordered sleep.

There are several other factors that contribute to the sleep difficulties of college students. Internet use, television viewing, and computer games were all related negatively to sleep quality (Van den Bulck, 2004). Research also indicates that there is a linear relationship between sleep quality and noise level with the quality of sleep decreasing as the noise level increases (Schapkin, Falkenstein, Marks, & Griefahn, 2006). Working 10 hours or more the day before and a higher workload from the day before were also associated with decreases sleep length (Ansiau, Wild, Niezborala, Rouch, & Marquie, 2008; Ansiau, Marquie, Wild, & Rouch, 2005).

Sleep and Physical Health

Research suggests that there is a relationship between sleep quality/length and physical health. One study linked chronic insomnia to coronary artery disease (Bonnet & Arand, 1998). In a sample of over 5,000 individuals over the age of 65, a link was found between poor sleep quality and decreased physical health including cardiovascular disease (Asplund, 2000; Newman et al., 1997). Sleep difficulties have also been linked to cardiovascular disease in a sample of adults (Apples & Mulder, 1984). The physical health complications that can stem from poor sleep can impact a person in numerous ways. In a sample of 5,090 Japanese white collar workers, poor sleepers were more likely to take sick leave, suffer physically and psychologically poor health and have problems in

work related activities and personal relationships (Doi et al., 2003). The specific factor that was related to poor sleep quality was hypertension.

One sleep disorder in particular that can lead to health difficulties is sleep disordered breathing (e.g., sleep apnea). Mild sleep disordered breathing has been shown to be associated with an increase in complaints of bodily pain in children as young as five years of age (Rosen et al., 2002). Mild sleep disordered breathing has also been associated with lower scores on a health-related quality of life measure in a sample of 5 to 17 year olds as well as a sample of 30 to 60 year olds (Finn et al., 1998). Mild sleep disordered breathing is even associated with other chronic conditions such as arthritis, angina, hypertension, diabetes, and back problems.

Eddéll-Gustaffson (2002) examined the relationship between sleep and health in a sample of 40 men ages 45-70 who were about to undergo a coronary artery bypass surgery in Sweden. He found that poorer overall physical health was significantly related to longer sleep latency. These individuals also displayed a decreased percentage of slow wave sleep, indicating they were not getting restorative sleep.

Individuals who reported poor sleep quality endorse more physical illness (Lund et al., 2010). In this study, 12% of poor sleepers reported missing class three times or more in the previous month due to illness compared to only 4% of the rest of the sample. In a sample of junior high students, a relationship was found between sleep quality and physical health. Participants reporting worse sleep quality also reported a higher number of illnesses and lower scores on measures of general health (Tanaka, et al., 2003). In a community sample any sleep problems including inadequate sleep, difficulty falling

asleep, and persistent nightmares were all associated with higher rates of migraines (Vgontzas, Cui, & Merikangas, 2008).

In recent years, there has been a growing interest in sleep quality and quantity as they relate to obesity. One longitudinal study found that in young adults there was a negative correlation between sleep length and body mass index (BMI) (Hasler et al., 2004). There was no significant relationship between these variables in adults over 40. This finding has very important implications for college students who have been shown to have a higher degree of sleep difficulties than does the general public. If these sleep difficulties contribute to a higher rate of obesity then college students could be at a higher risk for numerous health complications resulting from obesity.

Sleep Problems and Cognitive/ Academic Difficulties

Numerous studies demonstrate a relationship between sleep quality/length and academic/cognitive performance with a wide variety of age groups. Wolfson and Carskadon (1998) reviewed the literature regarding sleep and academic performance. In a sample of 200 first-year college students' sleep habits, particularly wake up times, accounted for the largest amount of variance in grade point average (Trockel et al., 2000). This study also found that each hour wake time was delayed during the weekdays grade point average (GPA) decreased by an average of .13 points, and for each hour weekend rise time was delayed, GPA decreased by an average of .11. Results also indicated that individuals with higher GPAs had earlier sleep and rise times.

In a sample of 150 Introduction to Psychology students, individuals who reported shorter sleep times (<6 hours per might.) had significantly lower GPA's compared to students who reported longer sleep times (Kelly et al., 2001). Long sleepers had an

average GPA of 3.2 compared to an average GPA of 2.7 for short sleepers. Medeiros and colleagues (2001) also found that there was a relationship between sleep onset and academic performance, sleep length and academic performance, and irregularity of sleep and academic performance. Individuals who had more irregular sleep and a shorter sleep length showed worse academic performance. The link between sleep and GPA was further confirmed by Jenkins and Buboltz's (2002) study with college students. Students reporting poor sleep quality also reported lower GPAs compared to students who reported moderate or good sleep quality.

In a sample of 253 undergraduate pharmacy students in Nigeria, it was also found that poorer sleep quality as measured by the Pittsburgh Sleep Quality Index was associated with worse academic performance, as measured by the official grade index (Adeosun et al., 2008). An analysis of 54,111 college students from 71 different institutions, revealed that individuals with poorer sleep quality as measured by the National College Health Assessment (NCHA; American College Health Association, 2007), also reported lower academic performance (Becker, Adams, Orr, & Quilter, 2008).

Research has also investigated the relationship of sleep quality and academic/cognitive performance in graduate students. In a sample of 35 medical students in Brazil, 38.9% of students reported poor sleep quality during exam periods (Medeiros et al., 2001). In this investigation, 42.8% of students had an irregular pattern of sleep-wake cycle. A regression analysis also revealed that individuals who had a more irregular sleep-wake cycle and shorter length of sleep also tended to have lower levels of academic performance.

Another study (Yeung, Chung, & Chan, 2008) examined the relationship between sleep and academic performance in 249 medical students in Hong Kong. Results indicated a significant correlation between having a usual sleep and wake time with better performance on a written evaluation. In addition, this investigation revealed that there was a significant relationship between the individuals' self-rated sleep quality and evaluation of clinical skills. The individuals who reported better sleep quality tended to perform better on an assessment of clinical skills.

Campbell, Murphy, and Stauble (2005) examined the relationship between napping and cognitive and psychomotor performance. First, speed on the Stroop Task was significantly improved in two sessions in the nap condition. Second, performance on the Wilkinson four-choice times test was significantly improved in the nap condition after two sessions.

Buckhalt, El-Sheikh, and Keller (2007) examined the relationship between sleep quality and cognitive functioning, as measured by Woodcock-Johnson-III in a sample of 106 eight and nine year olds. Their results indicate that self-reported increased sleepiness was related to a decrease in intellectual ability, verbal ability, and working memory. Self-report sleep-wake problems were also significantly related to a decrease in verbal ability and working memory. Decreased sleep efficiency was related to a decrease in processing speed.

Increased suggestibility is also linked to sleep deprivation (Blagrove, 1996). Sleep deprivation makes it more difficult to detect discrepancies between original and misleading information. Sleep deprivation also negatively impacts problem-solving and psychomotor reactivity through short-term memory (Kim, et al., 2001; Sagaspe, Charles,

Taillard, Bioulac, & Phillip, 2003). Sleep loss has been linked to decreased visuomotor skills, poor cognitive functioning, and false recall of recently learned words (Maquet, Schwartz, Passingham, & Frith, 2003; Roediger & McDermott, 1995). It has also been found that excessive sleep can lead to a decreased performance on selective attention tasks (Ansiau et al., 2005).

Children experiencing sleep apnea and narcolepsy have shown decreased performance on tests of auditory attention, visual attention, and memory (Hansen & Vandenberg, 2001). Successful treatment of the sleep disorders has led to significant improvement in overall cognitive performance. Similarly, decreased cognitive efficiency has been seen in children and adolescents experiencing sleep deprivation (Mitru, Millrood, & Mateika, 2002).

In a study of older adults (Nebes, Buysse, Haligan, Houck, & Monk, 2009), researchers found that individuals classified as poor sleepers, as identified by the PSQI, performed significantly worse on a measure of cognitive decline (RBANS; Repeatable Battery for the Assessment of Neuropsychological Status), a measure of intelligence, aptitude, abstract reasoning, and problem solving (TONI; Test of Nonverbal Intelligence), and a measure of visual attention and task switching (part B of the Trail Making Test), and one of two working memory measures. Their results also indicated that poor sleepers experienced a higher rate of depressive symptoms and problems making decisions and lower rates of motivation and concentration. In this study, sleep latency and sleep efficiency were highly correlated with performance on the tasks.

Sleep deprivation negatively affected individuals' performance on five of the seven WRAIR and PAB tasks (McCann, Wilson, Sgambati, & Ricaurte, 2009). Only the

time estimation and matching to sample tasks were not affected by sleep deprivation when comparing ecstasy users and non-ecstasy users. This study also found that recovery sleep did return performance to baseline level. In addition, this study found that sleep deprivation mediated increasing impulsivity of performance on the delayed recall and logical reasoning performance, and the accuracy of performance of the logical reasoning, serial aid, and subtraction tasks.

One of the most critical aspects of sleep in relation to learning is REM sleep. REM sleep is crucial in consolidating memory and experiences into long-term memory. Approximately seven to eight hours of sleep is sufficient to allow the individual to have enough REM sleep to integrate the information acquired throughout the day into long-term memory. During REM sleep the pathways formed when information is learned are activated and a new protein structure is created allowing the information to be stored in the form of memory (Steriade & McCarley, 1990). During REM sleep the brain is aroused and may begin processing information stored in memory, which reinforces memories and newly learned material (Antrobus, 1986). This highlights the importance of REM sleep for college students as college is a time when individuals vastly increase their knowledge.

De Koninck, Lorrain, Christ, Proulx, and Coulombe (1989) examined the relationship between REM sleep and learning efficiency in a sample of students enrolled in a 6-week French emersion course. Their results revealed that there was a positive correlation between the amount of REM sleep and the ability to recall newly acquired information. The individuals with a higher degree of REM sleep also presented with a lower error rate.

A correlation between REM sleep and learning information has also been found specifically in college students and in periods that extend beyond the night that the information was learned. A study by Smith and Lapp (1991) found that students who studied displayed an increased density in REM during the latter part of the evening during the five-day period after taking final exams. There was not an increase in the amount of sleep or an increase in the number of REM periods during sleep. This highlights the importance of students spacing out their studying and not cramming.

Sleep Difficulties and Psychological Difficulties

Asai et al. (2006) examined the relationship between sleep difficulties and complaints of somatic and psychological symptoms in a national sample of 28,714 Japanese citizens. The somatic complaints measured include headaches, dizziness, palpitation/dyspnea, epigastric discomfort, constipation/diarrhea, stiff neck, backache, easy fatigability, persistent fatigue, irritability, anxiety, and worrying about health. Their results indicated that the clients self-reports of difficulty initiating sleep were significantly positively correlated with every psychological and somatic complaint measured. The participants' self-reports of difficulty maintaining sleep and insomnia also were significantly positively correlated with every psychological and somatic complaint measured. Early morning awakenings were significantly positively correlated with all of the psychological and somatic complaints except headaches and persistent fatigue. Short sleep duration was correlated with all of the somatic and psychological and somatic symptoms measured except dizziness, epigastria discomfort, constipation/diarrhea, and worrying about health. Subjective insufficient sleep was significantly positively

correlated with all psychological and somatic symptoms except dizziness, palpitation/dyspnea, and constipation/diarrhea.

Insomnia has been endorsed more frequently in individuals diagnosed with Asperger's Disorder over a group of controls through free descriptions, sleep diaries, and sleep questionnaires (Tani et al., 2003). Research has also shown that individuals with panic disorder and agoraphobia have higher scores on the PSQI (Hsu et al., 2009).

Krystal et al. (2008) conducted a literature review of the relationship between sleep difficulties and mood disorders, alcoholism, and schizophrenia. They point out that sleep difficulties are found in up to 90% of individuals who have major depression. Some common sleep difficulties include difficulty falling or staying asleep, early morning awakenings with an inability to return to sleep, disturbing dreams, non-restorative sleep, daytime fatigue, and daytime sedation. EEG patterns also indicate alterations in sleep physiology of depressed patients including increased sleep latency, increased wake time after sleep onset, and awakenings. In addition, changes in the duration and timing of sleep stages during the night have also been observed in individuals diagnosed with depression. These changes include the reduction in the latency of the onset of REM sleep and diminished slow wave sleep. This increase in sleep difficulties has been associated with diminished quality of life and increased suicidality as well as deterioration in the course of depression. After controlling for all other symptoms of depression the insomnia item on the Beck Depression Inventory was associated with lower ratings of ability to function and quality of life. They also point to a study in which elderly patients show a correlation between sleep disturbance and suicidality including higher suicide scores on

the Schedule for Affective Disorders and Schizophrenia scale. In one study, which followed 954 individuals, insomnia was a significant predictor of suicide.

Another study (Lund et al., 2010), revealed that poor sleep quality was associated with higher self-reports of negative mood. Specific subscales measured were anger, tension, confusion, and depression. In a sample of 539 college students in Mexico, there was a significant relationship between depressive symptoms and sleep (Moo-Estrella, Perez-Benitez, Solis-Rodriguez, & Arankowsky-Sandoval, 2005). Students with a higher degree of sleep alterations also experienced a higher degree of depressive symptoms. Individuals with a greater latency to initiate sleep, greater number of awakenings, and a lower self-reported degree of rest after sleeping at night reported significantly more depressive symptoms.

Research has also found that sleep abnormalities are common in individuals with suicidal behavior (Sher, 2001). Specific symptoms include insomnia, hypersomnia, nightmares, and panic attacks while sleeping. The presence of both insomnia and hypersomnia increased the risk of suicidal ideation in a school based study (Sher). A temporal relationship was found between sleep difficulties and completed suicide in which individuals who attempted suicide had longer sleep latency, lower sleep efficiency, and fewer late-night delta wave counts (Sher).

The manic phase of Bi-polar disorder is characterized in part by a lack of sleep and research suggests that sleep reduction is central to the evolution of mania (Krystal et al., 2008). The theory posits that these individuals respond to a lack of sleep with mood elevation, increases in energy and goal directed behavior, and further decreases in sleep.

Individuals with alcoholism tend to report experiencing insomnia at a rate of 36% to 72% (Krystal et al., 2008). In a sample of alcoholics, scores on the sleep subscale were correlated with greater self-rated depression, higher psychological/physiological symptoms, lower energy, increased social isolation, and greater pain. They also pointed-out that insomnia is hypothesized to play an important role in the course of alcoholism as some individuals drink to try to lessen their sleep difficulties. While alcohol is a sedative that can reduce sleep latency and increase slow wave sleep, there is a rebound effect later in the night associated with increased sleep disturbances. This increases REM sleep, dreaming, and arousal of the sympathetic nervous system. They also pointed-out that abstinent alcoholics who begin drinking again experience an increase in sleep quality only for the first week and that daytime drinking promotes daytime sleeping that undermines sleeping at night. Their literature review indicated that disturbances in sleep can be observed through polysomnography and self-reports for up to two years after discontinuing alcohol.

Some individuals with more severe psychological disorders also experience sleep difficulties. Individuals with schizophrenia often report difficulties falling asleep and impaired sleep quality (Krystal et al., 2008). Sleep disruptions are also a common finding in polysomnography in this population. The most common polysomnography findings among this population are a shortening of REM latency and a decrease in non-REM sleep slow-wave amplitude and slow-wave sleep. These individuals are also likely to experience a reversal in the circadian rhythm as evidenced by ActiGraph studies. Sleep quality is also related to the severity of symptoms experienced in this population. Positive symptoms of schizophrenia have been associated with shorter REM sleep latency,

increased sleep density, reduced sleep efficiency, and increased sleep latency. The negative symptoms of schizophrenia have been associated with slow-wave sleep deficits and short REM latency. The slow wave sleep deficits have even been linked to the enlarged cerebral brain ventricles that are common fMRI findings in individuals with schizophrenia.

Treatments for Sleep Problems

Pharmacological Treatments. While research suggests that pharmacological treatments are effective (Ohayon et al., 1999) the effectiveness has been short term (Morin & Wooten, 1996). One study did find that Garboxadol was effective in treating sleep disorders in a sample of fourteen older adults (ages 63-75) (Mathias, Zihl, Steiger, & Lancel, 2005). Garboxadol improved sleep efficiency, wakefulness, and wakefulness after sleep onset. Exogenous melatonin has been found to only slightly improve sleep (Peck, LeGoff, Abmed, & Goebret, 2004).

Krystal et al. (2008) point out that insomnia often persists after otherwise effective antidepressant treatment. In one study in which individuals were treated with Fluoxetine, insomnia was the most commonly reported residual symptom. Another study (Blaker, Greenwood, Wesnes, Wilson, Woodward, Howe, & Ali, 2004) showed that treatment of chronic fatigue syndrome with Galantamine Hydrobrimide produces no significant effects on the Chalder Fatigue Rating Scale or the Pittsburgh Sleep Quality Index. In addition, pharmacological treatment of sleep disorders may underestimate the effectiveness of Cognitive Behavioral Therapy (Morin, Colecchi, Stone, Sood, & Brink, 1999). The expense and side effects of medication tend to outweigh the potential benefits, even in the short term (Morin & Wooten, 1996; Bootzin & Perils, 1992).

Pharmacological treatments also have a high addictive potential and the long-term effects of pharmacological treatment for sleep disturbances on the body are not known.

Psychological Interventions. Research indicates that 60% to 80% of individuals treated for sleep disorders with psychological interventions experience reliable and persistent improvements in sleep quality (Lichstein & Riedel, 1994; Morin, Culbert, & Schwartz, 1994; Morin & Wooten, 1996; Murtagh & Greenwood, 1995). Several different types of psychological interventions are used in the treatment of sleep disorders. Non-clinical interventions include the psychoeducational interventions of sleep hygiene, bright light therapy, and exercise. Clinical interventions include the behavioral interventions of stimulus control and sleep restriction therapy as well as relaxation training and cognitive therapy interventions.

