Summer 2007

Evaluation of a sleep hygiene program to improve inmate sleep quality

Jennifer F. Hodges-Crowder
Louisiana Tech University

EVALUATION OF A SLEEP HYGIENE PROGRAM TO IMPROVE INMATE SLEEP QUALITY

by

Jennifer F. Hodges-Crowder, M.A., LAC

A Dissertation Presented in Partial Fulfillment
of the Requirements for the Degree
Doctor of Philosophy

COLLEGE OF EDUCATION
LOUISIANA TECH UNIVERSITY

August 2007

LOUISIANA TECH UNIVERSITY

THE GRADUATE SCHOOL

May 3, 2007
Date

We hereby recommend that the dissertation prepared under our supervision by Jennifer F. Hodges-Crowder

entitled Evaluation of a Sleep Hygiene Program to Improve Inmate Sleep Quality

be accepted in partial fulfillment of the requirements for the Degree of Doctor of Philosophy

Supervisor of Dissertation Research

Head of Department
Psychology and Behavioral Sciences
Department

Recommendation concurred in:

Advisory Committee

Approved:
Director of Graduate Studies

Approved:
Dean of the Graduate School

Dean of the College

GS Form 13
(5/03)

ABSTRACT

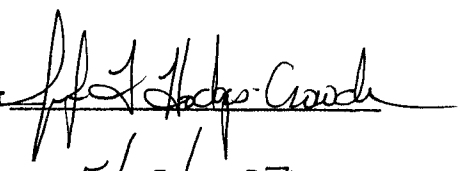
Research investigating the effectiveness of treatments for inmates with poor sleep quality appears minimal. Some difficulties related to poor sleep quality can be addressed effectively with little time and expense. Studies show that psychoeducational interventions are effective in reducing sleep complaints and improving sleep quality in a variety of populations including college students and adults. However, the effect of sleep hygiene interventions on inmate sleep complaints is unknown. Thus, the purpose of this study was to evaluate a psychoeducational intervention program aimed at improving prison inmate sleep habits, length, and quality.

Participants of this study were inmates at a department of corrections facility for men in the southern United States. Using the Sleep Quality Index, the Sleep Habits Questionnaire; the Pittsburgh Sleep Quality Index, and the Sleep Hygiene Awareness and Practice Scale the effectiveness of a psychoeducational intervention program aimed at improving sleep quality, length, and habits for inmates was evaluated using multivariate analysis of variance. Results revealed that the intervention program did not have a significant impact on sleep quality, length, or habits for study participants. However, inmates in this sample had a higher rate of sleep disturbances and poor sleep quality than reported in previous studies with adults and college student populations. This finding suggests a need for effective sleep hygiene interventions in the prison environment.

APPROVAL FOR SCHOLARLY DISSEMINATION

The author grants to the Prescott Memorial Library of Louisiana Tech University the right to reproduce, by appropriate methods, upon request, any or all portions of this Dissertation. It is understood that "proper request" consists of the agreement, on the part of the requesting party, that said reproduction is for his personal use and that subsequent reproduction will not occur without written approval of the author of this Dissertation. Further, any portions of the Dissertation used in books, papers, and other works must be appropriately referenced to this Dissertation.

Finally, the author of this Dissertation reserves the right to publish freely, in the literature, at any time, any or all portions of this Dissertation.

Author 

Date 5/03/2007

GS Form 14
(5/03)

DEDICATION

To my loving husband, Brian, and my precious brother, G III, who have always allowed me to be myself. You have taught me to love unconditionally, recognize my strengths, let go of my mistakes, succeed without losing myself, and enjoy life on a level I never knew existed. My dreams are possible because of you. I look forward to many years of sun, sand, and (warm) ocean with both of you.

TABLE OF CONTENTS

LIST OF TABLES

ACKNOWLEDGMENTS

I would like to thank my dissertation committee members, Dr. Walt Buboltz, Dr. Barlow Soper, and Dr. Jeff Walczyk for their assistance in guiding me through this work from beginning to end. I especially thank Dr. Buboltz and Dr. Soper for always helping me see the truth. My deep appreciation goes to Dr. Susan Tucker for her expertise, patience, and listening skills. A special thanks also, to Dr. Tom Staats for his encouragement and never ending patience with my ever changing schedule.

I am also deeply grateful to my family for their support throughout my ups and downs in graduate school. My loving husband, Brian, who always believed in and encouraged me no matter who or what I faced. My partner in chaos, Melani, who helped me understand that attitude and intelligence always wins. My brother, G III, who assisted me in learning how to work and play without loosing my mind. My sisters, Megan and Samantha, who reminded me about optimism and how I ended up here in the first place. My parents, as always, believed failure in school was not my option and never doubted I would succeed. The rest of my extensive family (especially Ma, Margie, Papa Ford and Tommie Jo), have also been tremendously tolerant of my hectic schedules, absences from activities, and high stress levels and I am eternally grateful. Finally, my precious step-son Jay has been understanding beyond his years and helped remind me what is most important in life: curiosity, following directions, play, hugs, and popcorn.

CHAPTER 1

The United States maintains the world's largest prison population (Prison Policy, 2005). There has been a record three decade rise in incarceration rates with the number of prisoners in America's correctional system at over two million individuals in 2005 (Bureau of Justice Statistics, 2005). In 2004, federal, state, and local governments spent an estimated 90 billion dollars on correctional costs including housing, nutrition, medical, psychiatric, educational, vocational, and rehabilitative programs (Bureau of Justice Statistics, 2005). Many government funded campaigns to educate the American public are also provided to inmates (S. Tucker, personal communication, November 2, 2006). Moreover, health education disseminated in or available to mainstream society is now available to the incarcerated. However, educational information about the negative effects of sleep difficulties on daytime functioning readily available to the American public appears absent in the prison population (Elger, 2004; M. Dauzart, personal communication, October 31, 2006; S. Tucker, personal communication, November 2, 2006). Little information about the impact of poor sleep quality, quantity, or habits is available to inmates (M. Dauzart, personal communication, October 31, 2006; S. Tucker, personal communication, November 2, 2006).

The first government sponsored research on sleep difficulties conducted by the National Commission on Sleep Disorders Research (1993) found that millions of

Americans are affected by sleep difficulties and that sleep disorders affect all age groups. This research also noted a strong association between sleep disturbances and mental health problems and substance abuse disorders. In the prison population, there is a higher prevalence of substance related disorders and mental health issues than in the general population (Bureau of Justice Statistics, 2005). It is possible that inmates suffering from these disorders are negatively impacted by sleep difficulties, as well. However, little research has explored sleep habits and sleep quality in correctional settings (Elger, 2004).