Nonclinical Interventions

Sleep Hygiene. An essential component of non-clinical treatment of sleep disorders is sleep hygiene, which involves basic information about ways to promote good sleep as well as inhibit poor sleep (American Sleep Disorders Association, 1990). Sleep hygiene education usually consists of methods designed to maintain a consistent sleep-wake schedule, information related to the effects of poor sleep, foods to avoid at night (e.g., those containing caffeine, nicotine, alcohol), ways to maintain a good sleep environment (e.g., bed just for sleeping, minimal light and noise in the bedroom), information about increased exercise (except for three hours before bedtime), naps in the afternoon, avoidance of stressful or exciting activities before bedtime (Reidel, 2000), and bright light therapy to promote sleep-wake cycles (Bootzin & Rider, 1997).

Sleep hygiene instructions typically are taught in conjunction with other sleep interventions. The results of studies examining the efficacy of sleep hygiene alone are generally positive. A study of 62 participants who received one session of sleep hygiene instructions reported improved sleep at one, three, and twelve month follow-ups (Hauri, 1993). In another study, sleep hygiene produced results equivalent to relaxation training and stimulus control therapies (Schoicket, Bertelson, & Lacks, 1988). Sleep hygiene knowledge and practices have been found to be significant predictors of sleep quality (Brown et al., 2002). Some of the significant predictors of sleep quality were noise disturbance, going to bed thirsty, and worrying about their ability to fall asleep at bedtime.

Informing clients about products containing caffeine and the effects of caffeine on sleep is an important component of sleep hygiene (Hauri, 1991). As little as one cup of coffee can increase sleep onset time, reduce the total amount of sleep, increase awakenings, and produce lighter sleep (Bonnet & Arand, 1992; Roehrs & Roth, 1997). Individuals who use caffeine regularly may habituate to caffeine use and experience fewer sleep disturbances than those who use caffeine only occasionally. However, individuals who use caffeine regularly may continue to demonstrate frequent sleep difficulties (Bonnet & Arand, 1992; Roehrs & Roth, 1997).

There is great variability in individuals' sensitivity to caffeine (Nehlig et al., 1992). Some individuals may be affected by caffeine for up to 10 hours and other individuals may experience little effects from caffeine use (Roehrs & Roth, 1997). Poor sleepers are generally more sensitive to the effects of caffeine. Saliva tests indicate the poor sleepers take longer to eliminate caffeine from their blood and experience

inconsistent consequences of caffeine more than good sleep (Tiffin, Ashton, Marsh, & Kamali, 1995). All of this information indicates that for people experiencing sleep difficulties caffeine intake should be limited to the morning hours.

Sleep hygiene instructions also typically include information about the effect of smoking on sleep. A correlational study of 3,500 20-69 year olds found smoking to be associated with difficulty falling asleep and a greater frequency of nightmares (Wetter & Young, 1994). Ex-smokers reported sleep quality equal to that of non-smokers. In another study, smokers reported greater difficulty falling asleep and less overall sleep (Soldatos, Kales, Scharf, Bixler, & Kales, 1980). Experimental studies suggest sleep may worsen for up to 6 weeks after smoking cessation due to withdrawal effects. In one study, smokers were assigned to continue smoking, placebo, or transdermal nicotine replacement (Wetter, Fiore, Baker, & Young, 1995). Subjective and objective measures show that those who continued smoking did not experience any changes in sleep, and the placebo group experienced some sleep deterioration during periods of withdrawal. Interestingly, however, the group assigned to the transdermal nicotine replacement reported more sleep difficulties but polysomography showed that their sleep increased. It is hypothesized (Wetter et al., 1995) that sleep improvements while on transdermal nicotine replacements may be due to lower, more consistent amounts of nicotine.

Ex-smokers continue to report sleep difficulties (Wolter et al., 1996). Smokers were assigned to one of three levels of transdermal nicotine replacements or a control placebo group (Wolter et al., 1996). Objective measures showed no change from baseline to 1-week follow up. All groups were then assigned a transdermal nicotine replacement for 7 weeks. There was no change in body movements during sleep when compared the

baseline 6 weeks after the start of therapy (Wolter et al.). These findings were questionable since the measures of sleep quality was based on wrist movement rather that polysomnographic measures.

Individuals frequently use alcohol to improve sleep quality (Johnson, 1997), but alcohol actually reduces sleep quality. Individuals who use alcohol occasionally experience shorter sleep latency and suppressed REM sleep. As the liver processes alcohol, the sedating effects decrease and individuals experience lighter sleep with an increase in nocturnal awakenings (Roehrs & Roth, 1997). Alcoholics experience an increase in sleep difficulties over time even after they cease using alcohol. Sleep may remain poor for weeks or months after they stop using alcohol (LeBon et al., 1997; Roehrs & Roth, 1997).

Other effects of alcohol use such as breathing suppression and increased limb movements can increase sleep difficulties. Increased limb movement during sleep is likely increased by drinking more than two servings of alcohol per day (Aldrich & Shipley, 1993). Alcohol use also increases the frequency of sleep apnea and hypoapneas during sleep (Guilleminault, Silvestri, Mondini, & Coburn, 1984; Mitler, Dawson, Henricksen, Sobers, & Bloom, 1988).

Avoiding afternoon naps is another sleep hygiene instruction. Research has shown that taking a two-hour nap resulted in longer sleep onset and reduced slow wave sleep (Feinberg, March, Floyd, Jimison, Bossom-Demitrack, & Katz et al., 1985; Karacan, Williams, Finley, & Hursh, 1970; Werth, Dijk, Acherman, & Borberly, 1996). Research has also demonstrated that early afternoon naps may increase alertness for afternoon and evening classes (Bonnet & Arand, 1994; Taub, Tanguay, & Clarkson, 1976). This

instruction may not fit everyone as in some cultures naps (e.g., siestas) are encouraged. When this occurs sleep hygiene instructions should recommend limiting naps to an hour and to take the naps prior to or 3PM for people who go to sleep prior to midnight. Taking naps in the late morning or early afternoon tend to reduce their interferences with sleep (Czeisler, Cajochen, & Turek, 2000).

A sleep hygiene instruction of paramount importance for college students is maintaining a consistent sleep-wake cycle. Many students have the misconception that increasing sleep on the weekends will compensate for the reduced sleep they experience during the week. Research (Lack, 1986; Machado, Varelle, & Andrade, 1998; Taub, 1979; Taub, 1980; Taub & Berger, 1974; Taub et al., 1976; Zammit, 1997) indicates that the idea that eight hours of sleep a night is the most important aspect of sleep is a myth. Unfortunately, some sleep experts (e.g., Dement, 2000) inadvertently perpetuate such myths by suggesting people can, "repay sleep debt," implying that lost sleep can be paid back.

Maintaining consistency in sleep-wake cycles may be difficult for college students. Thus, it is important that sleep hygiene instructions include recommendations that minimize the influence of inconsistency in sleep. Empirical evidence (e.g., Lack, 1986; Machado et al., 1998; Taub, 1979; Taub, 1980; Taub & Berger, 1974; Taub et al., 1976; Zammit, 1997) suggests it is important that college students try to keep these variations to less than two hours in sleep onset and sleep wake time. Research (e.g., Taub, 1979; Taub & Berger, 1974) also suggests that these variations in sleep can produce almost the same difficulties as receiving less than a normal amount of sleep. Bright light

therapy and exercise may also be important in helping to counter the ill effects of poor sleep schedules.

One of the most common ways that individuals can maintain a consistent sleep-wake cycle is through the use of bright light. Bright light therapy has shown to be effective in individuals with disturbed sleep schedules; particularly, when sleep and wake times differ from the norm (Campbell & Murphy, 1998; Rosenthal, Joseph-Vanderpool & Levandosky, 1990). Bright light therapy has even been shown to be effective when the light is shined on the back of individuals' knees (Campbell & Murphy, 1998). One study showed that exposing individuals to bright light in the morning and having them wear dark glasses in the evening decreases sleep onset times and allowed then to adjust to the desired sleep cycle (Eastman, Stewart, Mahoney, Liu, & Fogg, 1994). Bright light therapy is affordable and easily utilized. A broad spectrum light of more than 250 lumens is positioned to allow full exposure to the light for 30-60 minutes during daily activities, and a timer may be used to prevent over exposure. Time of exposure depends on the specific problematic phase syndrome. Bright light exposure enables the circadian rhythm to shift to a more normal mode and is usually included to teach people to create a consistent sleep-wake cycle (Bootzin & Rider, 1997). Bright light therapy is also used to treat Delayed Sleep Phase Syndrome, and many college students sleep difficulties are consistent with the symptoms of Delayed Sleep Phase Syndrome (Brown et al. 2001; Buboltz et al., 2001; Lack, 1986).

Regular exercise has been shown to improve sleep. Exercise has been related to decreased time to fall asleep and decreased sleep problems as well as increased deep sleep (Dement, 2000; Duncan, Bomar, Nicholson, & Wilson, 1995; Matsumoto, Saito,

Abe, & Furumi, 1984; Youngstedt, Kripke, & Elliot, 1999). Exercise has even been shown to improve sleep in individuals who cannot regulate their sleep due to shift work schedules (Shiota, Sudou, & Ohshima, 1996). Exercises consisting of cardiovascular components improve sleep more than exercises lacking those methods, but exercise in any form appears to improve sleep to some extent (Trinder, Paxton, Montgomery, & Fraser, 1985). Even simple hand squeezing exercises two hours before bedtime can reduce sleep onset time (Browman, 1980). Sleep hygiene instructions usually advise that individuals not to exercise in the evening although this recommendation has not received empirical support (O'Connor, Breus, & Youngstedt, 1998; Urponen, Vuori, Hasan, & Partinen, 1988; Youngstedt et. al., 1999). Research actually suggests that that evening exercise may be beneficial in reducing sleep onset time and enhance sleep (Browman, 1980; Urponen et al., 1988). Exercise in the hour before sleep though should be avoided to allow for physiological relaxation. Some activities, such as morning walks, can also integrate the benefits of both exercise and bright light therapy.

Individuals with mild to moderate non-chronic sleep problems have shown improvement using sleep hygiene education (Buboltz, Soper, Brown, & Jenkins, 2002). Moreover, individuals reporting sleep problems have shown improvement in sleep after only one session of sleep hygiene instruction at one, three, and twelve-month follow-up (Hauri, 1993). Sleep hygiene education has been found to be as effective as stimulus control therapy or relaxation (Schoicket et al., 1988). People often overestimate their knowledge of proper sleep habits and how they actually use the knowledge (Hicks, Lucero-Gorman, & Bautista, 1999), indicating that sleep hygiene education has the potential to improve sleep quality for many.

Psychotherapeutic Interventions

Stimulus Control. The goal of stimulus control is to increase the association between the bedroom and sleep onset and to create a more consistent circadian sleep/wake cycle (Morin & Wooten, 1996). This may also help reduce the association of the bedroom with anxiety that individuals may feel about not being able to sleep. In addition, increasing the association between the bedroom and sleep onset will reduce the association between the bedroom and non-sleep related activities, such as studying (Bootzin & Nicassio, 1991).

The instructions given to clients involve the context of sleep and the bedroom (Morin & Wooten, 1996). Some examples of instructions that may be given to clients include: using the bedroom for sleep and sex only; going to bed only when sleep; after 15-20 minutes of not sleeping getting up; and, going to another room and returning only when sleepy. Clients also are instructed not to take daytime naps and maintain a consistent wake time regardless of sleep onset time and duration (Bootzin & Epstein, 2000).

Reviews and meta-analyses suggest that stimulus control is one of the most effective interventions in treating sleep onset insomnia and sleep maintenance insomnia (Engle-Friedman, Bootzin, Hazelwood, & Tsao, 1992; Lack, 1986; Mortin et al., 1994; Morin & Wooten, 1996; Murtagh & Greenwood, 1995). Outcome studies looking at a period of one month suggest that stimulus control and relaxation therapies produce superior outcomes to other treatments for sleep disorders (McClusky, Milby, Switzer, Williams, & Wooten, 1991).

Sleep Restriction Therapy. Sleep Restriction Therapy was developed from the observation that many people with insomnia, particularly older adults, spend excessive time in bed trying to recover lost sleep. Sleep Restriction Therapy aims to increase and limit the time in bed to actual sleep time. Individuals who report getting only five hours of sleep are told to spend only five hours in bed. Time in bed is increased 15-20 minutes when sleep efficiency (i.e., actual time sleeping while in bed), exceeds 85-90% of the total time in bed. Clients are also instructed to reduce time in bed by 15-20 minutes when sleep efficiency falls below 80%. These adjustments continue until sound sleep is maintained through the night (Morin & Wooten, 1996). Individuals with insomnia may stay in bed longer in an attempt to get more sleep, which is the opposite of what sleep restriction therapy subscribes (Morin & Wooten). In addition, individuals with insomnia frequently complain of not being able to control their sleep patterns. As such, an important aspect of sleep restriction therapy and stimulus control therapy is learning that individuals can control their sleep habits.

Sleep restriction and stimulus control instructions are the two most effective sleep interventions (Morin et al., 1994). When both are used in sleep treatments, patients with sleep maintenance insomnia consistently demonstrated reductions in unwanted nocturnal awakenings, less time in bed awake, and generally increased sleep efficiency (Bootzin & Perlis, 1992; Edinger, Hoelscher, Marsh, Lipper, & Ionescou-Pioggia, 1992; Friedman, Bliwise, Yeasavage, & Salmon, 1991).

Relaxation Training. Relaxation therapies aim to facilitate sleep onset by reducing the level of arousal (Morin & Wooten, 1996). Some examples of relaxation therapies include deep breathing, progressive muscle relaxation, and mental imagery.

Mental imagery is imaging oneself in a calm and relaxing place, such as lying by a waterfall or imaging feelings of warmth. Imagery has been effective with physical and mental restlessness (e.g., ruminating), and behavioral approaches have shown to work only with physical restlessness (Morin & Wooten). Clients can create their own relaxation tapes to assist with the imagery and relaxation process. To be the most effective, consistent application and practice of the techniques are required.

Relaxation techniques decrease sleep latency (Bootzin & Perlis, 1992; Friedman et al., 1991; Hyrshko-Mullen, Brockl, Haddock, & Petterson, 2000; Morin et al., 1994; Morin & Woten, 1996). It is important to remember that not all individuals with sleep problems are hyper-aroused. Some research demonstrates a relationship between physiological arousal and sleep quality (e.g., Bonnet & Arand, 1995; Monroe 1967) and others show no relationship (e.g., Good, 1975; Haynes, Follingstad, & McGowan, 1974). Some people are cognitively aroused and may benefit more from cognitive interventions.

Paradoxical Interventions. Paradoxical interventions involve instructing individuals to do the opposite of what they desire to be doing or what you intend for them to do. Individuals with sleep problems may be instructed to try to stay awake at bedtime, which is the opposite of what they have been doing; that is, trying very hard to fall asleep. Paradoxical interventions may work best with individuals who resist therapeutic suggestions and are used to change individuals' perception of their sleep problems (Bootzin & Perlis, 1992). Their previous pattern may have created anxiety about sleep, and actually made sleep more difficult and decreased sleep quality. A paradoxical intervention aims to lessen the anxiety and failure associated with falling asleep and allows the client to become more relaxed and fall asleep easier. A meta-analysis that

examined over 100 studies regarding sleep interventions suggested paradoxical interventions were equal to most psychological interventions in reducing unwanted night time awakenings, but, were less effective in decreasing sleep-onset latencies (Murtagh & Greenwood, 1995).

Cognitive Therapy. Sleep difficulties can be caused by many cognitive factors such as ruminating thoughts and dysfunctional beliefs. Some individuals may benefit from cognitive techniques such as cognitive restructuring and thought stopping. Cognitive restructuring aims to change individuals' irrational thoughts such as exaggerating the need for sleep or becoming very distressed when sleep is interrupted. Cognitive restructuring aims to change five underlying cognitive functions regarding sleep: mistaken beliefs about the causes of insomnia, over-exaggeration about the consequences of poor sleep, unrealistic sleep expectations, feeling out of control about the sleep, and the faulty beliefs about practices that promote sleep. Treatments focusing on dysfunctional cognitions have been shown to improve sleep efficiency, reduce sleep latency, and decrease unwanted nocturnal awakenings (Morin, Kowatch, Berry, & Walton, 1993).

Thought stopping involves practices such as teaching the individuals to do things such as yell "stop!" silently each time an intrusive thought occurs and prevents them from sleeping (Wolpe, 1973). A similar technique is articulatory suppression where patients are taught to repeat a word to themselves several times a second until sleep onset occurs (Levey, Aldaz, Watts, & Coyle, 1991). This technique emerged from observations that repeating the same word rapidly interferes with other thoughts in short-term memory and can effectively reduce intrusive thoughts (Levey et al.).

Cognitive therapy has been effective in reducing sleep problems by especially focusing on an individual's expectations (Bootzin & Perlis, 1992). Initial small successes in experiencing control over sleep patterns facilitate further expectations of success. Primary expectations are encouraged when therapists help individuals control bedtime and related circumstances. These therapists are perceived as a legitimate source of help and after individuals experience small successes they begin to anticipate larger ones.

Sleep Treatments for Students

The high prevalence of sleep disturbances in college students and the impact poor sleep can have on students suggest a need for action. College administrators and college mental health workers need to be able help students improve their sleep and educate students on the impact sleep difficulties can have on their life. Although many of the solutions that would benefit students, such as starting classes later (Machado et al., 1998), are impractical and not feasible for universities. In addition, few students experiencing sleep difficulties seek help at university counseling centers. They may not even realize that some of their daily difficulties are due to poor sleep. As a result, psychoeducational approaches may be the best approach for working with college students. They can be included as part of summer orientation programs and fit into the classroom structure. These interventions will provide information students do not know. Hicks et al. (1999) found that the average correct response rate was only 50% on a test of sleep-hygiene knowledge. This suggests that psychoeducational sleep treatments may improve student sleep habits.