The National Sleep Foundation (2005) poll found that three-quarters of American adults report at least one symptom of a sleep problem. Millions of people sleep poorly, ignore sleep problems, and suffer consequences in relationships, performance at work, memory abilities, and many other facets of life (Carskadon & Taylor, 2000). Sleep problems such as snoring are also disruptive not only to the individual doing it, but to their sleep partners, as well. Research shows that three-quarters of people who sleep with a partner reported disturbed sleep due to partner snoring (National Sleep Foundation, 2005). According to a state Department of Corrections assistant warden, Michelle Dauzart, and a director of prison mental health services, Dr. Susan Tucker, inmates are housed in dormitory settings or tiers with open sleeping quarters that increase sound travel (M. Dauzart, personal communication, October 31, 2006; S. Tucker, personal communication, November 2, 2006). A multitude of environmental factors such as lighting, shift work schedule differences, guard activity, and sound travel, in the prison settings may contribute to inmate sleep disturbances.

Individuals can experience poor sleep quality even if they are sleeping the recommended 7 to 8 hours per night (Rothenberg, 2000; Taub & Berger, 1978). While

many correctional facilities have mandatory sleep schedules, inmates may not achieve good quality sleep during this time. In maintaining normal daytime functioning, quality of sleep, rather than quantity of sleep, appears to be more important (Dement & Vaughan, 2000). Poor sleep quality can result from many factors including disruptions in the sleep cycle, medications and their interactions, caffeine consumption, and nicotine use (Hauri, 1993; Tiffin, Ashton, Marsh, & Kamali, 1995).

Poor sleep quality also can result from irregular sleep schedules (Walsh & Lindblom, 2000). Some believe that missed sleep can be recovered at a later time; however, this appears to be a misconception (Taub, 1978; Wolfson & Carskadon, 1998). Lost sleep during the week cannot be recovered by sleeping longer on weekends (Taub, 1978). Individuals with chronic irregular sleep cycles have continually low levels of energy, emotional distress, reduced alertness, and slower reaction times. This may be a problem in correctional settings given the trend of allowing later bedtimes and napping on weekends (A. Batson, personal communication, February 1, 2007; M. Dauzart, personal communication, October 31, 2006). Limited research indicates that juvenile inmates have poorer sleeping habits and irregular sleep schedules during their incarceration (Ireland & Culpin, 2006).

Although American prisons are designed to be punitive, there is an increasing movement towards rehabilitative efforts in the penal system to decrease the likelihood of repeat offenses. With increased understanding of the problems prison inmates face before and after incarceration, many federal and state administrators are focusing on program development to meet the needs of prisoners (M. Dauzart, personal communication, October 31, 2006; S. Tucker, personal communication, November 2,

2006). Programs have been created in hopes of decreasing recidivism rates when inmates are released, as well as reducing potential problems for individuals during incarceration (Szykula & Jackson, 2005). As a result of these efforts many education programs are now available to inmates, including but not limited to, substance abuse prevention, parenting skills, anger management, healthy lifestyle choices, vocational training, and disease transmission prevention (M. Dauzart, personal communication, October 31, 2006; S. Tucker, personal communication, November 2, 2006). Additionally, addressing chronic mental illness in the inmate population is now federally mandated for the United States correctional system (New Freedom Commission on Mental Health, 2003).

Inmate surveys show that the problems within the prison population reflect concerns of American society in general (Bureau of Justice Statistics, 2004; Human Rights Watch, 2006; Prison Policy, 2005). However, there is minimal research investigating the effectiveness of treatments for inmates with poor sleep quality (Elgers, 2003; Elgers, 2004; Ireland & Culpin, 2006; Lutz, 1990). A large number of prisoners struggle with substance-related disorders, adjustment issues, situational depression, racial problems, medical illness, relationship distress, chronic mental illness (e.g.: Schizophrenia, Major Depressive Disorder, Bipolar Disorder, etc.), and educational needs (Alliance for Education, 2006; Bureau of Justice Statistics, 2004; McNiel, Binder, & Robinson, 2005; Prison Policy, 2005). It is evident that the social problems in mainstream society are present within the correctional system. These issues may be even more problematic for inmates due to the possible exacerbating effect of prison environmental restrictions.

As the correctional system begins to address more social problems, it is important to transfer educational information from mainstream society to the incarcerated. Many societal issues are now considered important to address in correctional settings such as substance abuse prevention, healthy lifestyle choices, reducing recidivism, and the high financial burden of caring for inmates (S. Tucker, personal communication, November 2, 2006). Yet, not all American educational campaigns are provided to the incarcerated. One not addressed is information on the importance of sleep hygiene and quality. It is clear, however, that public information as to the importance of sleep habits and treating sleep difficulties has increased (National Center on Sleep Disorders Research, 2006; National Sleep Foundation; 2005).

Sleep disturbances and irregular sleep habits appear to have a far reaching negative impact on society. The National Sleep Foundation (2005) urges the public and health care providers to pay more attention to sleep issues. Because a large segment of American society is experiencing sleep disturbances on a regular basis, every facet of life may be affected.

Some sleep related problems can be addressed effectively with minimal time and expense (Dement & Vaughan, 2000). Many individuals do not realize that poor sleep quality and habits may contribute to their problems, and this lack of knowledge may contribute to poor sleep habits (Brown, 2002; Buboltz, Brown, & Soper, 2001; Dement & Vaughan, 2000; Ireland & Culpin, 2006). Research suggests that poor sleep quality is related to a lack of knowledge about healthy sleep habits (Hicks, Lucero-Gorman, & Bautista, 1999; National Sleep Foundation, 2005). Research also demonstrates that teaching individuals proper sleep hygiene (activities that can improve or interfere with

sleep) is effective in reducing sleep complaints (Brown, 2002; Harvey, 2000; Morin, Culbert, & Schwartz, 1994; Morin & Wootin, 1996; Riedel, 2000).

Inmates consistently express concerns about sleep problems and an overall lack of sleep (Elger, 2003; Elger, 2004; Kjelsberg & Hartvig, 2005; Ireland & Culpin, 2006; Lindberg et al., 2003; M. Dauzart, personal communication, October 31, 2006; S. Tucker, personal communication, November 2, 2006; T. Albritten, personal communication, December 5, 2006), though specific numbers could not be found. An example would be juvenile offenders reporting sleeping less after incarceration (Ireland & Culpin, 2006). However, efforts to address sleep problems within prison populations are lacking in the literature. Research shows that teaching individuals proper sleep hygiene is effective in reducing sleep complaints and improving sleep quality in a variety of populations. Thus, it may be worthwhile to implement psychoeducational interventions for the incarcerated (Bootzin & Perlis, 1992; Friedman, Bliwise, Yesavage, & Salom, 1991; Ireland & Culpin, 2006; Morin et al., 1994; S. Tucker, personal communication, November 2, 2006). Thus, the purposes of this study are to a) evaluate a psychoeducational intervention program aimed at improving sleep habits and quality in prison inmates, b) evaluate the impact of the program on inmate knowledge about the importance of sleep hygiene, c) examine the extent to which inmate sleep quality, length, and habits change after participating in the program, and (d) evaluate how sleep hygiene education compares to relaxation education and a control group in improving inmate sleep quality and sleep hygiene.