Psychoeducational interventions are likely to be effective. A classroom mind/body wellness intervention for older adults with chronic illness was effective in

reducing sleep disturbances (Rybarcyzk, DeMarco, DeLaCruz, Lapidos, & Fortner, 2001). These psychoeducational interventions allow for the inclusion of some of the psychotherapeutic interventions, as well.

One psychoeducational intervention that has been shown to be effective in improving sleep quality in college students is STEPS (Sleep Treatment and Education Program for Students; Brown, Buboltz, & Soper, 2006). This program primarily uses sleep hygiene and instructs individuals in practice to facilitate proper sleep through educating them on the effects of diet, caffeine use, exercise, and environmental factors on sleep. Compared to a control group, a group that underwent the STEPS program demonstrated significantly better sleep quality as measured by the Pittsburgh Sleep Quality Index, at 6-week posttest (Brown, Buboltz, & Soper). Participants in the treatment group also demonstrated significantly less sleep disturbance compared to the control group including improved use of sleeping medications and sleep latency. Many factors can impact the outcomes of an intervention including personal characteristics of the participants (Karno, Beutler, & Harwood, 2003). Two factors that appear to impact the effectiveness of an intervention are approach/avoidance motivation and psychological reactance.

The Relationship between Approach/ Avoidance Motivation and Intervention Success

Individuals' motivation is important in considering the effectiveness of sleep interventions because the goal is to motivate individuals to take the steps necessary to improve their sleep quality and length. Individuals' motivation for their actions can be looked at in many ways. One way that motivation is explained is through

approach/avoidance theory. This theory examines the direction (i.e., toward or away from) of individuals' motivation in relation to stimuli. According to the theory (Carver, Sutton, & Scheier, 2000), two distinct systems regulate individuals' behavior toward or away from stimuli. The approach system (the behavioral activation system; BAS, Gray, 1990) controls individuals' behaviors toward potential rewards, and the avoidance system (the behavioral inhibition system; BIS, Gray) controls individuals' behavior away from potential threats or punishments.

When individuals are motivated toward, or to gain, a positive stimulus they are said to have an approach motivation orientation. The motivation of these individuals is directed by a positive or desirable event or possibility and these individuals are more responsive to cues of reward (Carver et al., 2000). This system is suggested by some (e.g., Gray, 1977, 1981, 1990) to be responsible for positive feelings such as hope, elation, and happiness. Individuals with an approach motivation are likely to engage in a higher degree of behaviors that will cause them to experience these positive feelings. Consequently, they may be more likely to engage in behaviors that will bring them status, recognition, and a sense of achievement and pride.

In contrast, when individuals are motivated away from, or avoid, a stimulus they are said to have an avoidance motivation orientation. The behavior of these individuals is directed by a negative or undesirable event or possibility and these individuals are more responsive to cues of threat and punishment (Carver et al., 2000). This system in suggested by some (e.g., Gray, 1978, 1981, 1990) to be responsible for negative feelings such as fear, anxiety, and frustration. Individuals with an avoidance orientation are motivated not to engage in behaviors that will cause them to experience these negative

feelings. Individuals with an avoidance motivation orientation may be more likely to avoid behaviors that will allow them to avoid shame and punishment.

Approach/avoidance motivation has been shown to be related to several aspects of learning. Approach goals were a significant predictor of rehearsal, elaboration, organization, and critical thinking (Bartels et al., 2009). These results were then replicated by the authors with a sample of 141 undergraduate students (Bartels et al., 2010). This suggests that individuals with approach motivation may be better able to apply the strategies and techniques presented to them. This could allow approach individuals to benefit more from an intervention.

Individuals with an approach orientation utilized self-efficacy enhancement and stress-reducing actions at a higher rate than avoidance motivated individuals (Bartels et al., 2009). In a sample of 145 undergraduate students, approach goals mediated the relationship between individuals' need for achievement and metacognitive self-regulation (Bartels & Magun-Jackson, 2009). A positive correlation between the Behavioral Approach Drive Subscale and attributes related to secondary psychopathy, suspiciousness, and aggression (Bjørnebekk, 2007). The Behavioral Inhibition Scale was negatively related to instrumental aggression and attributes associated with primary psychopathy (Bjørnebekk). Individuals high in approach orientation were more likely to make satisfaction ratings that were more closely tied to positive affect (Updegraff, Gable, & Taylor, 2004). The author suggests that this indicates that approach motivations may influence psychological health through emotions over time as well as how individuals weigh emotional experiences in ratings of satisfaction.

Sherman, Mann, and Updegraff (2006) examined the relationship between approach/avoidance motivation and health behaviors in a sample of 67 undergraduate students. There was no main effect for motivation orientation on flossing behavior, but there was an interaction effect for motivation orientation and message frame. When given a loss-framed article avoidant individuals flossed more than approach motivation individuals. When presented with the gain-framed message the approach motivation individuals flossed more. This was also true for their beliefs in their ability to floss more regularly and their intentions to floss more regularly. This suggests that approach/avoidance motivation has an impact on how receptive an individual is to an intervention and how likely they are to take and apply the techniques that are presented to them in an intervention.

Sullivan and Rothman (2008) examined the effect of motivation orientation on individuals' implantation of health goals. Results indicated that 1 week after the first session in a weight management program those with approach motivation and those with avoidance motivation did not differ significantly in their caloric intake or fat intake. However, 2 weeks after the first session those who pursued the avoidance motivation goal had marginally higher caloric intake and significantly higher fat intake than individuals who pursued the approach motivation goals. This suggests that individuals pursing approach goals benefited more from the intervention and applied the techniques taught to them at a higher rate.

Sideridis (2005) examined the effect of achievement motivation orientation of planned behavior in a sample of 377 fifth and sixth-grade students. Having an achievement goal orientation exerted a direct positive effect on individuals' perception of

control, attitude normative beliefs, intention, and overall academic achievement in a sample of students diagnosed with a learning disability and a control group. A higher perception of control may help individuals with approach motivation apply the techniques taught to them in an intervention at a higher rate. These individuals will likely believe that they have control over their sleep and see how these techniques can improve their sleep. Overall, the research suggests individuals with approach motivation benefit more from psychoeducational interventions.

The Relationship between Psychological Reactance and Intervention Success

Psychological reactance theory was originally proposed by Brehm in 1966 to help explain why individuals may reject persuasive messages (Quick & Stephenson, 2008). Psychological reactance theory is based on four predictive principles. The first principle is that reactance can only be elicited when individuals are aware of the freedom they have and are confident in their ability to exercise that freedom (Quick & Considine, 2008). The second principle states that the more desirable the freedom being threatened the greater level of reactance that will be aroused in individuals (Quick & Considine). Psychological reactance theory also states that reactance is increased proportionally to the number of threats individuals perceive (Quick & Considine). The fourth principle is that the additional threats will increase the magnitude of reactance arousal (Quick & Considine).

Brehm (1966) asserts that all humans have a set of "free behaviors" that we use to meet our specific needs. Brehm posits that when these behaviors are threatened they become more important to individuals. In order for a behavior to be considered "free" individuals must have knowledge of the behavior and the physical and psychological resources necessary to engage in the behavior (Brehm). In addition, the behavior must be

realistic in order to be considered free (Brehm). For example, suspending yourself freely in the air would not be considered a free behavior because humans are not capable of suspending freely in the air.

Brehm (1966) posits that when individuals are denied the use of a free behavior used to meet their needs they could experience pain and even death. In addition, the theory states that individuals thrive and survive when they perceive having the freedom to choose their behaviors. Brehm's theory asserts that these factors may cause individuals to become psychologically reactant and attempt to regain personal freedoms that have been lost, reduced, or threatened in order to restore or confirm their freedom to choose (Wright, 1986). This indicates that if individuals do not see the behavior as free at a given time they will not have as high of a level of psychological reactance. This also indicates that individuals must feel that a behavior is threatened in order to exhibit psychological reactance. A threat can be a social influence, behavior, or event that obstructs individuals' ability to exercise freedoms (Brehm & Brehm, 1981). There are several factors that impact whether a not individuals will become psychologically reactant and the level of psychological reactance they will experience.

Brehm (1966) states that the level of psychological reactance individuals experience is a result of: the importance of the behavior, the proportion of free behaviors being threatened, and the magnitude of the threat to the free behavior. The actual or perceived value of the needs that the behavior is meeting is an important factor in the level of psychological reactance individuals experience (Brehm). The more important that the behavior is perceived to be, the more psychological reactance that individuals will experience. The need the behavior is meeting can be immediate or the behavior may

be perceived as important for meeting a future need. Psychological reactance can also be heightened by the uniqueness of the free behavior in meeting individuals' needs. For example, if other free behaviors can meet a particular need the level of psychological reactance will likely not be as great (Brehm).

In addition, the higher the number of free behaviors that are perceived to be threatened the greater the level of psychological reactance likely to be aroused (Brehm, 1966). These findings were supported by Tennen, Press, Rohrbaugh, and White (1981), who found that individuals possessing fewer freedoms experience higher levels of reactance to the threat of a loss of freedom of choice. Research (Brehm & Brehm, 1981) has also shown that individuals experience psychological reactance when they anticipate a threat to a free behavior and that they do not have to experience an actual threat to a freedom of choice.

Individuals also consider the costs of attempting to regain a lost or threatened behavior when deciding whether or not they are going to attempt to regain their freedom (Brehm & Brehm, 1981). When individuals perceive the costs of attempting to regain their freedom as too high they are less likely to attempt to regain that freedom (Brehm & Brehm). Individuals may even experience denial with respect to the loss of the freedom and believe that they have not lost the freedom or come to believe that they cannot regain the freedom (Brehm & Brehm).

Brehm (1966) postulated that the magnitude of psychological reactance is proportional to the magnitude of the loss of the threat of the free behavior. For example, if individuals see the behavior or need as important they are more likely to experience a higher level of psychological reactance. In addition, the loss of one free behavior could

cause individuals to generalize that fear to the loss of other associated behaviors. Individuals may also experience "vicarious reactance" by seeing or having the knowledge of others losing some of their free behaviors (Brehm). Fogarty (1997) also showed that reactance results from seeing or having knowledge of other individuals losing some of their free behaviors.

Research that has found a relationship between gender and psychological reactance indicates that men are more reactant than women (Joubert, 1990; Loucka, 1991; Mallon, 1992). These findings have been indicated using the Therapeutic Reactance Scale (TRS; Loucka; Mallon) and the Questionnaire for the Measurement of Psychological Reactance (QMPR; Loucka). Several other studies support these findings (Dowd & Wallbrown, 1993; Joubert; Seeman, Buboltz, Jenkins, Soper, & Woller 2004). Other studies have not found a significant gender difference in psychological reactance (Hong & Page, 1989; Hong, 1990; Hong, Ginnakopoulous, Laing, & Williams, 1994). Gender role socialization has been posited to be the possible source of the difference in reactance between men and women (Dowd, Wallbrown, Sanders, & Yesenosky, 1994).

Psychological reactance theory assumes individuals will become psychologically reactant when they perceive persuasive messages as taking their ability to choose from different alternatives (Quick & Stephenson, 2008). This suggests that humans will resist forceful persuasive messages that restrict their freedom to choose (Wright, 1986). Research has shown that psychological reactance can greatly impact individuals and how they receive a message. For example, reactance has a negative relationship with global improvement and premature termination in therapy (Seibel & Dowd, 1999).

Psychological reactance also has been shown to effect responsiveness to a physician's advice (Greybar, Antonnuccio, Boutilier, & Varble, 1989).

Dogmatic language has been found to lead to reactance in messages pertaining to alcohol (Dillard & Shen, 2005; Quick & Stephenson, 2008), condom use (Quick & Stephenson, 2007) and exercise (Quick & Considine, 2008). This increased level of reactance makes it less likely that individuals will benefit from an intervention because they are likely not to apply the techniques learned through the intervention in order to confirm their freedom to choose.

Research also has found that the way that a message is presented can greatly affect whether or not individuals become psychologically reactant. In a sample of college students, focusing on what the individual will gain rather than lose produced a lower level of psychological reactance and produced a more positive message reaction (Reinhart, Marshall, Feeley, & Tutzauer, 2007). The increased positive reaction to the message makes it more likely individuals will benefit from the intervention.

Whether or not individuals feel threatened also greatly affects how they perceive a message. In a sample of 131 college students, individuals in a no threat condition agreed with the presenter significantly more than individuals in a threat at the beginning of the presentation condition and a threat at the end of the presentation group (Silvia, 2006). Increased agreement with the presenter may make individuals more likely to apply the techniques that intervention prescribes.

Wright (1986) examined attitudinal change with respect to contraceptive use under high and low threat conditions. In his sample of 56 undergraduate students, individuals in the high threat condition exhibited significantly more negative attitudinal

change. Individuals in the high threat condition also found the essay regarding contraceptive use they were presented with more forceful and reported feeling more pressured to agree by the essay. Individuals who initially agreed with the presenter exhibited more reactance (Wright). According to reactance theory individuals who initially agree with the message presenter can only express reactance by adopting a negative stance and the individuals who initially disagreed with the presenter can only express their reactance to the message by adopting a position that does not fully agree with the message of the presenter (Wright). When individuals feel threatened and can only express their reactance by disagreeing with the presenter it is more likely that individuals will not apply the techniques taught to them.

Quick and Considine (2008) examined several variables in relation to reactance in a sample of 247 individuals who were a member of a health and fitness center. The first variable they examined was persuasive language. Forceful language was positively associated with a perceived threat to choice. Individuals perceiving a message as threatening to their freedom experienced reactance and expressed their resistance to the message through negative thoughts and state anger. As individuals' reactance increased their perceived persuasiveness of the message decreased. This increased reactance and resistance make it more likely that the individuals will benefit less from the intervention.

Miller, Burgoon, Grandpre, and Alvaro (2006) examined the role of reactance in adolescent smoking behaviors in a sample of 1,831 students in grades 6 to 12 in Arizona. A logistical regression revealed a significant positive correlation between psychological reactance and risk for adolescent smoking. Taken together all of this information suggests that there are many factors that impact whether or not individuals experience

psychological reactance and a higher level of psychological reactance may negatively impact individuals' response to an intervention.

Hypotheses

Research suggests that there is a negative relationship between psychological reactance and responsiveness to an intervention. Research also suggests that there is a positive relationship between approach motivation and how receptive individuals are to an intervention. Several different types of interventions have been studied (e.g., adolescent smoking and contraceptive use). An exhaustive literature review revealed no research looking specifically at how psychological reactance and approach/avoidance motivation impact the effectiveness of a sleep intervention. With the prevalence of sleep disturbances being higher in college students than in the general population research is needed examining how psychological reactance and approach/avoidance motivation impact responsiveness to a sleep intervention. A better understanding of what impacts the effectiveness of sleep interventions will benefit counselors working with college students to improve students' academic performance, health, and psychological functioning. These variables have been shown to be negatively impacted by poor sleep quality and disturbances. The following hypotheses will be tested:

Hypothesis One

Participants in the STEPS program and the enhanced STEPS program groups will have significantly improved sleep quality compared to participants in the control group at time two.

Hypothesis Two

Participants in the STEPS program and the enhanced STEPS program groups will have significantly improved sleep length compared to the participants in the control group at time two.

Justification for Hypotheses One and Two

Research indicates that 60% to 80% of individuals treated for sleep disorders with psychological interventions experiences reliable and persistent improvements in sleep quality (Lichstein & Riedel, 1994; Morin et al., 1994; Morin & Wooten, 1996; Murtagh & Greenwood, 1995). Research has demonstrated that sleep restriction and stimulus control instructions are the two most effective sleep interventions (Morin et al., 1994). When both are used in sleep treatments, patients with sleep maintenance insomnia consistently demonstrate reductions in unwanted nocturnal awakenings, less time in bed awake, and generally increased sleep efficiency (Bootzin & Perlis, 1992; Edinger, Hoelscher, Marsh, Lipper, & Ionescou-Pioggia, 1992; Friedman et al., 1991). Given the fact that both the STEPS and enhanced STEPS programs include sleep restriction and stimulus control instructions it is reasonable to assume that the interventions will lead to an improvement in sleep quality and length.

Hypothesis Three

The enhanced STEPS program group will have significantly longer sleep length as compared to the STEPS program group at time two.

Hypothesis Four

The enhanced STEPS program group will have significantly improved sleep quality compared to the STEPS program group at time two.

Justification for Hypotheses Three and Four

College students experience sleep difficulties for many different reasons including drinking a high dose of caffeine, having an irregular circadian rhythm, having ruminating thoughts, and experiencing stress. Therefore, it is hypothesized that a sleep intervention that addresses a broader range of reasons that college students experience sleep difficulties (enhanced STEPS program) will lead to a greater improvement in sleep quality and length than a program that does not address cognitive factors that may be leading to an individual experiencing sleep difficulties (STEPS program).

Hypothesis Five

The treatment groups will report using significantly more sleep hygiene practices compared to the control group at time two.

Hypothesis Six

The treatment groups will have significantly more sleep hygiene awareness compared to the control group at time two.

Justification for Hypotheses Five and Six

Hicks et al. (1999) found that the average correct response rate was only 50% on a test of sleep hygiene knowledge. This indicates that individuals who have not been through a sleep hygiene program are not aware of sleep hygiene practices. Psychoeducational interventions have been shown to be effective in reducing sleep disturbances (Rybarcyzk, DeMarco, DeLaCruz, Lapidos, & Fortner, 2001). Thus, it is reasonable to assume that a psychoeducational intervention informing individuals of the

sleep hygiene practices will increase their awareness of sleep hygiene practices and the rate at with they use these practices.