Statement of the Problem

The expanding American prison system and the changing needs of the inmate population are continually evaluated (Bureau of Justice Statistics, 2005; Prison Policy, 2005). Research suggests that problems faced by prisoners are some of the same issues faced in American society at large; examples would include mental health issues, medical problems, family distress, sleep complaints, and education deficits (Alliance for Education, 2006; Bureau of Justice Statistics, 2005; Prison Policy, 2005). As a result, the traditionally punitive American correctional system is moving towards more rehabilitative efforts to address prisoner needs during incarceration in an attempt to reduce recidivism and assist inmates in becoming more productive members of society (Mauer, 2003). Rehabilitation efforts include providing educational opportunities, mental health services, prevention programs, and wellness education (M. Dauzart, personal communication, October 31, 2006). Even though progress has been made in assisting prisoners with frequent and significant complaints, some national education efforts seen in American society are not addressed within the prison setting.

One problem commonly impacting American society and inmates that is not addressed in correctional settings is sleep difficulties. Prisoners experience sleep complaints; however, these problems are not frequently addressed with the incarcerated (Elger, 2003; Elger, 2004; Ireland & Culpin, 2006). The general population in America experiences sleep problems and complaints at an alarming rate (National Sleep Foundation, 2005), and there is no reason to think they would be less for those incarcerated. Sleep difficulties have been linked to higher rates of mental health complaints, lower life satisfaction ratings, poor productivity, loneliness, cognitive

deficits, and physical health maladies in the general population (Everson, 2000; Pressman, Gollomp, Benz, & Peterson, 2000; Ware & Morin, 2000). Sleep problems and difficulties are linked to commonly diagnosed health problems, depression, anxiety, stress, substance use, and learning (Benca, Obermeyer, Thisted, Gillin, 1992; Caldwell, 2003; National Sleep Foundation, 2002; Soldatos & Paparrigopoulos, 2005). Because inmates experience many of the problems seen in society, it is possible they are experiencing similar sleep related problems. Poor sleep quality may be a bigger problem for the incarcerated due to the potentially exacerbating effects of the restrictive prison environment.

Poor sleep quality and inconsistent sleep habits can have far reaching effects on emotional health (Brown, Soper, & Buboltz, 2001). Poor sleep quality is associated with increased depression, anxiety, tension, increased sensitivity, impulsiveness, excitability, and learning impairments (Pilcher et al., 1997; Sicard, Jouve, & Biln, 2001). While many correctional facilities have set daily schedules including sleep times, inmates often are allowed to sleep during the day or go to bed later on the weekends (A. Batson, personal communication, February 1, 2007; M. Dauzart, personal communication, October 31, 2006). There is also potential for more sleep difficulties because inmates share sleeping quarters and may disrupt each others sleep. It is possible that inmates are experiencing negative consequences of irregular sleep habits and poor sleep quality as a result.

Attempts have been made to better educate the American public about the negative impact of sleep difficulties. However, there appears to be little evidence in the research literature that similar efforts are directed to inmates. It is clear that even minimal amounts of education on proper sleep habits and sleep schedules can

significantly reduce sleep complaints and improve sleep quality in adult populations (Harvey, 2000; Bootzin & Epstein, 2000; Bootzin & Nicassio, 1991; Brown, 2002). There are many people in American society who lack knowledge about behaviors that promote or inhibit sleep (Hicks et al., 1999). It can be assumed that there are prison inmates who also lack this knowledge. Despite inmate sleep complaints and the empirical support for educational interventions to reduce sleep difficulties in other populations, sleep education interventions apparently have not been tested with inmates. Educational interventions effective in reducing inmate sleep complaints by improving sleep quality, quantity, and/or habits may also assist in reducing associated problems.

Justification

The prison population is a growing concern in American society (Alliance for Education, 2006; Bureau of Justice Statistics, 2005; M. Dauzart, personal communication, October 31, 2006). Rehabilitative efforts to address problems faced by prison inmates in hopes of reducing recidivism rates are increasing (S. Tucker, personal communication, November 2, 2006). Educational programs in correctional settings often mirror American public education campaigns due to the common problems seen inside and outside of prisons. While progress has been made in addressing societal concerns such as substance abuse, family discord, health problems, chronic mental illness, and psychological distress, there are still other areas that are not addressed with the inmate population (M. Dauzart, personal communication, October 31, 2006). One such issue involves the negative impact of sleep difficulties, which is gaining public attention.

A significant portion of the American public suffers from poor sleep quality and sleep difficulties. Millions of Americans are affected by sleep problems which have a

very high cost to society in dollars, lives and human suffering (National Sleep Foundation, 2005; Carskadon & Taylor, 2000). Sleep complaints are also not uncommon in the prison population (Elger, 2003; Elger, 2004; S. Tucker, personal communication, November 2, 2006). Studies show that poor sleep quality is associated with industrial and other accidents, mood disorders, educational difficulties, and stress (National Sleep Foundation, 2005). However, poor sleep quality and sleep difficulties in inmates have not been given the same attention.

The inmate population is aging with associated medical problems and has a larger percentage of mental health problems than the general population (Bureau of Justice Statistics, 2005; Prison Policy, 2005). It is clear that medical problems, mental health issues, learning difficulties, and behavioral problems are correlated with poor sleep quality in adults, children, and college students (Rothenberg, 2000). It is likely that these difficulties also are related to poor sleep quality and sleep difficulties within the prison population. If poor sleep quality is related to these problems in the inmate population, then providing effective treatment to improve inmate sleep quality may assist in reducing related problems. Additionally, irregular sleep schedules and shift work, known to be associated with sleep difficulties in the general population, often are seen in correctional institutes and may be contributing to inmate sleep difficulties (M. Dauzart, personal communication, October 31, 2006; Carskadon & Taylor, 2000).

Research shows that psychoeducational interventions can help individuals improve sleep habits, sleep quantity, and sleep quality, thereby reducing sleep complaints (Bootzin & Perlis, 1992; Brown, 2002; Friedman, Bliwise, Yesavage, & Salom, 1991; Morin & Wooten, 1996). Because large segments of American society experience sleep

disturbances on a regular basis, scientists and health professionals must consider the probability that many individuals in the prison system also experience similar sleep difficulties. While the impact of these disturbances has yet to be investigated, reducing the number of sleep complaints in the prison population may be associated with reductions in other health related and poor daytime functioning problems. Psychoeducational interventions effective in reducing sleep complaints may be beneficial to inmates not only to improve sleep quality and sleep habits but to reduce health and behavioral concerns that have been correlated with poor sleep quality. Effective educational programs to improve inmate sleep quality may contribute to the American penal system rehabilitation efforts by assisting inmates in becoming more productive as a result of better sleep quality, quantity, and habits. Thus, the purpose of this study is to evaluate the effectiveness of a psychoeducational intervention program aimed at improving sleep quality, length, and habits for prison inmates.