Hypothesis Seven

Highly reactant individuals will show significantly less improvements in sleep quality compared to individuals low in reactance in the treatment groups.

Hypothesis Eight

Highly reactant individuals will show significantly less improvements in sleep length compared to individuals low in reactance in the treatment groups.

Justification for Hypotheses Seven and Eight

Several studies suggest that a higher level of psychological reactance can decrease individuals' receptiveness to messages. For example, reactance has a negative relationship with global improvement and premature termination in therapy (Seibel & Dowd, 1999). Psychological reactance also has been shown to effect receptivity to a physician's advice (Graybar, Antonnuccio, Boutilier, & Varble, 1989). Reactance has also been found to impact individuals' responses to messages pertaining to alcohol (Dillard & Shen, 2005; Quick & Stephenson, 2008), condom use (Quick & Stephenson, 2007) and exercise (Quick & Considine, 2008). Thus, it is reasonable to assume that reactance will impact individuals' responses to an intervention addressing sleep.

Hypothesis Nine

There will be a significant difference in sleep length between approach motivation and avoidance motivation in the treatment groups at time two.

Hypothesis Ten

There will be a significant difference in sleep quality between approach motivation and avoidance motivation in the treatment groups at time two.

Justification for Hypotheses Nine and Ten

Research has found that there are many positive effects of individuals having an approach goal motivation. Approach goals have been found to be a significant predictor of rehearsal, elaboration, organization, and critical thinking (Bartels et al., 2010). Research (Bartels et al., 2009) also indicates that individuals with an approach orientation utilized self-efficacy enhancement and stress-reducing actions at a higher rate than avoidance motivated individuals. These results indicate that individuals with approach motivation goals are able to take information and put it into practice through rehearsal and organization. Therefore, it is likely that the individuals with an approach goal orientation will be able to implement the strategies and techniques taught to them in an intervention to improve sleep.

CHAPTER TWO

METHOD

This section will begin with a discussion of the experimental design utilized in the study and follow with a description of participant recruitment. Next, the measures utilized in the study will be described. The measures that will be described are: a demographic questionnaire, the Sleep Quality Index (SQI; Uropnen, Parinen, Vuori, & Hasan, 1991) which measured general sleep quality, the Pittsburgh Sleep Quality Index (PSQI; Buysse, Reynolds, Monk, Berman, & Kupfer, 1989) which measured sleep quality, the Sleep Hygiene Awareness and Practice Scale (SHAPS, Lacks & Rotert, 1986) which assessed sleep hygiene knowledge and practice, the Marlowe-Crowne Social Desirability Scale Short Form C (MCSDS; Crowne & Marlowe, 1960) which assessed socially desirable response patterns, the Therapeutic Reactance Scale (TRS; Dowd, Milne, & Wise, 1991) which examined psychological reactance, and the Behavioral Inhibition Questionnaire and Behavioral Approach Questionnaire (BIS/BAS; Carver & White, 1994) which examined motivational patterns. The section will conclude with a description of the procedures utilized for data collection and data analysis.

Design

This study employed a pretest-posttest control group design. There were two levels of intervention. One group received a psychoeducational intervention to help

improve their sleep quality. The second treatment group participated in a psychoeducational sleep intervention which was enhanced by adding cognitive interventions and relaxation training. All participants completed the demographic questionnaire (APPENDIX B), SQI (APPENDIX C), PSQI (APPENDIX D), TRS (APPENDIX F), BAS/BIS (APPENDIX G), SHAPS (APPENDIX H), and MCSDS (APPENDIX E) which took approximately 20 minutes at the beginning of the intervention and at 5-week posttest.

Participants

Participants were recruited from undergraduate psychology classes at a medium-sized Midwestern university in the United States. Participants were informed that their participation was completely voluntary. The ethical standards of the American Psychological Association (APA, 2002) regarding the treatment of research participants were strictly followed. All participants were guaranteed anonymity. The survey packet was approved by the university's institutional review board (see Appendix A). The survey packet consisted of a demographic questionnaire, the SQI, the PSQI, the TRS, SHAPS, BAS/BIS and the MCSDS. Prior to participation participants were asked to read and sign the consent form and notified of their right to refuse participation. No data were presented individually. In addition, the informed consent documents and data were stored separately to ensure confidentiality. The list of participants and their identification numbers were kept by an individual not involved with the research and destroyed upon the completion of data collection to ensure confidentiality.

Measures

Demographic Questionnaire. The demographic questionnaire included items that inquired about participants' age, gender, ethnicity, and year in school.

The Sleep Quality Index. The Sleep Quality Index (SQI; Urponen et al., 1991) measures general sleep difficulties through eight self-report items. The three possible responses to every item are: "no", "< 3 days per week", and "3-7 days per week". The responses are coded zero, one, or two and a score of two represents the most severe symptom. A sleep quality score is obtained by summing the scores of all eight items. A score of zero or one indicates good sleep quality. Scores from two to eight indicate the person is experiencing occasional sleep difficulties, and scores of 9 to 16 indicates poor sleep quality. Validity of the SQI is provided by a significant relationship between sleep quality and subjective health (Uropnen et al.). The test-retest reliability coefficient with college students has ranged from .74 to .96 with a mean of .84 (Uropen et al.). The Chronbach's alpha for the SQI is .74 (Uropnen et al.)

The Pittsburgh Sleep Quality Index. The Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989) assesses sleep quality and disturbances over a 1-month period through 19 self-report items that take approximately 5 to 10 minutes to complete. The PSQI uses a four-point Likert scale (*not during the past month, less than once a week, once or twice a week, 3 or more times a week).* The PSQI has seven subscales: sleep quality; sleep latency; sleep duration; habitual sleep efficiency; sleep disturbances; use of sleeping medication; and daytime dysfunction. The seven subscales are weighed equally on a zero to three scale and summed to obtain a global score which ranges from 0 to 21. Higher scores indicate poorer sleep quality. Buysse et al. recommend a cutoff score of

five or above to classify poor sleepers. They report that this correctly classified 88.5% of all subjects and controls ($\kappa = .75$, $p < .001$), indicating a sensitivity (correct identification of positive results) of 89.6% and a specificity (correct identification of negative results) of 86.5%.

Overall, the PSQI has been shown to be a reliable measure with good internal consistency ($\alpha = .83$) and good test-retest reliability ($r = .85$) (Buysse et al., 1989). The seven subscales have moderate internal consistency ranging from .76 for subjective sleep quality and habitual sleep efficiency to .35 for sleep disturbances. The test-retest reliability for most subscales is adequate with sleep latency having the highest ($r = .84$) and medication having the lowest ($r = .65$). Since being published, the PSQI has been widely used in research with university students (Brown et al., 2002; Pilchner 1997; Pilchner & Ott, 1998; Pilchner, Schoeling, & Prosancky, 2000).

Sleep Hygiene Awareness and Practice Scale. The Sleep Hygiene Awareness and Practice Scale (Lacks & Rotert, 1986) measures awareness and application of sleep hygiene techniques. The sleep hygiene awareness section in subdivided into two sections: Sleep Hygiene Awareness and Caffeine Awareness. The Sleep Hygiene Awareness subscale is comprised of 13 self-report items that measure knowledge of whether specific activities are helpful, disruptive, or neutral to sleep. Respondents use a seven-point Likert scale (seven = *very helpful to sleep*; one = *very harmful to sleep*). Correct responses are given a score of one, items left blank are scored two, and incorrect items are given three points. For example, an item in which the correct answer is that the behavior is disruptive to sleep would be scored one point for ratings of four or below. The response would be scored three for responses five or higher. Scores range from 13 to 39 and a higher score

indicates a lower level of sleep hygiene awareness. This section has been shown to have good internal reliability ($\alpha = .78$) and good test-retest reliability ($r = .76$) (Brown et al., 2002). The caffeine awareness subscale of this section will not be used as it has not been found to have adequate internal reliability.

The Sleep Hygiene Practice subscale consists of 19 self-report items that enquire about how many nights per week respondents engage in activities that promote or inhibit sleep. Respondents indicate how many nights per week they engage in each activity. Items are scored one point for each night of the week they engage in the activity (zero to seven points). Scores on this section range from 0 to 133 and higher scores indicate less engagement in good sleep hygiene practice (Lacks & Robert, 1986). The Sleep Hygiene subscale has been shown to have poor internal reliability ($\alpha = .55$), but good test-retest reliability ($r = .74$) (Brown et al., 2002). The weak internal reliability may be a result of respondents having both good and poor sleep habits and is not necessarily indicative of poor psychometric quality.

Marlowe-Crowne Social Desirability Scale Short Form C. The Marlowe-Crowne Social Desirability Scale (Crowne & Marlowe, 1960) measures the tendency to respond to self-report items in a socially desirable manner using True/False items. In research, the scale is often used with self-report measures to examine if socially desirable response bias is impacting the data collected. The 13-item abbreviated form of this scale was administered as it has been found to have satisfactory concurrent validity and reliability (Reynolds, 1982).

Internal consistency reliability of this form have ranged from 0.62 to 0.76 (Ballard, 1992; Loo & Thorpe, 2000; Zook & Sipps, 1985) and correlations of scores on

this scale with scores on the original form ranged from 0.91 to 0.96 (Fischer & Fick, 1993; Loo & Thorpe). Reynolds (1982) originally reported an internal consistency reliability of 0.76 and a correlation of 0.93 with the original form of the scale. Research has shown a 6-week test-retest reliability of 0.74 (Zook & Sipps). This form contains eight items with a socially desirable response of 'False' and five with a socially desirable response of 'True' (Ballard, 1992).

Therapeutic Reactance Scale. The Therapeutic Reactance Scale (TRS; Dowd et al., 1991) assesses psychological reactance through 28 self-report items. Respondents use a four-point Likert-type scale ranging from one (*strongly disagree*) to four (*strongly agree*). In addition to a total reactance score, verbal reactance and behavioral reactance scores are obtained.

Internal consistency for the TRS has ranged from .75 to .84 (Dowd et al., 1991). Three-week test-retest reliability has ranged from .57 to .60, although Lukin, Dowd, Plake, and Kraft (1985) reported a 1-week test-retest reliability of .76. The construct validity of the TRS has been supported by several studies (Buboltz Woller, & Pepper, 1999; Seibel & Dowd, 1999). The subscales have also been shown to have good internal consistency. Dowd et al. reported the behavioral reactance scale to have an internal reliability of .81 and a 3-week test-retest reliability of .60. The verbal reactance scale was shown to have an internal consistency of .75 and a 3-week test-retest reliability of .57 (Dowd et al.).

The Behavioral Inhibition and Behavioral Approach System Questionnaire (BIS/BAS). The BIS/BAS was designed by Carver and White (1994) to assess the direction of individuals' behavior toward reward and punishment. The measure is a 24-

item self-report questionnaire in which individuals rate the severity of personal statements using a four-point Likert scale (*very true* to *very false*). The BIS examines individuals' reaction to punishment and the BAS examines individuals' reaction style toward reward. The BAS is comprised of three scales, BAS fun, BAS reward, and BAS drive. The BIS/BAS measure has been shown to be an adequately reliable measure with 8-week test-retest reliability of .66 for the BIS, .66 for BAS Drive, .59 for the BAS Reward, and .69 for the BAS Fun scales (Carver & White). The internal validity for the BAS was .74 and the internal validity for the BIS has ranged from was .66 to .74 (Carver & White).

Materials

The Sleep Treatment and Educational Program for Students. For one of the treatment groups the Sleep Treatment and Education Program for Students (STEPS) was used. The STEPS program was designed by Brown, Buboltz, and Soper (2006). Included in the STEPS program is a 15-minute oral presentation and handouts regarding sleep hygiene guidelines, stimulus control instructions, and information about substances with caffeine.

The scripted oral presentation was read verbatim to participants. The beginning paragraph explained the purpose of STEPS program. This was followed by a brief description of the prevalence of sleep difficulties in college students. Information regarding the consequences college students experience due to inadequate sleep length, inconsistent sleep habits, and poor sleep quality was also presented. Included in this section were brief summaries of studies that demonstrate the importance of sleep. The

script also reviewed the Sleep Hygiene Guidelines, Substances with Caffeine Handout, and Stimulus Control Instructions and emphasized the reason for the instructions.

The Sleep Hygiene Guidelines are 10 behaviors that promote or hinder sleep. These guidelines are used in many clinical practices (Lack, 1986) and have received substantial clinical support (e.g., Morin et al., 1994; Murtagh & Greenwood, 1995). Included in the guidelines are traditional sleep hygiene instructions (Lack; Bootzin & Nicassio, 1991) and guidelines for regular morning exposure to natural and bright (i.e., more than 250 lumens) artificial light.

The Substances with Caffeine handout lists the caffeine contained in commonly used products such as coffee, cola, chocolate, and medications (Nehlig et al., 1992; Roehrs & Roth, 1997; Tiffin et al., 1995).

The Stimulus Control Instructions list four recommendations to improve sleep difficulties that are widely used in clinical practice (Lack, 1986) and supported by empirical evidence (e.g., Morin et al., 1994; Morin & Wooten, 1996; Murtagh & Greenwood, 1995). Stimulus control is based on the clinical observations that individuals with persistent difficulties falling or staying asleep become anxious about sleep. This pattern can turn sleep difficulties into a permanent problem. Individuals may come to associate the bedroom with non-sleep activities such as reading, watching television, homework, and other non-sleep related activities which can interfere with sleep. Stimulus control has the goal of breaking the habit of trying too hard to fall asleep and end the association of anxiety and non-sleep related activities in the bedroom (Bootzin & Nicassio, 1991) The instructions were modified for a college dormitory lifestyle to help account for the fact that college students use their dorm rooms for many purposes. For

example, in addition to sleep and sex, the instructions included non-school related relaxing activities.

The Enhanced STEPS Program

In addition to the Sleep Hygiene Instructions and the Stimulus Control Instructions individuals in the enhanced STEPS program were instructed in cognitive techniques to help individuals experiencing sleep difficulties due to ruminating thoughts. They were instructed in thought stopping and informed of techniques such as placing a rubber band around their wrist and when an intrusive thought comes flick their wrist with the rubber band in order to stop the thoughts that they are having. Another thought stopping technique participants were taught was shouting stop internally. They were also instructed on how to redirect their thoughts to a less distressing thought so that they are able to sleep.

The enhanced STEPS program group also included several relaxation techniques. Specifically, it included the following: diaphragmatic breathing, mental imagery, and progressive muscle relaxation. Mental imagery taught them to imagine a safe and calm place using their five senses. Progressive muscle relaxation is designed to train individuals to relax each muscle in their body starting at their head and working their way down their body.

Procedure

The Institutional Review Board approved this study before it was conducted (see Appendix A). Participants were recruited from undergraduate courses at a Midwestern medium sized university in the United States. The researcher actively recruited volunteers to participate in exchange for extra credit. There was a comparable alternative extra credit

opportunity offered by the professor for those who did not wish to participate in the research project.

Participants were randomly assigned to the control group or one of the two treatment groups and informed of where and when they could participate based on their assignment. All groups were conducted in the same room and at the same time of day to help ensure uniformity. The groups met one time for approximately 40 minutes. Upon arrival to the first group all participants were read the instructions, signed the informed consent (APPENDIX A), and completed the survey packet. The packet was labeled with a six-digit participant number which the participant was asked to write on a note card along with his or her name. The note cards were then given to the class instructor to keep so that they were not stored with the data to ensure anonymity and confidentiality. Participants were informed of the services offered by the university counseling center should they become concerned about sleep difficulties.

The control group received a study skills intervention (e.g., proper note taking skills, reading comprehension skills) in order to control for the effects of a 40-minute group conducted in the treatment groups.

The first treatment group received a psychoeducational sleep intervention which utilized sleep hygiene, stimulus control, and sleep restriction therapy. During the groups the participants received sleep hygiene guidelines, stimulus control instructions, and a handout about substances with caffeine. Participants were allowed to keep the handouts to refer to as needed. The participants were given adequate time to ask questions about the handouts. The group next discussed of the prevalence of sleep difficulties and poor

sleeping habits in college students, and the impact of poor sleeping habits on college students.

The second intervention group received the same intervention that the first intervention group received. In addition, this group also received relaxation training. Relaxation training focused on diaphragmatic breathing, deep muscle relaxation, and mental imagery. The second group also received cognitive sleep interventions, with an emphasis on thought stopping.

Five weeks after the completion of the intervention the researcher returned to the class and re-administered the sleep measures. A 5-week posttest was selected in order to examine if the interventions improved sleep to a degree that the improvements were sustained. The instructions for completing the measures were reviewed, and the participants were re-administered the SQI, PSQI, SHAPS, and the MCSDS. The note cards were distributed and participants were asked to write the six-digit number on their surveys so that the pretest and posttest data could be matched. Participants were given adequate time to ask questions and reminded of the services provided by the university counseling center.

Statistics and Data Analysis

The first level of statistical analysis conducted involved the calculation of frequency and percentages of the demographic variables (e.g., gender and ethnicity). Means, standard deviations, and ranges were calculated for all study variables. A norm comparison was conducted on the mean and standard deviation of scores on the Marlowe-Crowne Social Desirability Scale to determine whether or not the sample responded in a socially desirable manner. Socially desirable responding was controlled

for to ensure positive results are not due to socially desirable responding. The normality of the data was also examined.

Hypothesis one stated that participants in the enhanced STEPS program and STEPS program groups would have significantly improved sleep quality compared to participants in the control group. This hypothesis was tested by conducting a repeated measures multivariate analysis of covariance (MANCOVA). Within subject factor was time and two levels: pretest and a 5-week posttest. The between subject factor was the treatment condition and had two levels: the control group and the treatment groups. The dependent variables were the total scores on the PSQI and SQI. The independent variables were which group the individual was assigned to and time.

To test hypothesis two which stated that at posttest the participants in the STEPS program and the enhanced STEPS program groups would have significantly improved sleep length compared to participants in the control group, the statistical analysis was repeated with total number of hours slept as the dependant variable.

Hypothesis three stated that the enhanced STEPS program would lead to a significantly improved sleep length as compared to the STEPS program. This hypothesis was tested by conducting a repeated measures analysis of covariance (ANCOVA). Within-subject factor was time and had two levels: pretest and a 5-week posttest. The between-subject factor was the treatment condition and had two levels, treatment group one and treatment group two. The dependent variable was total average number of hours slept. The independent variables were which group the individual was assigned to and time.

To test hypothesis four which stated that the enhanced STEPS program would lead to a significantly improved sleep quality as compared to the STEPS program the statistical analysis was repeated with the dependent variables as the total scores on the PSQI and SQI.

Hypothesis five stated that the treatment groups would report using significantly more sleep hygiene practices than the control group at time two. This hypothesis was tested by conducting a repeated measures analysis of covariance (ANCOVA). The within-subject factor was time and had two levels: pretest and a 5-weeks posttest. The between-subject factor was the treatment condition and had two levels: the control group and the treatment groups. The dependent variable was the scores of the sleep hygiene practice scale. The independent variables were the group and time.

To test hypothesis six, which stated that the treatment groups would have significantly more sleep hygiene awareness than the control group at time two, the statistical analysis was repeated with the dependent variable as the sleep hygiene awareness scores. The independent variables were the group and time.

Hypothesis seven stated that highly reactant individuals would show significantly less improvement in sleep quality compared to individuals low in reactance in the treatment groups. This hypothesis was tested by conducting a repeated measures multivariate analysis of covariance (MANCOVA). The within-subject factor was time and had two levels: pretest and a 5-week posttest. The between-subject factor was level of reactance and the variable was trichotamized with three levels: low, medium, and high. The dependent variables were the scores of the PSQI an SQI. The independent variable was the level of reactance.

To test hypothesis eight, which stated that highly reactant individuals would show significantly fewer improvements in sleep length compared to individuals low in reactance in the treatment groups the statistical analysis, was repeated with the dependent variable as average total number of hours slept. The independent variable was level of reactance.

Hypothesis nine stated that there would be a significant difference in sleep length between approach motivation and avoidance motivation in the treatment groups at time two. This hypothesis was tested by conducting a repeated measures multivariate analysis of covariance (MANCOVA). Within-subject factor was time and had two levels: pretest and a 5-week posttest. The between-subject factor was level of approach motivation and avoidance motivation and had two categories: approach and avoidant. The independent variable was type of motivation. The dependent variable was the average total number of hours slept.

To test hypothesis ten, which stated that there will be a significant difference in sleep quality between approach motivation and avoidance motivation in the treatment groups at time two, the statistical analysis was repeated with the dependent variable as scores of the PSQI an SQI. The independent variable was type of motivation.

CHAPTER THREE

RESULTS

Participants

Overall Sample

Participants were 151 undergraduate students at a mid-sized university in the American Midwest. The sample was 76% female (n = 114) and 24% male (n = 37) with an average age of 19 (SD = 1.12; *Range* = 18-24). The sample was 83% European American (n = 125), 9% African American (n = 13), and 9% Latino, Asian, Middle Eastern, Multiracial, or "Other" (n = 13). The sample was comprised of individuals from all academic classifications, 42% identified as freshman (n = 64), 31% identified as sophomores (n = 46), 17% identified as juniors (n = 26), 9% identified as seniors (n = 13), and 1% identified as other (n = 2), possibly meaning that they are 5th-year seniors.

A Levene's test of homogeneity of variance was used to examine the groups for homogeneity in terms of gender, age, class, and ethnicity. The groups did not differ significantly in terms of age, $F(2, 148) = .37$, class $F(2, 147) = .81$, or ethnicity, $F(2, 148) = .37$). The groups were significantly different in terms of gender, $F(2, 148) = 3.54$, $p < .05$. The control group had the most females (88%), followed by the enhanced STEPS group (71%), and the STEPS group had the lowest number of females (67%). Based on these findings, gender was controlled for when examining the hypotheses.

Control Group

The 51 participants in the control group were 88% female (n = 45) and 12% male (n = 6) with an average age of 19 (SD = 1; *Range* = 18-22). The control group was 80% European American (n = 41), 6% African American (n = 3), and 14% Latino, Asian, Middle Eastern, Multiracial, or "Other" (n = 7). The control group was comprised of 41% freshman (n = 21), 29% sophomores (n = 15), 18% juniors (n = 9), and 10% seniors (n = 5).

STEPS Group

The 49 STEPS program participants were 67% female (n = 33) and 33% male (n = 16) with an average age of 19 (SD = 1; *Range* = 18-22). The STEPS program group was 88% European American (n = *43*), 10% African American (n = 5), and 2% Latino, Asian, Middle Eastern, Multiracial, or "Other" (n = 1). The STEPS program group was comprised of 51% freshman (n = 25), 27% sophomores (n = 13), 14% juniors (n = 7), 6% seniors (n = 3), and 2% other (n = 1).

Enhanced STEPS Group

The 51 participants in the enhanced STEPS program were 71% female (n = 36) and 29% male (n = 15) with an average age of 19 (SD = 1; *Range* = 18-24). The enhanced STEPS Program group was 80% European American (n = 41), 10% African American (n = 5), and 10% Latino, Asian, Middle Eastern, Multiracial, or "Other" (n = 5). The enhanced STEPS program group was comprised of 35% freshman (n = 18), 35% sophomores (n = 18), 18% juniors (n = 9), 10% seniors (n = 5), and 2% other (n = 1).

Descriptive Statistics and Reliabilities

Table 1 presents the reliability coefficients, means, standard deviations, and ranges for the Therapeutic Reactance Scale, the Behavioral Inhibition Scale/Behavioral Approach Scale, the Sleep Hygiene Awareness and Practices Scale, the Pittsburgh Sleep Quality Index, the Sleep Quality Index, and the Marlowe-Crowne Social Desirability Index. The current sample was compared to normative samples using one-sample t-tests. The results of a one-sample t-test revealed that the TRS mean for the current sample (M = 65.74) is significantly lower than mean for the sample (M = 68.87) that Dowd et al. (1991) developed the TRS with, $t(1, 143) = -4.3, p < .01$.

With respect to the BIS/BAS, a one sample t-test revealed the current sample scores on the BIS (M = 21.95) are significantly higher than the standardization sample (M = 19.99; Carver & White, 1994), $t(1, 148) = 6.12, p < .01$. The current sample mean on the BAS Drive Scale (M = 10.67) was significantly lower than the average of the sample the measure was standardized on (M = 12.05; Carver & White, 1994), $t(1,149) = -7.71, p < .01$. The current sample means on the BAS Reward Responsiveness (M = 17.85) BAS Fun Seeking Scale (M = 12.38) did not significantly differ from the means of Carver and White's (1988) standardized sample (Reward Responsiveness: M = 17.59, $t(1, 149)$ = 1.54; Fun Seeking: M = 12.05, $t(1,194) = 1.94$).

With respect to sleep quality, the current sample had significantly lower scores on the PSQI at time one (M = 6.78) and time two (M = 5.99) than the standardization sample (M = 7.4; Buysse et al., 1989): time one $t(1,150) = -2.39$, time two $t(1, 149) = -5.92$.

Table 1

Means, Standard Deviations, Range, and Reliabilities for Entire Sample

Variables	*M*	*SD*	*Range*	*α*
TRS Total	65.74	8.75	42-87	.81
TRS Behavioral Scale	36.05	5.99	21-52	.80
TRS Verbal Scale	29.70	3.86	17-40	.61
BIS	21.95	3.91	9-28	.79
BAS Reward Scale	17.85	2.04	9-20	.70
BAS Drive Scale	10.87	2.19	6-16	.72
BAS Fun Seeking Scale	12.38	2.11	5-16	.65
SHAPS Awareness Scale				
Time One	23.58	5.36	13-37	.71
Time Two	22.38	5.77	13-39	.76
SHAPS Practice Scale				
Time One	28.65	11.23	7-69	.63
Time Two	28.64	13.14	4-78	.74
PSQI Total				
Time One	6.76	3.19	1-18	.68
Time Two	5.96	2.92	1-15	.74
SQI Total				
Time One	5.78	3.42	0-15	.72
Time Two	5.45	2.98	0-14	.68
MCSDS				
Time One	6.36	2.58	1-13	.62
Time Two	6.75	2.92	0-13	.71

Note: TRS = Therapeutic Reactance Scale; BIS = Behavioral Inhibition Scale; BAS = Behavioral Approach Scale; SHAPS = Sleep Hygiene Awareness and Practice Scale; PSQI = Pittsburgh Sleep Quality Index; SQI = Sleep Quality Index; MCSDI = Marlowe-Crowne Social Desirability Scale

Table 2 presents the descriptive statistics for the control group. The control group's mean on the Sleep Hygiene Awareness subscale at time one was 22.57 and the mean at time two was 22.87. With respect to the Sleep Hygiene Practice subscale, the mean at time one was 29.86 and the mean at time two was 22.86. The PSQI mean at time one was 6.61 and at time two the mean was 6.02. With respect to the SQI, the mean at time one was 5.31 and the mean at time two was 5.28. The mean on the MCSDS at time one was 6.27 and the mean was 6.12 at time two.

Table 3 presents the descriptive statistics for the STEPS group. The STEP group's mean on the Sleep Hygiene Awareness subscale at time one was 22.43 and the mean was 22.93 at time two. With respect to the Sleep Hygiene Practice subscale, the mean at time one was 28.36 and the mean at time two was 27.90. The PSQI mean at time one was 7.40 and at time two the mean was 5.94. With respect to the SQI, the mean at time one was 6.57 and the mean was 5.61 at time two.

Table 4 presents the descriptive statistics for the enhanced STEPS group. The enhanced STEPS group's mean on the Sleep Hygiene Awareness subscale at time one was 23.78 and the mean was 21.35 at time two. With respect to the Sleep Hygiene Practice subscale, the mean at time one was 27.70 and the mean at time two was 30.06. The PSQI mean at time one was 6.30 and at time two the mean was 5.92. With respect to the SQI, the mean at time one was 5.49 and at time two the mean was 5.45

Table 2

Means, Standard Deviations, Range, and Reliabilities for Control Group

Variables	*M*	*SD*	*Range*	*α*
TRS Total	66.29	8.77	48-87	.83
TRS Behavioral Scale	36.06	5.85	24-49	.77
TRS Verbal Scale	30.12	3.54	23-38	.61
BIS	22.35	3.93	15-28	.72
BAS Drive Scale	10.67	2.10	6-15	.77
BAS Reward Scale	17.92	1.79	14-20	.67
BAS Fun Scale	12.16	1.93	8-16	.58
SHAPS Awareness Scale				
Time One	22.57	4.76	3-35	.63
Time Two	22.86	5.39	13-35	.70
SHAPS Practice Scale				
Time One	29.86	10.10	15-69	.54
Time Two	22.86	5.39	13-35	.57
PSQI Total				
Time One	6.61	2.70	1-13	.69
Time Two	6.02	2.63	1-13	.72
SQI Total				
Time One	5.31	3.16	0-12	.68
Time Two	5.28	2.77	0-13	.65
MCSDS				
Time One	6.27	2.68	1-11	.67
Time Two	6.12	3.11	0-12	.76

Note: TRS = Therapeutic Reactance Scale; BIS = Behavioral Inhibition Scale; BAS = Behavioral Approach Scale; SHAPS = Sleep Hygiene Awareness and Practice Scale; PSQI = Pittsburgh Sleep Quality Index; SQI = Sleep Quality Index; MCSDI = Marlowe-Crowne Social Desirability Scale

Table 3

Means, Standard Deviations, Range, and Reliabilities for STEPS Group

Variables	*M*	*SD*	*Range*	*α*
TRS Total	65	8.32	47-82	.77
TRS Behavioral Scale	35.69	6.35	24-52	.77
TRS Verbal Scale	29.39	3.49	23-38	.49
BIS	21.88	4.29	9-28	.82
BAS Drive Scale	11.12	2.20	8-16	.71
BAS Reward Scale	18.29	1.92	9-20	.70
BAS Fun Scale	12.76	2.19	9-16	.65
SHAPS Awareness Scale				
Time One	24.43	5.89	15-37	.76
Time Two	22.93	5.95	13-39	.78
SHAPS Practice Scale				
Time One	28.36	12.66	10-62	.68
Time Two	27.90	13.40	10-70	.74
PSQI Total				
Time One	7.40	3.74	1-18	.70
Time Two	5.94	2.85	2-13	.70
SQI Total				
Time One	6.57	3.81	1-15	.76
Time Two	5.61	3.30	1-14	.72
MCSDI				
Time One	5.95	2.61	1-13	.71
Time Two	6.81	2.22	0-13	.63

Note: TRS = Therapeutic Reactance Scale; BIS = Behavioral Inhibition Scale; BAS = Behavioral Approach Scale; SHAPS = Sleep Hygiene Awareness and Practice Scale; PSQI = Pittsburgh Sleep Quality Index; SQI = Sleep Quality Index; MCSDI = Marlowe-Crowne Social Desirability Scale

Table 4

Means, Standard Deviations, Range, and Reliabilities for Enhanced STEPS Group

Variables	*M*	*SD*	*Range*	*α*
TRS Total	65.94	9.20	42-86	.82
TRS Behavioral Scale	36.39	5.84	21-51	.76
TRS Verbal Scale	29.57	4.42	17-40	.70
BIS	21.61	4.06	11-28	.80
BAS Drive Scale	10.24	2.22	6-16	.69
BAS Reward Scale	17.35	2.31	9-20	.71
BAS Fun Scale	12.25	2.19	5-16	.69
SHAPS Awareness Scale				
Time One	23.78	5.32	13-35	.70
Time Two	21.35	5.93	13-35	.80
SHAPS Practice Scale				
Time One	27.70	11.12	7-57	.66
Time Two	30.06	15.66	4-78	.81
PSQI Total				
Time One	6.30	3.01	1-13	.64
Time Two	5.92	3.28	1-15	.79
SQI Total				
Time One	5.49	3.23	0-12	.69
Time Two	5.45	2.91	0-13	.72
MCSDS				
Time One	6.84	2.40	1-12	.53
Time Two	7.33	2.58	0-12	.60

Note: TRS = Therapeutic Reactance Scale; BIS = Behavioral Inhibition Scale; BAS = Behavioral Approach Scale; SHAPS = Sleep Hygiene Awareness and Practice Scale; PSQI = Pittsburgh Sleep Quality Index; SQI = Sleep Quality Index; MCSDI = Marlowe-Crowne Social Desirability Scale

A Levene's test of homogeneity of variance was conducted to examine if the groups differed significantly on any of the variables at time one. The test revealed that the group variances were not significantly different on any of the variables at time one: SQI Total, $F(2,148) = 1.98$; PSQI Total, $F(2,148) = 1.54$; SHAPS Awareness, $F(2,147) = 1.57$; SHAPS Practice, $F(2,144) = .48$; TRS Behavioral, $F(2,144) = .16$; TRS Verbal, $F(2,145) = .48$); TRS Total, $F(2,141) = .27$; BAS Drive, $F(2,147) = 2.04$; BAS Reward, $F(2, 147) = 2.73$; BAS Fun Seeking, $F(2,148) = 1.15$; BIS, $F(2,146) = .46$; MCSDS, $F(2,147) = 1.5$.

Correlations between Variables

Table 5 presents the correlations between all of the study variables. Not surprisingly, the TRS total score was significantly positively correlated with both the TRS Behavioral Reactance scale ($r = .93, p < .01$) and the TRS Verbal Reactance Scale ($r =. 54, p < .01$). The TRS Behavioral Reactance Scale and the TRS Verbal Reactance Scale were also positively correlated ($r = .54, p < .01$).

The TRS scales also correlated significantly with the BAS/BIS scales. All three TRS scales were significant negative correlations with the BIS (TRS Total $r = -.29, p < .01$; TRS Behavioral $r = -.18, p < .05$; TRS Verbal Scale $r = -.37, p < .01$) and significantly positively correlated with the BAS Drive Scale (TRS Total $r = .37\ p < .01$; TRS Behavioral $r = .36, p < .05$; TRS Verbal Scale $r = .27, p < .01$) and BAS Fun Seeking Scale (TRS Total $r = .25, p < .01$; TRS Behavioral $r = .22, p < .01$; TRS Verbal Scale $r = .20, p < .01$).