Literature Review

Theories of Sleep

There is no question that sleep is a necessary function in sustaining life (Rechtschaffen, Bergmann, Everson, Kushida, & Gilliland, 1989). Laboratory animals die when deprived of sleep, and presumably so would human beings (Hirshkowitz, Moore, & Minhoto, 2000). The American Cancer Society survey of 1960 included one million Americans and was one of the first national questionnaires evaluating American sleep habits (Carskadon & Taylor, 2000). Results indicated increased mortality rates for individuals who sleep significantly more or less than the normal 8 hours per night. For example, women who slept 6 hours per night had a 1.5% higher death rate than women

who slept 8 hours. Men who slept less than 4 hours per night had a death rate 2.8 times higher than those who slept 8 hours.

This early study by the American Cancer Society was criticized because some fatal diseases produce sleep disorders such as insomnia (Carskadon & Taylor, 2000). A later study by Wingard and Berkman (1983) in which results were adjusted for age and comorbidity found similar results to the American Cancer Society survey. Wingard and Berkman (1983) found that persons sleeping 6 hours or less or 9 hours or more per night had a 30% higher death rate than those getting a normal amount of sleep.

The function of sleep has long been debated and has been a topic of interest for hundreds of years (Hirshkowitz, Moore, & Minhoto, 2000). The debate over the purpose of sleep is still ongoing and has spawned several theories. Each theory attempts to explain the function of sleep from observations and research findings. However, no single model has satisfactorily explained the combined data. The reasons for this lack of an all encompassing theory may be a result of the relative infancy of modern sleep research. Additionally, like many other behavioral, cognitive, and emotional activities, sleep is difficult to evaluate scientifically. With the advent of modern technology, scientists have proposed some reasons for sleep but still struggle with a comprehensive theory. However, several prominent theories do exist and provide some insight into the purpose of sleep.

Throughout history, sleep has been associated with death and the supernatural, such as in Greek mythology (Hobson, 1995). The Greek god of sleep was the twin brother of the god of death, and both were believed to be the offspring of the night. Subsequently, sleep was viewed as a short death, and death was seen as the long sleep.

European physicians referred to sleep as the intermediate state between wakefulness and death as recently as 200 years ago (MacNish, 1834). With the understanding that dreams occur during sleep, many cultures viewed dreams as supernatural messages from beyond this world (Hobson, 1995). Later, dream interpretation became an area of study in hopes of learning about individuals and how to correct maladaptive behaviors (Thorpy, 1991).

Sigmund Freud (1900) offered one of the most influential views of dream interpretation in his classic work, *Interpretation of Dreams*. He proposed that dreams are a release of sexual and aggressive energy that arise from the unconscious. The true scientific study of sleep began in 1928 by Hans Berger, who used an electroencephalograph (EEG) to record electrical activity of the brain during sleep (Hobson, 1995). As sleep research progressed, investigators began using electrooculographs (EOG) to measure eye movements and electromyographs (EMG) to measure muscle tension in various parts of the body during sleep. Modern sleep research evolved into the measurement of oxygen levels, cardiac rhythms, and muscle activity to identify and differentiate maladaptive sleep patterns as well (Hirshkowitz et al., 1992).

All of these physiological measures are used in polysomnography, a standard sleep brain wave recording, and contribute to the understanding of sleep (Hirshkowitz, et al., 1992). As scientist began using physiological measures during sleep, they realized that non-dream sleep is a very active process just as dream sleep (Hobson, 1995). This resulted in the abandonment and modification of many prior sleep theories. New theories have evolved as well, and most current theories of non-dream sleep fit into two main schools of thought, restoration models and evolutionary theories.

Restoration models of sleep propose that the primary function of sleep is to rest or regenerate the body (Hobson, 1995; Hirshkowitz et al., 1992). However, if this were true individuals who use more energy during the day would sleep more than sedentary individuals (Horne, 1988). Research has shown that increases in exercise do not significantly impact the required amount of sleep for an individual. Sleep, however, does have some restorative properties (Hirshkowitz et al., 1992). The metabolic rate decreases by approximately 9% during sleep (Reich, Geyer, & Karnovsky, 1972). Tissue synthesis, cell division, and hormone release occur during the slow wave stages of sleep (Adams & Oswald, 1977; Dunleavy, Oswald, Brown, & Strong, 1974). Also, neurotoxins are neutralized (Adams & Oswald, 1977; Hartman, 1973).

The neurotransmitter replenishment theory of sleep proposes that sleep allows aminergic neurons to rest and to replenish supplies of neurotransmitters (Hobson, 1995). While most neural activity decreases during sleep, aminergic neurons cease all activity during rapid eye movement sleep. These neurons release norepinepherine and serotonin during active times and are believed to be involved in learning and memory (Hobson, 1995; Siegel & Rogawski, 1988). It is hypothesized that during REM sleep aminergic neurons generate and reserve neurotransmitters needed to assist in cognitive activities during the next wakeful cycle (Hobson, 1995).

Developmental theories of sleep propose that one of the primary functions of sleep is to facilitate in brain and nervous system development (Carlson, 2004; Hobson, 1995). The function of rapid eye movement (REM) sleep is a focus of most developmental theories because of the increased time devoted to this stage of sleep in utero and in infancy (Hobson, 1995). In the first few weeks of life, infants spend up to

80% of their sleep time in REM, which is more than three times that of adults. Developmental theorists propose that the increased amount of time spent in REM corresponds to the most active period of brain development because neural pathways are strengthened during sleep. Roffwarg and his colleagues (1966) found support for this theory by determining that REM sleep is greatest at birth across various animal species and consistently levels off by adulthood (Roffwarg, Muzio, & Dement, 1966). While developmental theories successfully outline the relationship between sleep and brain development, they fail to explain the function of REM sleep in adults (Hobson, 1995).

Learning theories of sleep suggest the primary function of sleep is to facilitate memory reinforcement and consolidation (Carlson, 2004). Research shows that learning does not occur during sleep (Wood, Bootzin, Kihlstrom, & Schacter, 1992), but lack of sleep does appear to interfere with daytime learning (Hobson, 1995). Animal studies show that REM sleep may play a role in learning (Smith, 1996). Animals that were selectively deprived of this stage of sleep learned tasks more slowly. Likewise, new neural pathways formed during learning appear to be active during REM sleep and may account for the difficulties humans experience in learning when deprived of REM sleep (Hobson, 1995).

Antrobus (1986) suggested that the brain is aroused during the REM stage of sleep and may process information stored in memory. Because there is no environmental stimulation, the brain processes memory information affecting both new and old memories. Research supporting this theory demonstrated that college students with an increase in REM sleep after an intense period of learning performed significantly better

on a test than students who did not show increases in this stage of sleep (DeKoninck et al., 1989).

The relationship between REM sleep and the consolidation of new information in long-term memory does not appear limited to the period of time immediately following learning (Buboltz, Loveland, Jenkins, Brown, Soper, & Hodges, 2005). Research suggests this interaction extends well beyond the night information was originally integrated. During the five day period following studies for final examinations, college students showed increases in REM sleep (Smith & Lapp, 1991). As REM sleep increased there was not an actual increase in overall sleep time nor was there an increase in the number of rapid eye movement periods. These results suggest that information learned for the examination continued to be integrated into long-term memory even after the examination was taken.