Table 5

Correlation Matrix of Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 TRS Total	1																
2 TRS Beh.	.93**	1															
3 TRS Verbal	.81**	.54**	1														
4 BIS	-.29**	-.18*	-.37**	1													
5 BAS Drive	.37**	.36**	.27**	-.09	1												
6 BAS Reward	09	. 10	.05	.18*	.44**	1											
7 BAS Fun	.25**	.22**	.20*	-.20*	.42**	.44**	1										
8 SHAPSA (1)	.01	.01	.03	-.12	.02	.03 .	.1	1									
9 SHAPSA (2)	-.01	-.06	.07	-.17*	0	.07	.17*	.66**	1								
10 SHAPSP (1)	.08	.07	.10	.05	.06	.03	.10	.06	.08	1							

Table 5 (Continued)

Correlation Matrix of Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
11 SHAPSP (2)	.21*	.22*	.14	-.03	.07	.01	.15	.16	.20*	.62**	1						
12 PSQI (1)	.09	.04	.14	.05	.11	.05	.05	.02	0	.68**	.44**	1					
13 PSQI (2)	.21*	.16	.24**	-.02	.15	.06	.21*	.03	.09	.62**	.65**	.66**	1				
14 SQI (1)	.15	.08	.23**	.04	.14	.09	.08	.06	.02	.59**	.34**	.70**	.59**	1			
15 SQI (2)	.17*	.1	.22**	.07	.07	.10	.12	.08	.04	.49**	.52**	.53**	.77**	.66**	1		
16 MCSDI (1)	-.28**	-.32**	-.17*	-.18*	-.19*	-.02	.01	.10 .	15	-.15	-.15	-.22**	-.22**	-.27**	-.23**	1	
17 MCSDI (2)	-.23**	-.28**	-.09	-.17*	-.20*	-.14	-.04	.25**	.23**	-.1	-.07	-.14	-.20**	-.17*	-.20**	78**	1

Note: TRS = Therapeutic Reactance Scale; BIS = Behavioral Inhibition Scale; BAS = Behavioral Approach Scale; SHK = Sleep Hygiene Knowledge; SHP = Sleep Hygiene Practice; PSQI = Pittsburgh Sleep Quality Index; SQI = Sleep Quality Index; MCSDI = Marlowe-Crowne Social Desirability Index; * $p < .05$ two-tailed, ** $p < .01$ two-tailed.

In addition, the TRS scales correlated significantly with some measures of sleep quality. There was a significant positive correlation with the PSQI at time two ($r = .21, p < .05$), and the SQI at times two ($r = .17, p = .05$). TRS Verbal Reactance Scale was significantly positively correlated with the PSQI at time two ($r = .24, p < .01$), SQI time one ($r = .23, p < .01$), and SQI time two ($r = .22, p < .01$).

As would be expected, the BAS scales presented with some significant positive correlations. The BAS Reward Responsiveness scale was significantly positively correlated with the BAS Drive Scale ($r = .44, p < .01$) and BAS Fun Seeking Scale ($r = .44, p < .01$) and the BIS ($r = .18, p < .05$). The BAS Fun Seeking scale was also significantly positively correlated with the BAS Drive Scale ($r = .42, p < .01$).and significantly negatively correlated with the BIS ($r = -.20, p < .05$). The BAS Fun Seeking Scale was also significantly positively correlated with the PSQI at time two ($r = .21, p < .05$).

The SHAPS Sleep Hygiene Awareness Scales was not significantly correlated with any measures at time one, but at time two was significantly negatively correlated with the BIS ($r = -.17, p < .05$), and significantly positively correlated with the BAS Fun Seeking Scale ($r = .17, p < .01$) and Sleep Hygiene Practice scale at time two ($r = .20, p < .05$). The SHAPS Sleep Hygiene Awareness Scale at time one and two were significantly positively correlated ($r = .66, p < .01$).

At time two, the Sleep Hygiene Practice Scale was significantly correlated with the TRS Total ($r = .21, p < .05$) and TRS Behavioral Scale ($r = .22, p < .05$). The two administrations of the SHAPS Sleep Hygiene Practice scale were also significantly positively correlated ($r = .62, p < .01$). The Sleep Hygiene Practice Scale at time one was

significantly positively correlated with all measure of sleep quality: PSQI time one (r = .68, p < .01), PSQI time two (r = .62, p < .01), SQI time one (r = .59, p < .01), and SQI time two (r = .49, p < .01). The Sleep Hygiene Practice Scale at time two was also significantly positively correlate with all measures of sleep quality: PSQI time one (r = .44. p < .01), PSQI time two (r = .65, p < .01), SQI time one (r = .34, p < .01), and SQI time two (r = .52, p < .01).

All measures of sleep quality also displayed significant positive correlations: PSQI time one and two (r = .66, p < .01), SQI time one and two (r = .66, p < .01). SQI time one and PSQI time one (r = .70, p < .01), SQI time one and PSQI time two (r = .59, p < .01), SQI time two and PSQI time one (r = .53, p < .01), SQI time two and PSQI time two (r = .77, p < .01).

Social Desirability

The results of a one-sample t-test revealed that that for this sample the mean and standard deviation on the Marlowe-Crowne Social Desirability Scale – Short Form C at time one (M = 6.36, SD = 2.58) and time two (M = 6.76, SD = 2.92) were significantly higher (i.e., more socially desirable) than the average mean and standard deviation (M = 5.37, SD = 3.13) Andrews and Meyer (2003) calculated in the seven studies they examined, time one: $t(149) = 4.7, p < .01$; time two: $t(148) = 5.8, p < .01$. Based on these findings, social desirability was controlled for when examining the hypotheses.

Hypotheses

Hypothesis One

Hypothesis one stated that participants in the STEPS program and the enhanced STEPS program groups would have significantly improved sleep quality compared to the participants in the control group at time two. To test this hypothesis, a MANCOVA was run controlling for gender and social desirability. The dependent variables were the total scores on the SQI and PSQI and the independent variable was the participant group (control, STEPS, or Enhanced STEPS). The hypothesis was not supported, $F(2, 149) = .477$ (see Table 6). Hence, the STEPS group and the enhanced STEPS group did not show significantly improved sleep quality compared the control group. The mean on the SQI are as follows: control group: time one *M*: 5.31, time two *M*: 5.28; STEPS group: time one *M*: 6.57, time two *M*: 5.61; enhanced STEPS group; time one *M*: 5.49, time two *M:* 5.45. With respect to the PSQI the means were as follows: control group: time one *M*: 6.61, time two *M*: 6.02; STEPS group Time 1 *M*: 7.40, Time 2 *M*: 5.94; the enhanced STEPS group: time one *M*: 6.3, time two *M*: 5.92.

Table 6

Results of the MANCOVA for Hypothesis One

	df	*F*	η	*p*
Group	4	.477	.007	.753
Gender	2	.753	.010	.481
Marlowe-Crowne (1)	2	1.91	.026	.152
Marlow-Crowne (2)	2	.096	.001	.909

Hypothesis Two

Hypothesis two stated that the STEPS program and the enhanced STEPS program groups would have significantly improve sleep length compared to the control group at time two. To test this hypothesis, an ANCOVA was run controlling for gender and social desirability. The dependent variable was sleep length and the independent variable was the participant group (control, STEPS, or Enhanced STEPS). The results of the ANCOVA did not support this hypothesis, $F(2, 149) = .644$ (see Table 7). Therefore, the enhanced STEPS group and the STEPS GROUP did not show significantly improved sleep length compared to the control group. The average sleep lengths were as follows: control group: time one *M*: 6.93 hours, time two *M*: 6.91 hours; enhanced STEPS group: time one *M*: 7.04 hours, time two *M*: 7.02 hours; STEPS group: time one *M*: 7.03 hours, time two *M*: 7.26 hours.

Table 7

Results of the ANCOVA for Hypothesis Two

	df	*F*	*η*	*p*
Group	2	.644	.009	.527
Gender	1	1.501	.010	.223
Marlowe-Crowne (1)	1	.766	.005	.383
Marlowe-Crowne (2)	1	.001	.000	.957

Hypothesis Three

Hypothesis three stated that the enhanced STEPS program group will have significantly longer sleep length as compared to the STEPS program group at time two.

To test this hypothesis, an ANCOVA was run controlling for gender and social desirability. The dependent variable sleep length and the independent variable was the participant group (STEPS, or Enhanced STEPS). The results of the ANCOVA did not support this hypothesis, $F(1, 98) = .303$ (see Table 8). Accordingly, the enhanced STEPS group did not show significantly improved sleep length as compared to the STEPS group. The means were as follows: enhanced STEPS group: time one *M*: 7.04 hours, time two *M*: 7.02; STEPS group: time one *M*: 7.03 hours; time two *M*: 7.26 hours.

Table 8

Results of the ANCOVA for Hypothesis Three

	df	*F*	η	*p*
Group	1	.303	.003	.583
Gender	1	2.146	.023	.146
Marlowe-Crowne (1)	1	.003	.000	.958
Marlow-Crowne (2)	1	.104	.001	.748

Hypothesis Four

Hypothesis four stated that the enhanced STEPS program group will have significantly improved sleep quality compared to the STEPS program group at time two. To test this hypothesis, a MANCOVA was run controlling for gender and social desirability. The dependent variables were the total scores on the SQI and PSQI and the independent variable was the participant group (STEPS, or enhanced STEPS). The results of the MANCOVA did not support this hypothesis, $F(1, 98) = .198$ (see Table 9). Thus, the enhanced STEPS group did not show significantly improved sleep quality compared

to the STEPS group. The Means on the SQI are as follows: STEPS group: time one *M*: 6.57, time two *M*: 5.61; enhanced STEPS group: time one *M*: 5.49, time two *M:* 5.45. With respect to the PSQI the averages were as follows: STPES group: time one *M*: 7.40, Time 2 *M*: 5.94; enhanced STEPS group time one *M*: 6.3, time two *M*: 5.92)

Table 9

Results of the MANCOVA for Hypothesis Four

	df	*F*	*η*	*p*
Group	2	.198	.004	.821
Gender	2	.322	.007	.719
Marlowe-Crowne (1)	2	2.341	.048	.102
Marlowe-Crowne (2)	2	.766	.016	.468

Hypothesis Five

Hypothesis five stated that the treatment groups would report using significantly more sleep hygiene practices compared to the control group at time two. To test this hypothesis, an ANCOVA was run controlling for gender and social desirability. The dependent variable was the score of the SHAPS Sleep Hygiene Practice Scale and the independent variable was the participant group (Control, STEPS, or Enhanced STEPS). The results of the ANCOVA did not support this hypothesis, $F(2, 149) = .065$ (see Table 10). Therefore, the enhanced STEPS group and STEPS group did not show significantly improved sleep hygiene practice use compare to the control group. The averages on the SHAPS Sleep Hygiene Practice Were as follows: control group: time one *M*: 29.86, time

two *M*: 22.86); STEPS Group time one *M*: 28.36, time two *M*: 27.09; enhanced STEPS group time one *M*: 27.70, time two *M*: 30.06.

Table 10

Results of the ANCOVA for Hypothesis Five

	df	*F*	η	*p*
Group	2	.065	.001	.937
Gender	1	.001	.000	.972
Marlowe-Crowne (1)	1	3.796	.026	.053
Marlowe-Crowne (2)	1	.554	.004	.458

Hypothesis Six

Hypothesis six stated that the treatment groups would have significantly more sleep hygiene awareness compared to the control group at time two. To test this hypothesis, an ANCOVA was run controlling for gender and social desirability. The dependent variable was the score of the SHAPS Sleep Hygiene Awareness Scale and the independent variable was the participant group (Control, STEPS, or Enhanced STEPS). The results of the ANCOVA did not support this hypothesis, $F(2, 148) = 1.114$ (see Table 11). Thus, the enhanced STEPS group and the STEPS group did not show significantly improved sleep hygiene awareness as compared to the control group. The averages on the Sleep Hygiene Awareness Scale were as follows: control group: time one *M*: 22.57, time two *M*: 22.86; STEPS group: time one *M*: 24.43, time two *M*: 22.93; enhanced STEPS group: time one *M*: 23.78, time two *M*: 21.35.

Table 11

Results of the ANCOVA for Hypothesis Six

	df	*F*	η	*p*
Group	2	1.114	.015	.331
Gender	1	1.465	.010	.228
Marlowe-Crowne (1)	1	1.283	.009	.259
Marlowe-Crowne (2)	1	8.493	.056	.004

Hypothesis Seven

Hypothesis seven stated that highly reactant individuals would show significantly fewer improvements in sleep quality compared to individuals low in reactance in the treatment groups. To test this hypothesis, a MANCOVA was run controlling for gender and social desirability. The dependent variables were the scores of the SQI and the PSQI and the independent variable was level of reactance. The results of the MANCOVA did not support this hypothesis: $F(2, 97) = .27$ (see Table 12). Thus, reactance showed no effect of improvements in sleep quality. With respect to the PSQI, the group lowest in reactance had an average of 6.84 at time one and at time two the mean was 5.42. The mid-level reactance group had an average of 7.10 at time one and an average of 5.97 at time two. The group highest in reactance had an average of 6.62 at time one and an average of 6.32 at time two. With respect to the SQI, the group lowest in reactance had an average of 5.44 at time one and 5.41 at time two, while the middle reactance group had an average of 6.23 at time one and 5.97 at time two. The group highest in reactance had an average of 6.35 at time one and 6.32 at time two.

Table 12

Results of the MANCOVA for Hypothesis Seven

	df	*F*	*η*	*p*
Group	4	.266	.006	.899
Gender	2	.377	.008	.687
Marlow-Crowne (1)	2	2.436	.051	.093
Marlow-Crowne (2)	2	.735	.016	.482

Hypothesis Eight

Hypothesis eight stated that highly reactant individuals would show significantly less improvements in sleep length compared to individuals low in reactance in the treatment groups. To test this hypothesis, an ANCOVA was run controlling for gender and social desirability. The dependent variable was sleep length and the independent variable was level of reactance. The results of the ANCOVA did not support this hypothesis, $F(2, 97) = .183$ (see Table 13). Therefore, individuals lower in reactance did not show significantly more improvements in length as compared to individuals higher in reactance. The group highest in reactance had an average sleep length of 7.18 hours at time one and 6.89 hours a night at time two. The group lowest in reactance had an average sleep length of 6.66 hours at time one and 7.22 hours at time two. The mid-level reactance group had an average sleep length of 7.04 hours at time one and 7.34 hours at time two.

Table 13

Results of the ANCOVA for Hypothesis Eight

	df	*F*	η	*p*
Group	2	.183	.004	.833
Gender	1	2.108	.022	.150
Marlowe-Crowne (1)	1	.001	.000	.973
Marlowe-Crowne (2)	1	.113	.001	.737

Hypothesis Nine

Hypothesis nine stated that there would be a significant difference in sleep length between approach motivation and avoidance motivation in the treatment groups at time two. To test this hypothesis, an ANCOVA was run controlling for gender and social desirability. The dependent variable was sleep length and the independent variable was motivational style. The results of the ANCOVA did not support this hypothesis, $F(1, 97) = .416$ (see Table 14). The average sleep lengths were as follows: approach motivated group: time one *M*: 6.88 hours, time two *M*: 6.96 hours; avoidant motivation group: time one *M*: 7.18 hours, time two *M*: 7.28 hours.

Table 14

Results of the ANCOVA for Hypothesis Nine

	df	*F*	η	*p*
Group	1	.416	.004	.521
Gender	1	1.268	.013	.263
Marlowe-Crowne (1)	1	.003	.000	.957
Marlowe-Crowne (2)	1	.125	.001	.724

Hypothesis Ten

Hypothesis ten stated that there would be a significant difference in sleep quality between approach motivation and avoidance motivation in the treatment groups at time two. To test this hypothesis, a MANCOVA was run controlling for gender and social desirability. The dependent variables were the total score on the PSQI and SQI independent variable was motivational style. The results of the MANCOVA did not support this hypothesis, PSQI: $F(1, 98) = .212$ (see Table 15). Thus, there was no relationship between motivation style and improvement in sleep quality. With respect to the PSQI, the approach motivational group average at time one was 6.67 and 5.96 at time two. The avoidant motivational style PSQI average at time one was 7.08 and 5.96 at time two. With respect to the SQI, the approach motivation group average at time one was 5.96 to and at time two the average was 5.59. On the SQI, the avoidant motivation group had an average of at time one of 6.16 and 5.59 at time two.

Table 15

Results of the MANCOVA for Hypothesis 10

	df	*F*	η	*p*
Group	2	.212	.005	.809
Gender	2	.753	.007	.734
Marlowe-Crowne (1)	2	2.24	.046	.112
Marlowe-Crowne (2)	2	.681	.015	.509

CHAPTER FOUR

DISCUSSION

This section begins with a general overview of the results, followed by a discussion of each hypothesis. The general implications for the study are discussed, followed by the limitations of the study and suggestions for future research.

General Overview of Results

The first level of data analysis revealed that the current sample was significantly less reactant than the sample on which the TRS was standardized. The current sample also had a higher average on the BIS at time one. In addition, the groups differed significantly with respect to gender. Results also revealed that the current sample did respond in a socially desirable manor at time one and time two. The current sample had significantly better sleep quality as measured by the PSQI. Hypotheses one through four posited that the STEPS program and enhanced STEPS program would significantly improve sleep quality and sleep length. Contrary to the hypotheses, the STEPS program and enhanced STEPS program did not significantly improve sleep quality (Hypothesis One) or sleep length (Hypothesis Two) compared to the control group. Analysis indicated that the enhanced STEPS program did not improve sleep length (Hypothesis Three) or sleep quality (Hypothesis Four) compared to the STEPS program. Analysis also revealed that participating in the STEPS program or enhanced STEPS program did not

significantly improve sleep hygiene practice (Hypothesis Five) or sleep hygiene knowledge (Hypothesis Six). Contrary to previous research (Brown, Buboltz. & Soper, 2006), the current findings indicate that overall the STEPS program and enhanced STEPS program did not significantly improve sleep length, sleep quality, sleep hygiene awareness, or sleep hygiene practices.

Hypotheses Seven and Eight posited that compared to individuals high in reactance individuals low in reactance would see significantly more improvements in sleep quality and sleep length as a result of participating in the STEPS or enhanced STEPS program. Analysis revealed that individuals lower in reactance did not have significantly improved sleep quality (Hypothesis Seven) or sleep length (Hypothesis Eight) as a result of participating in the STEPS or enhanced STEPS program. The second personality factor examined was approach/avoidance motivation. Results did not support the hypothesis that individuals with approach motivation would see a significant improvement in sleep length (Hypothesis Nine) or sleep quality (Hypothesis Ten) compared to individuals with an avoidance orientation as a result of participating in the STEPS or enhanced STEPS program.

Hypothesis One

Hypothesis One stated that participants in the STEPS program and the enhanced STEPS program groups will have significantly improved sleep quality compared to participants in the control group at time two. The results of the MANCOVA did not support this hypothesis. One possible reason that this hypothesis was not supported is the time frame of a 5-week posttest that was used. It is possible that a 5-week posttest did not allow participants adequate time to implement the techniques that they learned in the

STEPS and enhanced STEPS programs. The changes necessary to see improvements in sleep quality are difficult to make, and may take individuals a great deal of time. It is possible that a follow up of several months may have allowed participants time to implement the changes necessary to see changes in sleep quality.

The changes necessary to improve sleep quality are made even more difficult for college students to implement because of their external environment. For example, college students are not able to control the level of noise that other individuals in their residence hall or the behaviors of their roommate that could wake them up. They may not be able to control the temperature in their room in the residence hall. Also, some of the sleep restriction techniques (e.g., using the bedroom for only sleep and sex) are going to be more difficult for college students to implement as they live and sleep in one room.

It is also possible that the program in its current form is not powerful enough to impact sleep quality. The program may be more effective if conducted over multiple groups. This may allow participants to have increased contact with the material and increase the participants' memory and implementation of the behavior. This may also allow participants to see what difficulties they have in implementing the intervention techniques and then to trouble shoot the problems they have with the intervention facilitator.

Given the fact that there were not any significant changes in sleep hygiene practices it is not surprising that there were no significant changes in sleep quality as measured by the PSQI and SQI for the treatment groups compared to the control group. As seen in table 5, the SHAPS sleep hygiene practice subscale had a significant positive correlation with every measure of sleep quality. Research has also shown that sleep

practices are what lead to improvements in sleep quality. Given the fact that sleep practices did not improve it is unlikely that sleep quality would improve.

It is also important to remember that the current sample had significantly better sleep quality that the standardization group for the PSQI. This suggests that the current sample may not have been able to benefit from the sleep intervention because they did not need to improve their sleep quality.

These findings suggest that the program may be more beneficial in different formats (e.g., two to three sessions). It may also possible that the program would be more effective if it had some problem-solving strategies built in to help college students address their specific difficulties in changing their external environment.

Hypothesis Two

Hypothesis Two stated that the STEPS program and the enhanced STEPS program groups would have significantly improved sleep length compared to the control group at time two. The results of the ANCOVA did not confirm this hypothesis. It is possible that that the current sample did not see an improvement in sleep length as a result of the intervention because the STEPS and enhanced STEPS program are predominantly focused on sleep quality. There may not have been enough information regarding how to improve sleep length built into the program.

The external demands on college students likely make the changes needed to improve sleep length even more difficult to implement than the changes necessary to improve sleep quality. If students want to participate in extra-curricular activities and socialize with friends they often have no choice but to stay up late. In addition, when they have classes that start at different times (e.g., 8 a.m. Monday and Wednesday and 11 a.m.

Tuesday and Thursday) it is very difficult for college students to put themselves on a consistent sleep and wake time schedule. This is made even more difficult on the weekends because going to bed at close to the same time on the weekend as they do during the week may cause students to miss social activities.

Another possible reason that there was not a significant improvement in sleep length is that participants did not see the benefit of the program. In order to for individuals to pay attention adequately and implement the techniques learned in an intervention they need to see a benefit of making the changes. College students may actually see not making changes to sleep length as more beneficial to them because making these changes could cause them to miss important extra-curricular and social activities.

Individuals' motivation for participating in the program may have impacted the results. Participants were given extra credit for their participation. Thus, their motive may not have been to improve their sleep length but to improve their grade. Without the motivation to improve their sleep length they may not have paid adequate attention during the intervention and may not have even looked at the handouts of recommendations after the group.

As discussed with respect to hypothesis one, given the fact that there were not any significant changes in sleep hygiene practices it is not surprising that there were no significant changes in sleep length in the treatment groups as compared to the control group.

These findings have several implications. The program may benefit from the addition of motivational interviewing techniques. This may increase participants'

motivation to implement the techniques learned in the intervention. The program may also benefit from building in incentives to increase the motivation of participants and create an immediate benefit. In addition, the program may benefit from building in more techniques that focus specifically on improving sleep length. This may allow the programs to address a wider range of sleep difficulties.

Hypothesis Three

Hypothesis Three stated that the enhanced STEPS program group will have significantly longer sleep length as compared to the STEPS program group at time two. The results of the ANCOVA did not confirm this hypothesis. It is possible that the current sample was not cognitively oriented. This could cause them to have difficulty in implementing cognitive techniques and relaxation techniques. In addition, it may be harder for them to grasp how they would be beneficial. Hence, the addition of these techniques would not benefit the current sample.

It is also possible that the current sample may not have seen sleep length as a problem that they needed to address. Consequently, neither intervention is going to be effective. In order for an intervention to be effective the participants must see the personal benefit of making the necessary changes. The participants in current study may not have been experiencing health, psychological, or academic problems. As a result, they are not likely to implement the techniques from the intervention.

It is also possible that participants were not able to make the changes necessary to improve their sleep length because from the time of the intervention to the 5-week posttest the work load for their classes may have increased. Accordingly, it is going to be

very difficult for the participants to increase their sleep length because more time is required of them to complete their required school work at posttest.

As discussed in the previous hypotheses, with no significant changes in sleep hygiene practices it is not surprising that there was not a significant change in sleep length.

These findings imply that interventions to improve sleep must be individualized or specific to the individual and are very difficult to use in a group setting. This points to the fact that many different factors may be impacting an individual's sleep length. For example, if an individual is not cognitively oriented they are not likely to benefit from an intervention that utilizes cognitive techniques. It is also very important for individuals to conduct the posttest time at a point at which there is likely to be an increase in the work load that individuals have in their classes.

Hypothesis Four

Hypothesis Four stated that the enhanced STEPS program group will have significantly improved sleep quality compared to the STEPS program group at time two. The results of the MANCOVA did not confirm this hypothesis. It is possible that memory bias is impacting the results. For example, participants are likely going to remember the previous night's sleep better than their sleep over time. The PSQI asks individuals to respond based on their sleep over the past month and the SQI asks participants to respond based on their sleep over the past three months. Participants may not be able to remember and provide an accurate picture of their time sleep with respect to those time frames.

In addition, it is important to remember that these results are self-reported aggregated data. In addition to difficulty remembering the quality of their sleep

participants are also asked to average out their sleep over time. It is likely that the times in which they have slept very well or had very poor sleep quality are prominent in their memory. In effect, those instances are going to weigh heavily when they attempt to estimate their sleep quality over time.

As discussed with the previous hypothesis one, it is important to remember that the current sample had significantly better sleep quality than standardization sample for the PSQI. Thus, they may not have been able to benefit from the program as much as other students or samples. In addition, given that there were no significant changes in sleep hygiene practices for the treatment groups it is not surprising that there was not a change in sleep quality.

This highlights the importance of how sleep quality is measured. The program may benefit from examining multiple ways to measure sleep quality. It is also going to be very important for researchers to find ways to account for memory bias with self-report results.

Hypothesis Five

Hypothesis Five stated that the treatment groups will report using significantly more sleep hygiene practices compared to the control group at time two. The results of the ANCOVA did not confirm this hypothesis. The lack of significant findings with respect to changes in sleep practices may be due to the difficulty college students are up against when attempting to change their lifestyles and sleep patterns. As mentioned previously, in order to participate in some activities or to socialize with friends, college students are sometimes required to stay up late. It is typically very difficult for college students to give up some of the activities that they are participating in and give up

spending time with their friends in order to improve their sleep. That aspect of their lives may be more important to them than the benefits they would have from getting a good night sleep.

The current results may also have been impacted by the current participants not recognizing how the changes in sleep practices may benefit them. The program discussed the impact that poor sleep can have on individuals in terms of physical and psychological health and cognitive/academic functioning. This is not a major focus of the program though. The program may not do enough to motivate participants to make the recommended changes to their sleep practices.

It is also possible that participants in this current study were not motivated to make the necessary changes to their sleep practices because they were not experiencing problems in any of the areas that were discussed. The fact that this sample did have significantly better sleep quality than the PSQI standardization sample suggests that they likely already have good sleep practices. Thus, they are not likely to see the benefit of improving their sleep practices and may not need to improve their sleep practices.

These findings imply that it is essential for participants to see the benefit of making changes to their sleep practices. These findings also highlight the importance of working with the unique challenges that college students face when trying to change their sleep hygiene practices. The program may benefit from an enhanced focus on working with unique issues facing college students.

Hypothesis Six

Hypothesis Six stated that the treatment groups would have significantly more sleep hygiene awareness compared to the control group at time two. The results of the ANCOVA did not confirm this hypothesis. The lack of significant sleep hygiene awareness changes may be indicative of the importance that students place on awareness of sleep hygiene changing rather than their actual level of knowledge changing. For example, most students can deduce that it is beneficial not to drink caffeine shortly before going to bed, but they may not have realized how important not drinking caffeine shortly before bed is to sleep.

Participants' motivation may also have impacted these results. For example, the participants may have been motivated to participate in the current study just to get the extra credit that was offered. They may not have paid adequate attention during the presentation and may not have looked at the handouts after the group. Thus, their knowledge about sleep hygiene would not improve.

These findings suggest that a discussion of how important the behaviors are to sleep may be a key part of an intervention to improve sleep. This will help eliminate the possibility that we are just re-telling the students information that they already know and are helping increase their motivation to make changes.

Hypothesis Seven

Hypothesis Seven stated that highly reactant individuals would show significantly less improvements in sleep quality compared to individuals low in reactance in the treatment groups. The results of the MANCOVA did not confirm this hypothesis. It is possible that there was not a significant improvement in sleep quality because

participants may not have been experiencing enough threat to their freedom of choice for their reactance to be evoked. Participants were told that their participation was optional. Without a true threat to their freedom the reactance in individuals was likely not evoked. If this is true, this would have made the highly reactant individuals more likely to follow the instructions in the intervention because they did not feel that they needed to reclaim a freedom that was being threatened.

The STEPS and enhanced STEPS program also did not present the information in a way that is threatening. The program presents many different ways in which individuals can improve their sleep and the participants are then free to use the strategies that they believe will be the most beneficial to them and that they need to use. The program does not present the information in a way in which participants are told that they must use the techniques or that these techniques are the only way in which they will see improvements in their sleep.

The participants also may not arouse a high level of psychological reactance because the participants do not see the information as personally relevant. Brehm (1961) indicates that the more important the behavior being threatened is to the more psychological reactance that will be aroused. In addition, the participants in this study also may not have generalized the behaviors being discussed to other behaviors that they see as more important. Brehm and Brehm (1981) indicate that individuals may generalize the fear of losing a behavior to other similar behaviors. This intervention may not have generalized to other behaviors that the participants do consider important.

It is also possible that the make-up of the sample impacted the results. The current sample was significantly less reactant than the standardization sample for the TRS. The

sample might not have had a high enough level of psychological reactance to cause the participants to react to this intervention with psychological reactance. In addition, this sample was comprised predominantly of women. Research has suggested that women are less psychologically reactant than men. This may also impact the fact that the current sample is less psychologically reactant than the standardization sample and that psychologically reactance did not impact whether or not an individual benefited from the intervention.

These findings highlight how important it is for the information presented to individuals to be personally relevant. Personal relevance appears to greatly impact whether or not an individual is more likely to implement the changes that are suggested. It also appears to highlight the importance of the way that the message is framed to an individual. Without the presence of a threat to the loss of a choice of freedom psychological reactance is not likely to be evoked.

Hypothesis Eight

Hypothesis Eight stated that highly reactant individuals will show significantly less improvement in sleep length compared to individuals low in reactance in the treatment groups. The results of the ANCOVA did not support this hypothesis. In addition to the possibilities discussed in hypothesis seven it is possible that there was not a difference in sleep length for the different levels of reactance because the program was not effective. The two programs may not have been able to benefit any of the participants regardless of their level of reactance.

It is also possible that reactance may not have impacted how individuals respond to an intervention because they could have been impacted by others. Research has shown

that individuals can experience reactance if they perceive that a freedom is being taken away from another individual. Accordingly, reactant individuals may have had their reactance reduced because they could tell the individuals around them did not feel threatened. In addition, participants may have seen the changes as impossible to make. Reactant individuals may respond by not even attempting to make any changes if they see the changes as impossible to make. Thus, individuals may not have even attempted to make any of the changes because they saw them as impossible to make.

This highlights the importance of the way that a message is presented. The STEPS and enhanced STEPS program may benefit from building in some discussion regarding how the recommend changes may take some times and are difficult to make. This may decrease the chance that individuals will stop trying to implement the changes if they are ineffective after just a few days.

Hypothesis Nine

Hypothesis Nine stated that there would be a significant difference in sleep length between approach motivation and avoidance motivation in the treatment groups at time two. The results of the ANCOVA did not confirm this hypothesis. This hypothesis may not have been supported because the message in the STEPS program and enhanced STEPS program are not framed in gain or loss way. Research has shown that individuals with approach motivation respond better to a message when the message is focused on the benefits (gain frame) of making the recommended changes. Research has also shown that individuals with an avoidance motivation orientation respond better to a message frames in terms of how they can avoid negative consequences (loss frame). In light of

this, the STEPS and enhanced STEPS program may not motivate approach or avoidance oriented individuals to use the techniques that were taught in the interventions.

In addition, as discussed with respect to psychological reactance the program was not overall effective. It is possible that the two programs were unable to benefit participants regardless of whether they have an approach or avoidance motivation.

As with respect to psychological reactance, it is likely that the importance of the consequences greatly impact participants' response to an intervention. For example, individuals with an approach orientation presented with a gain frame message may still not be motivated to change their behavior if they do not consider what they will gain important. Individuals in the current study may not have changed their behavior because they did not consider the possible impact on their lives (physical, psychological, or academic) personally important.

These findings highlight the importance of the way in which the message is framed and how personally relevant the information is to participants. It is likely that to evoke a response based on motivational style the message must be presented in a loss or gain frame way. In addition, individuals must consider what they will lose or gain important in order to take action.

Hypothesis Ten

Hypothesis Ten stated that there would be a significant difference in sleep quality between approach motivation and avoidance motivation in the treatment groups at time two. The results of the MANCOVA did not confirm this hypothesis. In addition to the possibilities discussed with respect to hypothesis nine is it possible that approach individuals did not show a significant improvement in sleep quality because for them to

do that would cause them to avoid other behaviors, and needs, they consider important. Participants may have been responding based on their motivational style; the focus was just not the consequences of improving sleep quality. Their focus was increasing their social interactions and the amount of time that they can spend with friends. Therefore, they were moving toward something they considered important and decided not to implement the changes suggested in the interventions.

In addition, participants may have been motivated not to implement the changes recommended in order to avoid confrontation with their peers. For example, they may have worried that if they reduce their alcohol consumption that that they would be ridiculed by their friends. They may also have worried that if they went to bed earlier that they would miss something fun and not feel as if they are a part of the group. This tends to be particularly true on the weekends.

This highlights the importance of tailoring the intervention to the group to which you are presenting the information. The presenter must know what is important to the audience and be able to help them trouble shoot and address their major concerns.

Implications

This study has important implications for college administrators, instructors, and counselors. The fact that there was not a significant improvement in sleep hygiene practices highlights how difficult it is for college students to change their sleep patterns and lifestyles. This suggests the need for changes at the institution level in order to help college students improve their sleep. For example, colleges and universities should not allow intramural sports to start late at night. Universities should also consider having classes that end earlier in the evening. A class that meets twice a week from 5:30 p.m. to

7:30 p.m. may be more beneficial than a class that occurs once a week from 5:30 p.m. to 9:30 p.m. This will allow students to get home earlier, and take care of any responsibilities, and get to bed at a more reasonable hour. It may also prevent the students from staying up significantly later than normal one evening which could disrupt their sleep schedule for several nights. The high correlations between the SHAPS sleep hygiene practice scale and all measures of sleep quality also highlights the importance of universities putting practices in place that promote good sleep practices and allow students to get adequate sleep.

With respect to the STEPS and enhanced STEPS programs these findings suggest that the program may be more beneficial in different formats. It may be more beneficial to present the STEPS and enhanced STEPS programs in two or three shorter sessions rather than one session. It may also be possible that the program would be more effective if it had some problem-solving strategies built in to help college students address their specific difficulties in changing their external environment (e.g., noise of roommate).

These finding also highlight how difficult interventions to improve sleep are to implement in a group setting, and how the intervention must be individualized to person receiving the intervention. Many different factors may impact an individual's sleep length, and the specific reason that individual is experiencing sleep difficulties should be addressed.

The lack of change in sleep hygiene practices and awareness also highlights the necessity for mental health professionals to emphasize the importance of sleep hygiene practices. These results suggest that students may already be aware of good sleep practices, but do not place enough importance on sleep practices to change them. Thus, it

is going to be important for mental health professionals working with college students to emphasize the physical and psychological impact of poor sleep. It is also going to be important for mental health professionals to emphasize the possible impact that poor sleep can have on their academic performance.

The results also highlight the importance of the way that the intervention to improve sleep is presented. For example, there was no significant change in sleep quality or length for individuals lower in reactance. It is possible that if the message had been presented in a way that evoked reactance, such as telling the participants that they had to use the techniques learned if they wanted to improve their sleep, then a significant difference would have presented. Presenting the information in this way may have made reactant individuals less likely to use the techniques presented because they would have felt their freedom to choose was being taken away.

The fact that no significant difference in sleep quality or length presented with respect to approach/avoidant motivation also highlights the importance of message framing. The STEPS program and enhanced STEPS program are presented in an informative way and not in a loss or gain frame. This is less likely to evoke the motivational patterns of the participants. In order to get participants to truly want to change their sleep practices and improve their sleep pattern and sleep length it may be necessary to present the information in a gain frame or loss frame way.