Meddis (1977) proposed the adaptive theory of sleep stating that sleep increases survival probability. This theory is derived from the idea that species differ in their sleep-wake cycles according to their biological needs. For example, a nocturnal animal that has highly adaptive night vision is able to sleep in daylight, and meet basic needs after dark (Hirshkowitz et al., 1997). By contrast, an animal without night vision becomes immobile at night to keep from becoming a nocturnal animal's prey.

The energy conservation theory emphasizes a decrease in metabolism as a primary function of sleep (Zeplin & Rechtschaffen, 1974). Research shows an association between metabolism rates and sleep duration. Animals with higher metabolic rates sleep longer than animals that burn energy more slowly. However, a 200 pound individual saves only 120 calories by sleeping 8 hours rather than being in a state of

relaxed wakefulness (Zeplin, 1994). This appears to be an inefficient process and is a major challenge to the energy conservation theory (Hirshkowitz et al., 1997).

Stages of Sleep

Sleep is a highly structured physiological process essential for survival. Sleep patterns evolve throughout life beginning in utero until old age (Hirshkowitz et al., 1997). The average human being spends approximately one-third of their life sleeping (Hobson, 1995). The importance of sleep has long been hypothesized; however, it was not until the invention of the electroencephalograph (EEG) that the true scientific study of sleep began (Soldatos & Paparrigopoulos, 2005). After Hans Berger made the first EEG recordings of human sleep in 1929, the complicated neurological process of sleep became an interest of study for many scientists (Hirshkowitz et al., 1997). Sleep is no longer viewed as an intermission from the busy activities of life, but as an amazingly complex process that is influenced by and influences a wide range of physical, neurological, and psychological activities.

The active, complicated brain process of sleep is recorded by the EEG machine through continuous tracings of brain waves (Hobson, 1995). The EEG records impulses from the scalp that translate into brain wave activity. EEG recordings document activity by registering both the amplitude and frequency of brain waves. The amplitude refers to how high the waveform occurs, and the frequency refers to how many times the waves appear per second (Hirshkowitz et al., 1997). When a person is awake, brain waves recorded with the EEG reflect a high level of activity. This brain wave activity consists of mostly alpha and beta activity (Carlson, 2004). Alpha waves are medium frequency regular waves produced when a person is quietly resting. Beta activity brain waves are

irregular low amplitude waves that occur when a person is physiologically aroused or is engaged in mental processing tasks. From the brain wave activity recorded during sleep, scientists have identified five distinct stages of sleep (Hobson, 1995).

When a person becomes drowsy, Stage 1 sleep begins creating a transition between wakefulness and sleep (Carskadon & Dement, 2000). Muscles begin to relax, alertness decreases, and light sleep ensues. The EEG pattern in this stage consists of small irregular waves, similar to the awake state, intermixed with some alpha and theta waves. This low-voltage, mixed-frequency EEG activity is sometimes accompanied by slow eye movements (SEMs) as well (Hirshkowitz et al., 1997). SEMs are slow back and forth movements of the eyeballs from one side of the eye socket to the other. Sleepers are easily awakened during this stage of sleep and tend to deny they were asleep if questioned (Carskadon & Dement, 2000). A greater percentage of Stage 1 sleep throughout the night is a common sign of disturbed sleep. Insomniacs often receive more sleep than they acknowledge because of the denial of being asleep.

Stage 1 sleep lasts approximately 10 minutes after which Stage 2 begins. Sleep spindles, K complexes, and the absence of SEMs distinguish Stage 2 sleep from other stages (Carlson, 2004; Rechtschaffen & Kales, 1968). Sleep spindles are EEG short wave bursts that have a waxing and waning spindle appearance (Carskadon & Dement, 2000). These waves occur between two and five times a minute during the first four sleep stages (Carlson, 2004). K complexes are sudden, sharp EEG waves which are generally only found in Stage 2 sleep. These waves can be slow or sharp but are typically less than a second in duration (Carskadon & Dement, 2000). Sleep spindles often follow

K complexes in Stage 2 sleep recordings. Research suggests that these two types of waveforms are involved in keeping people asleep (Bowersox et al., 1985).

During Stage 2 sleep, the body temperature is slightly lowered and sleep deepens (Carskadon & Dement, 2000). More intense stimuli are required to produce arousal in Stage 2 sleep than in Stage 1 sleep. A healthy young adult will spend approximately 10 to 25 minutes in stage 2 sleep (Bowersox et al., 1985). As this stage progresses, there is an increase in high voltage slow wave activity called delta waves. Once delta waves account for 20% of the EEG recorded brain activity, Stage 3 sleep begins (Rechtschaffen & Kales, 1968).

Delta waves are the slowest EEG activity to occur during sleep and characterize both Stage 3 and 4 sleep recordings (Hirshkowitz et al., 2000). However, Delta EEG amplitudes are higher in children than in adults and appear to decline with age. Delta waves are recorded by the EEG during Stage 3 sleep for several minutes until stage 4 begins (Carskadon & Dement, 2000). Stage 3 sleep is deeper than Stage 2 and is characterized by increasing Delta waves and a reduction in sleep spindles and K complexes. This stage is considered a transition stage of sleep and only lasts several minutes until Stage 4 begins.

Stages 3 and 4 of the sleep cycle are generally known as slow wave sleep (SWS) due to the presence of delta waves and are the deepest level of the sleep process (Hirshkowitz et al., 2000). During SWS, there are slow and steady wave activities recorded by the EEG from several areas of the brain. This delta wave activity reflects synchronized activity between brain areas and is referred to as synchronous sleep (Carskadon & Dement, 2000). The slow wave sleep that occurs during stage 3 and 4 is

the most commonly occurring sleep stage to begin following a period of sleep deprivation (Bonnet, 2000). Research also shows that the amount of SWS increases after behaviorally active days or unusually high amounts of exercise and that the largest amount of growth hormone is released during SWS (Horne & Mindard, 1985; Sassin, Parker, & Johnson, 1969; Trinder, Paxton, Montgomery, & Fraser, 1985). The importance of SWS to physical health is suggested through all of these discoveries.

Stage 4 sleep typically starts when all K complexes and sleep spindles cease and the delta waves make up 50% of the EEG activity (Bowersox et al., 1985). In Stage 4 sleep, EEG recordings indicate predominantly delta waves with resulting deep sleep (Carskadon & Dement, 2000). Sleepers in this stage will display confusion if awoken, most likely fall back asleep, and will not remember the incident (Williams, Karacan, & Hursch, 1974). After Stage 4 sleep, the sleeper cycles back through Stage 3 and then Stage 2. However, Stage 1 sleep does not occur again. The sleeper enters Stage 5 sleep instead.

The final stage of sleep occurs about 90 minutes after sleep onset and is known as Rapid Eye Movement (REM) sleep (Carlson, 2004). This sleep stage is characterized by eye movement activity and low-amplitude EEG waves (Reinoso-Suarez, DeAndres, Rodrigo-Angulo, & Garzon, 2001). These waves are thought to reflect increases in cerebral activity not present during other sleep stages (Hirshkowitz et al., 2000). REM sleep is often characterized by vivid dreaming which is correlated with the high level of cerebral activity during this stage of sleep. The original discovery of REM sleep and its association with dreaming actually led to an increase in dream research (Hobson, 1995). Some basic questions about dreams have been answered through laboratory studies

including the facts that people generally dream in color, dreams occur in real time, dreams are often about recent events, and people sleeping in a laboratory often dream about sleeping in a laboratory (Ellman & Antrobus, 1991). However, there is not a current unified theory of dreams from the research and the absolute meaning of dreams is still elusive (Hirshkowitz et al., 2000).

REM sleep is also characterized by a decrease in voluntary muscle movement (Hobson, 1995). Sometimes during REM sleep there can be irregular heartbeats, sexual arousal, and changes in blood pressure and breathing (Carlson, 2004). This type of sleep is also known as paradoxical sleep because of the voluntary muscle paralysis with the presence of beta wave activity, which involves waveforms usually only present during Stage 1 sleep or wakefulness. The reasons for loss of muscle tone are debated, but it is possible that this temporary condition is a safety measure to prevent the acting out of dream activities during this stage of sleep (Hirshkowitz et al., 2000). In research involving cats with surgical lesions in certain areas of the brain responsible for muscle paralysis during REM sleep, the animals pounced on imaginary prey during EEG recorded dream activity. Additionally, individuals with REM sleep behavior disorders that have no muscle paralysis during REM sleep attempt to act out dreams which lead to injuries both for the sleeper and unsuspecting bystanders.

The amount of time spent in each stage of sleep is influenced by age (Hobson, 1995). Infant sleep differs from adult sleep in organization, structure, and type (Mindell, 2000). Infants have polyphasic sleep periods, meaning they have several sleep periods throughout the day as opposed to adults, which is usually a single 7 to 8 hour period. These sleep periods contain a large percentage of REM sleep with short transitions

between stages, which are less defined than in later years (Mindell, 2000). During the first 2 to 6 months of life, infants do not exhibit NREM sleep brain waves (Carskadon & Dement, 2000). This is most likely due to the developing central nervous system and the apparent inability of the brain to initially produce high-voltage, slow sleep waves.

Researchers studying infant sleep classify the sleep as either active rapid eye movement (REM) or quiet non rapid eye movement (NREM) (Mindell, 2000). During active-REM sleep, which is equivalent to adult REM sleep, infants move their arms or legs, whimper, have irregular breathing, and their eyes may be partly open or dart back and forth under their eyelids. About 50% of infant sleep is active whereas only about 20-25% of adult sleep is REM. Active-REM sleep is cyclical like in adult sleep but infant cycles are only about 60 minutes. Infants may also experience an active-REM sleep cycle immediately upon falling asleep which is unusual for adults to experience.

Infant sleep does not contain the characteristic stages one, two, three, and four of adult sleep (Lozoff, Wolf, & Davis, 1985). Instead, infant sleep has a quiet-NREM stage, which corresponds to adult NREM sleep (Mindell, 2000). During this stage, infants lie very still, and their breathing is regular. However, they may have a startle response or make sucking movements with their mouth. Infant sleep also differs from adult sleep in that quiet REM sleep accounts for a smaller proportion of total sleep time, 50%, as opposed to adult sleep, which is almost 75% NREM sleep.

The differences between adult and infant sleep patterns dissipate quickly (Hobson, 1995). As infants age, their sleep begins to consolidate and they sleep less. Typical newborns sleep 17 to 18 hours a day (Mindell, 2000). By 3 or 4 months of age, they sleep 15 hours a day and two-thirds of their sleep occurs at night. Infant sleep stages

also begin to resemble adult sleep stages by 3 months of age. At 6 months of age, infants have fewer daytime sleep periods; sleep about 13 hours a day, and REM sleep accounts for 30% of sleep time. By 24 months of age sleep is reduced to about 12 hours a day with one daytime nap. As children age sleep becomes characterized by NREM and REM sleep with little transitional sleep of stage one and two. This helps to explain why children are often difficult to awaken. Busby and Pivik (1983) found that ten-year-old children were able to sleep through a loud sound at 123 decibels, which is slightly louder than an ambulance siren.

Between early adolescence and early adulthood, there is a 40% reduction in the amount of REM sleep (Carskadon & Dement, 1987). Normal adult sleep patterns are generally established by the age of 18 (Hobson. 1995). Adult sleep is generally divided into the REM stage and the first four NREM stages (Carlson, 2004). Throughout the night, adults alternate between REM and NREM sleep in an average of 90 minute cycles. The first cycle generally contains about 25 minutes of REM sleep, and the periods of REM sleep progressively increase throughout the night. An adult will typically have four to five periods of REM sleep during 8 hours of sleep, which is considered the average amount of sleep needed (Vogel, 1999). REM periods of sleep increase throughout the night, while SWS sleep decreases and is almost absent by the end of the sleep period (Carskadon, & Dement, 2000). The normal sleep process appears to give precedence to SWS in that it dominates the first half of sleep, and REM sleep dominates the second half of sleep. The majority of REM sleep is attained in the last 2 hours of the sleep cycle. Normal young adults spend 2% to 5% of sleep time in Stage 1, 45% to 55% in Stage 2,

3% to 8% in Stage 3, 10% to 15% in Stage 4, and 20% to 25% in REM sleep (Hirshkowitz, Moore, Hamilton, Rando, & Karacan, 1992).

Night time awakenings increase with age, some of which are remembered and others are not (Carskadon, Brown, & Dement, 1982). By age 80, very little SWS patterns are exhibited in most humans (Carskadon, & Dement, 2000). The amount of REM sleep, however, does not change significantly in healthy older adults. Some senior adults with dementia, Alzheimer's disease, and Parkinson's disease do show a marked decline of REM sleep, which appears to be correlated with intellectual functioning (Printz et al., 1982).

The Sleep-Wake Cycle

There are some nonpathological significant individual differences in the process of sleep (Hirshkowitz et al., 2000). Some people are naturally short sleepers and others are naturally long sleepers. The reasons why some people require less sleep than others is unclear. However, differences may stem from the internal coordination of the three principal factors involved in the regulation of the sleep-wake cycle (Refinetti, 2000). The three physiological processes that directly affect the sleep-wake cycle are the autonomic nervous system, the homeostatic drive for sleep, and circadian rhythms.