Presenting the STEPS or enhanced STEPS program in a gain or loss frame way based on the individual's motivational style may help increase individual's motivation to implement the suggested changes. The programs may also benefit from building in motivational interviewing techniques. This may increase participants' motivation to

implement the techniques learned in the intervention. Another way that the program may increase participants' motivation is building in incentives to increase the motivation of participants and create an immediate benefit. In addition, the program may benefit from building in more techniques that focus specifically on improving sleep length. This may allow the programs to address a wider range of sleep difficulties.

Limitations and Suggestions for Future Research

This section addresses the limitations of the current study and suggestions for future research. There are several limitations to the current study. First, is the generalizability of the study due to the specificity of the sample. The current sample consisted of 151 undergraduate students ranging in age from 18 to 24. The sample is not representative of the general population because all of the participants are undergraduate students. Therefore, it is not clear if the results would generalize to individuals with a lower degree or higher degree of education. It is also not clear if the results are generalizable to individuals who are not currently students. The study participants are attending a Midwestern public university. This makes the generalizability of the results to students attending other types of higher education institutions (e.g., private) and higher education institutions outside the Midwestern United States questionable. In addition, the current results may not generalize to individuals living outside of the Midwest in general. The sample was predominantly female, which is not representative of the general population, and may not allow the results of the current study to generalize to the general population.

Second, participation was not limited to individuals experiencing sleep difficulties. In the current sample, only 17% had a score above eight on the SQI which is

the score used to classify an individual as experiencing a high degree of sleep difficulties. On the PSQI, only 60% of the current sample had a score above five which is the score used to classify an individual as a poor sleeper. The current sample may not have been able to benefit from an intervention to improve sleep as much as a sample of only individuals who are experiencing sleep difficulties.

Third, the current study was open to students in undergraduate psychology classes without attempting to ensure equal numbers of males and females. Research (Brown et al., 2001; Buboltz et al., 2001) has shown that females typically report more sleep difficulties than males. There were no significant differences with respect to indicators of sleep quality, sleep hygiene practices, or sleep hygiene awareness at the onset of the study, and the repeated measures design reduced the need for comparable groups, because degree of change was measured over time. It is possible that changes in sleep quality and length as well as changes in sleep hygiene awareness and practice could have been impacted by the sample being predominantly female.

Fourth, all data collected in the current study were self-reported. Thus, this study must assume that the participants' responses were truthful. Efforts were made to minimize the impact of using self-report data in this study. Participants returned their consent forms separately from the survey packet to ensure privacy and confidentiality of their responses. In addition, the cards with the participants name and participant number were kept by an individual who did not have access to the data. This ensured that the anonymity of the participants data. The Marlowe-Crowne Social Desirability Scale was also used to control for response socially desirable responding. Despite these efforts, participants may have over or under reported their responses.

Fifth, instrumentation is also a limitation of the current study. All of the data were self-report aggregated data. Thus, memory bias could have impacted the results. The SQI asks respondents to assess their sleep quality over the past three months and the PSQI asks participants to assess their sleep quality over the past month. It is very difficult for individuals to remember their sleep patterns over an extended period of time. It is also very difficult for individuals to accurately average their sleep quality over time.

Sixth, the outcome measure being limited to 5 weeks post-treatment. It is possible that larger changes in sleep quality take place over longer periods of time. Thus, the current study would not be able detect any changes in sleep quality or sleep length.

Seventh, the current study assess the effectiveness of the two interventions overall. This may cause the current study not to find specific components of the interventions that are effective. In addition, this may also cause the current study to miss specific aspects of sleep quality or sleep hygiene practice that were impacted by the interventions.

Eighth, the personality factors examined were limited to psychological reactance and motivational style. There are many personality factors that may impact whether or not an individual benefits from an intervention to improve sleep. The current study does not examine the vast majority of personality factors that impact individuals' response to an intervention to improve sleep.

Given these limitations, several suggestions for future research can be made. The current study should be expanded to include a sample more representative of the general population and include individuals of different educational level, socioeconomic status, geographic region, ethnicity, gender, and age. In addition, the study should be expanded

to include individuals who are not currently students. Expanding the study in this way will help increase the generalizability of study.

It is also important that the effectiveness of the STEPS program and enhanced STEPS program be examined with a sample limited to individuals experiencing sleep difficulties. This will help ensure that the intervention has a chance to be effective because the sample will be able to benefit from the intervention. Limiting the sample to individuals who are experiencing sleep difficulty will also help ensure that the individuals are motivated to make the changes that the interventions recommend.

The literature would benefit from examining the current hypotheses with a sample controlled for equal numbers of males and females. This would help ensure that the results are not accounted for by the fact the women generally experience a higher degree of sleep difficulties. It would also help ensure that the results cannot be accounted for by women's tendency to show a lower level of psychological reactance than men.

Future research should measure sleep quality and sleep length using objective measures, such as an Actiograph. The use of physiological measures of sleep quality eliminates human error and the chance of memory bias impacting the results. Physiological measures also eliminate the chance that individuals are not assessing their sleep quality over time correctly. The use of a sleep diary to assess sleep length versus a onetime report measure may also help assess sleep length more accurately.

In addition, future research may benefit from a post-treatment measure of changes in sleep quality and sleep length several months after treatment. This may be a better indicator of treatment efficacy. A post-treatment measure several months after treatment would also allow for the examination of more long term efficacy of the treatment. There

is also a need for a longitudinal investigation of the impact of sleep interventions and how personality factors impact the effectiveness of an intervention to improve sleep to further investigate the long and short term impacts.

Future research should examine a wider range of personality factors that could impact whether or not an individual benefits from an intervention. This will allow researchers to get a better picture of what impacts individuals' responses to an intervention.

APPENDIX A

HUMAN USE APPROVAL LETTER

LOUISIANA TECH
UNIVERSITY

OFFICE OF UNIVERSITY RESEARCH

MEMORANDUM

TO: Ms. Barbara Calvert and Dr. Walter Buboltz

FROM: Barbara Talbot, University Research

SUBJECT: Human Use Committee Review

DATE: May 2, 2012

RE: Approved Continuation of Study HUC 859

TITLE: **"The Effect of Psychological Reactance and Approach/Avoidance Motivation on Sleep Interventions"**

HUC 859

The above referenced study has been approved as of May 2, 2012 as a continuation of the original study that received approval on April 21, 2011. **This project will need to receive a continuation review by the IRB if the project, including collecting or analyzing data, continues beyond May 2, 2013.** Any discrepancies in procedure or changes that have been made including approved changes should be noted in the review application. Projects involving NIH funds require annual education training to be documented. For more information regarding this, contact the Office of University Research.

You are requested to maintain written records of your procedures, data collected, and subjects involved. These records will need to be available upon request during the conduct of the study and retained by the university for three years after the conclusion of the study. If changes occur in recruiting of subjects, informed consent process or in your research protocol, or if unanticipated problems should arise it is the Researchers responsibility to notify the Office of Research or IRB in writing. The project should be discontinued until modifications can be reviewed and approved.

If you have any questions, please contact Dr. Mary Livingston at 257-4315.

APPENDIX B

DEMOGRAPHIC FORM

PAR. NUM_____

DEMOGRAPHIC FORM

Please answer the following questions about yourself by filling in the blank or by placing a check in the appropriate box. If you need extra space to add information, feel free to use the back of this page. We will keep all information about our participants anonymous and confidential.

1. Age: _____ 2. Gender: _____

3. With which ethnic group do you most identify?
__ African American/Black (non-Hispanic)
__Asian/Asian American/Pacific Islander
__Biracial/Multiracial
__Caucasian/European American/White (non-Hispanic)
__Hispanic/Latino/Latina
__Middle Eastern/Arab
__Native American/American Indian/Alaska Native
__South Asian/Asian Indian
__Other:
Please specify: _____

4. Class Year: _____

5. What is the distance to the nearest metropolitan area (an area with a population greater than 100,000 usually including a city with a population greater than 50,000) from your home?

_____ miles

APPENDIX C

SLEEP QUALITY INDEX

Sleep Quality Index

Please answer the following questions to the best of your ability by circling the response that best fits you. If unsure, please give your best guess.

1. Time to fall asleep.

   <10 min 11-30 min >30 min

2. Suffered from insomnia during the past 3 months

   No < 3 days/week 3-7 days/week

3. Difficulties falling asleep during the past 3 months

   No < 3 days/week 3-7 days/week

4. Disturbed night sleep during the past 3 months

   No <3 days/week 3-7 days/week

5. Nocturnal awakenings during the past 3 months

   No <3 days/week 3-7 days/week

6. Tiredness in the morning

   Very or Mostly Alert Don't Know Very or Mostly Tired

7. Wake up too early in the morning during the past 3 months

   No <3 days/week 3-7 days/week

8. Use of sleeping medication during the past 3 months

   No Occasionally At least once per week

APPENDIX D

PITTSBURGH SLEEP QUALITY INDEX

Pittsburgh Sleep Quality Index

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

1. During the past month, when have you usually gone to bed at night?....._____
2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?..___
3. During the past month, when do you usually awake in the morning?..... _____
4. During the past month, how many hours of actual sleep did you get at night?..... _____

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

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

(a) Cannot get to sleep within 30 minutes.
Not during the past month_____
Less than once a week_____
Once or twice a week_____
Three or more times a week_____

(b) Wake up in the middle of the night or early morning.
Not during the past month_____
Less than once a week_____
Once or twice a week_____
Three or more times a week_____

(c) Have to get up to use the bathroom.
Not during the past month_____
Less than once a week_____

(d) Cannot breathe comfortably.
Not during the past month_____
Less than once a week_____
Once or twice a week_____
Three or more times a week_____

(e) Cough or snore loudly.
Not during the past month_____
Less than once a week_____
Once or twice a week_____
Three or more times a week_____

(f) Feel too cold.
Not during the past month_____
Less than once a week_____
Once or twice a week_____
Three or more times a week_____

(g) Feel too hot.
Not during the past month_____
Less than once a week_____
Once or twice a week_____
Three or more times a week_____

(h) Had bad dreams.
Not during the past month_____
Less than once a week_____
Once or twice a week_____
Three or more times a week_____

(i) Have pain.
Not during the past month_____
Less than once a week_____
Once or twice a week_____
Three or more times a week___
Once or twice a week _____
Three or more times a week ____

(j) Other reasons for sleep difficulties, please describe
_____
Not during the past month_____
Less than once a week_____
Once or twice a week_____
Three or more times a week_____

6. During the past month, how would you rate your sleep quality overall?
Very Good _____
Fairly Good _____
Fairly Bad _____
Very Bad _____

7. During the last month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?
Not during the past month_____
Less than once a week_____
Once or twice a week_____
Three or more times a week_____

8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activities?
Not during the past month_____
Less than once a week_____
Once or twice a week_____
Three or more times a week_____

9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?
Not during the past month ___
Less than once a week ____
Once or twice a week ____
Three or more times a week ____

APPENDIX E

MARLOWE-CROWNE SOCIAL DESIRABILITY

SCALE SHORT FORM C

Read each of the following items and decide whether the statement is *true* or *false* as it pertains to you personally and mark T or F in the blank beside the statement to indicate this.

_____ 1. I sometimes feel resentful when I don't get my way.

_____ 2. On a few occasions, I have given up doing something because I thought too little of my ability.

_____ 3. There have been times when I felt like rebelling against people in authority even thought I knew they were right.

_____ 4. No matter who I'm talking to, I'm always a good listener.

_____ 5. I can remember "playing sick" to get out of something.

_____ 6. There have been occasions when I took advantage of someone.

_____ 7. I'm always willing to admit it when I make a mistake.

_____ 8. I sometimes try to get even, rather than forgive and forget.

_____ 9. I am always courteous, even to people who are disagreeable.

_____ 10. I have never been irked when people expressed ideas very different from my own.

_____ 11. There have been times when I was quite jealous of the good fortunes of others.

_____ 12. I am sometimes irritated by people who ask favors of me.

_____ 13. I have never deliberately said something that hurt someone's feelings.

APPENDIX F

THERAPEUTIC REACTANCE SCALE

Therapeutic Reactance Scale

Instructions: Please answer each item by circling the appropriate letter for each question. Use the following categories to record your answer:

A= Strongly Disagree B= Disagree C= Agree D= Strongly Agree

1. If I receive a lukewarm dish at a restaurant, I make an attempt to let that be known.	A	B	C	D
2. I resent authority figures who try to tell me what to do.	A	B	C	D
3. I find that I have to often question authority.	A	B	C	D
4. I enjoy seeing someone else to something neither of us are supposed to do.	A	B	C	D
5. I have a strong desire to maintain my personal freedom.	A	B	C	D
6. I enjoy playing "Devil's Advocate" whenever I can.	A	B	C	D
7. In discussions I am easily persuaded by others.	A	B	C	D
8. Nothing turns me on as much as a good argument!	A	B	C	D
9. It would be better to have more freedom to do what I want in a job.	A	B	C	D
10. If I am told what to do, I often do the opposite.	A	B	C	D
11. I am sometimes afraid to disagree with others.	A	B	C	D
12. It really bothers me when police officers tell people what to do.	A	B	C	D
13. It does not upset me to change my plans because someone in the group wants to do something else.	A	B	C	D
14. I don't mind other people telling me what to do.	A	B	C	D
15. I enjoy debates with other people.	A	B	C	D
16. If someone asks a favor of me, I will think twice about what this person is really after.	A	B	C	D

17. I am not very tolerant of others' attempts to persuade me.	A	B	C	D
18. I often follow the suggestions of others.	A	B	C	D
19. I am relatively opinionated.	A	B	C	D
20. It is important to me to be in a powerful position relative to others.	A	B	C	D
21. I am very open to solutions to my problems from others.	A	B	C	D
22. I enjoy "showing up" people who think they are right.	A	B	C	D
23. I consider myself more competitive than cooperative.	A	B	C	D
24. I don't mind doing something for someone even when I don't know why I'm doing it.	A	B	C	D
25. I usually go along with others' advice.	A	B	C	D
26. I feel it is better to stand up for what I believe than to be silent.	A	B	C	D
27. I am very stubborn and set in my ways.	A	B	C	D
28. It is important to me to get along well with the people I work with.	A	B	C	D

APPENDIX G

BEHAVIORAL INHIBITION SCALE/

BEHAVIORAL APPROACH

SCALE

For each item, indicate how much you agree or disagree with what the item says. Choose only one response to each statement. Please be as accurate and honest as you can be. Respond to each item as if it were the only item. That is, don't worry about being "consistent" in your responses. Choose from the following four response options:

	Very true for me	Somewhat true for me	Somewhat false for me	Very false for me
1. A person's family is the most important thing in life.	1	2	3	4
2. Even if something bad is about to happen to me, I rarely experience fear or nervousness.	1	2	3	4
3. I go out of my way to get things I want.	1	2	3	4
4. When I'm doing well at something I love to keep at it.	1	2	3	4
6. I'm always willing to try something new if I think it will be fun.	1	2	3	4
6. How I dress is important to me.	1	2	3	4
7. When I get something I want, I feel excited and energized.	1	2	3	4
8. Criticism or scolding hurts me quite a bit.	1	2	3	4
9. When I want something I usually go all-out to get it.	1	2	3	4
10. I will often do things for no other reason than that they might be fun.	1	2	3	4
11. It's hard for me to find the time to do things such as get a haircut.	1	2	3	4
12. If I see a chance to get something I want I move on it right away.	1	2	3	4
13. I feel pretty worried or upset when I think or know somebody is angry at me.	1	2	3	4

14. When I see an opportunity for something I like I get excited right away.	1	2	3	4
15. I often act on the spur of the moment.	1	2	3	4
16. If I think something unpleasant is going to happen I usually get pretty "worked up."	1	2	3	4
17. I often wonder why people act the way they do.	1	2	3	4
18. When good things happen to me, it affects me strongly.	1	2	3	4
19. I feel worried when I think I have done poorly at something important.	1	2	3	4
20. I crave excitement and new sensations.	1	2	3	4
21. When I go after something I use a "no holds barred" approach.	1	2	3	4
22. I have very few fears compared to my friends	1	2	3	4
23. It would excite me to win a contest.	1	2	3	4
24. I worry about making mistakes.	1	2	3	4

APPENDIX H

SLEEP HYGIENE AWARENESS AND PRACTICE SCALE

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

Beneficial to sleep			No effect	Disruptive to sleep		
1	2	3	4	5	6	7
very	moderately	mildly		mildly	moderately	very

What effect does each of these behaviors have upon sleep?

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

Sleep Hygiene Practice

For each of the following behaviors please state the number of days per week (0-7) that you engage in the activity or have that experience. Base you answers on what you would consider an average week for yourself.

Indicate the number of days or nights in an average week you:

1. Take a nap ____
2. Go to bed hungry ____
3. Go to bed thirsty ____
4. Smoke more than one pack of cigarettes ____
5. Use sleeping medications (prescriptions or over-the counter) _____
6. Drink beverages containing caffeine (e.g., coffee, tea, colas) within 4 hours of bedtime ____
7. Drink more than three ounces of alcohol (e.g., 3 mixed drinks, 3 beers, or 3 glasses of wine) within 2 hours of bedtime ____
8. Take medications/drugs with caffeine within 4 hours of bedtime ____
9. Worry as you prepare for bed about your ability to sleep at night ____
10. Worry during the day about your ability to sleep at night ____
11. Use alcohol to facilitate sleep ____
12. Exercise strenuously with 2 hours of bedtime ____
13. Have your sleep disturbed by light ____
14. Have your sleep disturbed by noise ____
15. Have your sleep disturbed by your partner ____ (put NA if no partner)
16. Sleep approximately the same length of time each night ____
17. Set aside time to relax before bedtime ____
18. Exercise in the afternoon or early evening ____
19. Have a comfortable nighttime temperature in your bed/bedroom ____

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