The rhythmic patterns of the natural environment found in seasonal changes, lunar cycles, and solar patterns have contributed to the physiological adaptation of animals to the environment (Strubb & Woods, 2001). Most animals, including humans, have a number of biological rhythms that serve as internal clocks that help regulate physiological changes. Examples include annual rhythms like the secretion of testosterone in males and monthly rhythms like the menstrual cycle in females. Some

biological rhythms are circadian rhythms that follow the natural environment 24 hour cycle. The sleep-wake cycle follows a circadian rhythm but it appears to be closer to a 25 hour cycle and is reset daily. This internal clock is reset to a 24 hour cycle on a daily basis by external cues like light. Research shows that in animals, including humans, that brief periods of light will reset circadian rhythms after a maintained period of darkness (Aschoff, 1979). These findings support the idea that humans have adapted to a 24 hour sleep-wake cycle as a result of natural cues such as sunlight.

The circadian rhythms are regulated by the suprachiasmatic nucleus located in the hypothalamus of the brain (Sleep Research Society, 1993). This nucleus controls patterns of the sleep-wake cycle through the regulation of melatonin hormone secretion from the pineal gland (Zeman & Reading, 2005). The suprachiasmatic nucleus becomes less active a few hours prior to a person's regular sleep time, and the pineal gland begins to release melatonin into the bloodstream causing sleepiness within an hour (Cajochen, Kraeuchi, & Wirz-Justice, 1997). The pineal gland slows production of melatonin as a person nears normal waking time, which allows for an increase in alertness. The suprachiasmatic nucleus not only follows a daily rhythm but follows a seasonal rhythm as well (Ralph & Lehman, 1991). It causes larger amounts of melatonin to be secreted from the pineal gland during the winter season due to longer periods of darkness. When there is damage to the suprachiasmatic nucleus, the flow of melatonin is unregulated, and individuals with this type of damage have difficulty maintaining alertness during the day (Cohen & Albers, 1991).

The suprachiasmatic nucleus receives messages from the retinohypothalamic tract, a bundle of nerves in the non-visual photoreceptors in the retina of the eye.

Research has shown that when these nerves are damaged, circadian rhythms get out of synch and do not follow normal environmental cues (Refinetti & Menaker, 1992). The retinohypothalamic tract also appears to receive stimuli from other photoreceptors in the skin. Campbell and Murphy (1988) demonstrated that the circadian rhythm of humans kept in dim light for several days could be reset when a light was focused behind the knee, without contacting the photoreceptors in the eyes. A control group who did not receive the light treatment failed to show regular circadian rhythms.

The firing pattern of the suprachiasmatic nucleus is also correlated with daily fluctuations in body temperature (Hirshkowitz et al., 2000). As a result, circadian rhythms are often monitored by using temperature cycle markers. Drowsiness occurs with lower body temperatures. Falling asleep is easiest at the lowest point of body temperature (Campbell & Zulley, 1989). Muscular activity promotes the production of body heat but this activity is almost non-existent during sleep. The normal reaction of shivering in response to lowered body temperatures is not active during sleep but sweating still occurs to cool the body (Hobson, 1995). During sleep, the body maintains physiological responses in order to lower core temperatures. This mechanism is believed to be a result of the need to rest thermo regulating neurons found in the hypothalamus of the brain so that body temperature can be more effectively regulated during waking time (Parmagginani, 1994). There is some support for this theory from sleep deprivation studies done with rats that perished after extreme periods of sleep deprivation due to an inability to conserve body heat (Rechtschaffen et al., 1983). The specific relationship between body temperature regulation and sleep is not clear, but there is evidence that sleep may be necessary for the maintenance of thermoregulation (Hobson, 1995).

The second process involved in the regulation of sleep is controlled by the time spent awake (Campbell, 2000). This homeostatic sleep drive builds during long periods of alertness and can cause sleepiness even when the circadian rhythm is pushing for wakefulness. Prolonged wakefulness produces a sleep debt (Carskadon and Dement, 1987; Dement & Vaughan, 2000). The longer and individual stays awake, the sleepier they will become. The homeostatic drive for sleep is regulated by the hypothalamus and is similar to the drives that motivate hunger and thirst (Campbell, 2000). While these drives motivate the individual to perform actions to reduce the drive, the activity is not the purpose of the drive. Sleep is not just a means to reduce sleepiness no more than eating is just to relieve hunger (Hobson, 1995). These drives serve as mechanisms to encourage behaviors that will meet the body's needs. From this perspective, sleepiness requires a cessation of activity for relief so that other processes can occur (Dement & Vaughan, 2000).

The homeostatic sleep drive helps regulate sleep and the stages thereof (Campbell, 2000). For example, depriving an individual of REM sleep produces a sleep debt. If the individual is then given an opportunity to sleep, REM sleep rebounds above normal levels to make up for previous deficits (Hobson, 1995). Interestingly, SWS has a similar response pattern to selective deprivation, which supports the theory that there are specific requirements for different types of sleep.

The autonomic nervous system is the third factor involved in the regulation of sleep (Refinetti, 2000). The autonomic nervous system is a component of the peripheral nervous system that controls arousal to both internal and external stimuli. The autonomic nervous system is composed of two subcomponents, the sympathetic system and the

parasympathetic system. The body responds to stressors by increased activity through the sympathetic system and relaxes through actions of the parasympathetic system. Sleep activities are associated with decreases in sympathetic system functioning and increases in parasympathetic functioning (Parmagginani, 1994). Electrical stimulation of parasympathetic systems in the brain results in behavioral signs of sleep in animals (Parmagginani, 1994). Conversely, stimulation of the sympathetic nervous system in response to stressors can be disruptive to normal sleep patterns (Hirshkowitz et al., 2000).

Sleep disruptions can occur with both internal and external stimuli. Internal stimulation can result from fear, worry, anxiety, tension, or physical pain (Taub, 1978; Taub & Hawkins, 1979; Verlander et al, 1999). External stimulation that excites the sympathetic nervous system resulting in sleep disturbances can occur from excessive heat, intrusive noises, or ingestion of chemicals (Parmagginani, 1994). Sometimes even the frustration of worrying about falling asleep can significantly impair the ability to fall asleep (Hobson, 1985). Similarly, if the sleeping environment is repeatedly associated with anxiety-provoking, frustrating attempts to sleep, insomnia can become conditioned (Hauri & Fisher, 1986).

Sleep Disorders

While the primary function of sleep remains to be determined, the negative impact of poor sleep on human health has been documented. Evidence from worldwide epidemiological studies show that approximately one-third of the population experiences or is at risk of developing sleep problems within a given year (Constantine & Paparrigopoulos, 2005). There are three main classification systems for sleep disorders. The American Academy of Sleep Medicine (2001) maintains the *International*

Classification of Sleep Disorders (ICSD-Revised). Sleep disorders are classified into four categories in the ICSD-Revised: dyssomnias, disorders related to insomnia or excessive sleepiness; parasomnias, undesirable behaviors that intrude during sleep; sleep disorders associated with medical or mental disorders; and proposed sleep disorders. The ICSD-Revised contains information regarding diagnostic criteria, epidemiological information, onset, course, duration, and EEG characteristics of each disorder.

The American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders Forth Edition Text Revision* (2000) (DSM-IV-TR) classifies sleep disorders into four categories: primary sleep disorders related to dyssomnias and parasomnias, those related to other mental disorders, those sleep disorder due to general medical conditions, and substance-induced sleep disorder. This system outlines the diagnostic features, associated disorders, laboratory findings, physical findings, etiology, and information on differential diagnoses of sleep disorders.

The third classification system for sleep disorders is found in the *10th International Classification of Disease* (1992) created by the World Health Organization. This system is organized differently from the previously mentioned classifications. Non-organic sleep disorders are listed in chapter five with mental and behavioral disorders. The sleep disorders included are dysomnias, parasomnias, and several other non-organic disturbances. The physiological sleep disorders such as sleep apnea and narcolepsy are in chapter six of the ICD-10. This system is less detailed that the ICSD or DSM-IV-TR. However, all three classification systems follow similar diagnostic guidelines for sleep disorders.

As stated earlier, disordered sleep can result from several causes including disruptions of the circadian rhythm, increases in the homeostatic sleep drive, or from abnormal functioning of the autonomic nervous system (Zelman & Reading, 2005). There are many types of sleep disorders that can generally be classified into three broad categories. The parasomnias are disorders of experience and behavior that occur during sleep (Constantine & Paparrigopoulos, 2005). This category includes wake-sleep transition disorders, phenomena resulting from light sleep such as sleep talking, sleep terrors, arousal disorders such as sleep walking, and REM disturbances such as nightmares. There are also sleep disorders associated with neurological malfunctions such as epilepsy and sleep problems related to psychiatric disorders such as psychoses (Zelman, & Reading, 2005). The most common types of sleep disorders are the dyssomnias which are disorders associated primarily with insomnia or excessive sleepiness.

Dysomnias can result from intrinsic or extrinsic causes. The intrinsic sleep disorders appear to have biological causes and include narcolepsy, obstructive sleep apnea, and idiopathic insomnia (Rothenberg, 2000). There are several types of insomnia all characterized by difficulty falling asleep, nocturnal awakenings, or by poor quality sleep that occurs at least three times per week for one month or longer. Idiopathic insomnia is distinguished from other types of insomnia through EEG and computerized evaluations (Constantine & Paparrigopoulos, 2005). The brain wave activity of idiopathic insomnia is distinctly different from insomnia secondary to other conditions such as major depression (Perils, Smith, Andrews, Orff, & Giles, 2001). The dysomnias

resulting from extrinsic rather than biological causes include insufficient sleep syndrome, altitude insomnia, and inadequate sleep hygiene (Zelman, & Reading, 2005).

Insomnia is defined as a subjectively-measured complaint of inadequate sleep that is perceived as a sleep loss problem (Aldrich, 2000). Insomnia can arise from three maladaptive timing problems, including delayed sleep onset, impaired sleep continuity, and early morning awakenings. Insomnia is related to various medical conditions including disorders of the musculoskeletal, cardiovascular, respiratory, renal, and gastrointestinal systems (National Sleep Foundation, 2005).

Sleep Disordered Breathing (SDB) is a maladaptive condition associated with sleep apnea in which episodes of breathing cessation occur for 10 or more seconds during sleep (Aldrich, 2000). This irregular pattern of breathing can cause significant sleep disturbances and occurs in children as young as five years old (Rosen, Palermo, Larkin, Emma, & Redline, 2002). Research shows that children with mild SDB experience more body pain complaints and attain lower scores on health-related quality of life measures than children without SDB. Adults with SDB give negative health ratings on health reports similar to individuals who suffer from chronic conditions including hypertension diabetes, arthritis, and angina (Finn, Young, Palta, Fryback, & Dennis, 1998).

The dyssomnia category of sleep disorders also includes circadian rhythm sleep disorders (Rothenberg, 2000). This subcategory of disorders is related to sleep deprivation problems. Shift work sleep disorder, jet lag syndrome, and delayed sleep-phase syndrome are circadian rhythm sleep problems. Hypersomnia is excessive daytime sleepiness or a tendency to fall asleep during daily activities. Excessive daytime sleepiness can result from inadequate amounts of sleep or from an increased drive to

sleep (National Sleep Foundation, 2005). Inadequate sleep is often associated with shift work sleep disorder and delayed sleep phase syndrome (Constantine & Paparrigopoulos, 2005). However, disrupted sleep resulting in daytime sleepiness is more often the result of intrinsic problems such as sleep apnea or periodic limb movement disorder as well as neurological dysfunction, such as narcolepsy.

Delayed Sleep Phase Syndrome (DSPS) may occur when normal sleep onset and wake times are intentionally delayed by 3 to 6 hours (Walsh & Lindblom, 2000). Individuals meeting the criteria for DSPS, while still sleeping 8 hours nightly, were found to experience difficulty concentrating, had increases in depressive feelings, and reduced social interactions (Taub & Berger, 1978). In a study by Lack (1986), Australian college students who met criteria for DSPS had significantly lower grades, more irritability, and greater feelings of drowsiness than other students. Similar results were found from research with American college students (Buboltz et al., 2001).

Research identifying primary sleep disorders has also examined the effects of sleep deprivation (Walsh & Lindblom, 2000). Most early studies involving sleep deprivation have focused on physiological sleepiness. Research has expanded to include recovery sleep, neurological effects, immune system functioning under sleep loss, and autonomic nervous system responses to sleep loss (Hobson, 1995). Examining these effects has resulted in a better understanding of the function of sleep and the negative impact of sleep loss (Walsh & Lindblom, 2000). The National Sleep Foundation (2002) *Sleep in America Poll* determined that nearly one third of Americans surveyed reported getting less sleep than they need to function adequately during the day. It is estimated that people on average now sleep one and a half hours less than people did a century ago.

Investigations into the impact of sleep deprivation on daily life have yielded results that some believe make sleep deprivation one of the most pervasive health problems facing America. Sleep deprivation studies have yielded information on the impact of total sleep deprivation as well as the effects of partial sleep deprivation.

Partial Sleep Deprivation

Partial sleep deprivation (PSD) is defined as a restriction of total sleep that is below the daily amount required by most individuals (Zammit, 2000). This has become an area of interest as sleep research has grown to identify the necessity of sleep for development and adequate functioning. PSD appears to be an increasing problem in industrialized societies not only because of the identification of sleep disorders but also due to lifestyles that deemphasize sleep (National Sleep Foundation, 2005). Entertainment is available 24 hours a day, workdays have been extended, school schedules start earlier, and large segments of the population commute long distances for work. There is a general cultural belief in America that individuals who sleep little are industrious and those who sleep more are lazy (Hirshkowitz et al., 2000). Additionally, many regard sleep as a necessary evil or a waste of time.

Even small amounts of sleep loss or deprivation can have significant effects on daytime functioning (Dement & Vaughan, 2000). Sleep loss results in a sleep debt that must eventually be repaid during future sleep cycles at the expense of maintaining a normal sleep cycle. With sleep deprivation, sleep latency (the time it takes to fall asleep) is shorter, and there is a rapid entry into deep sleep (Roehrs, Carskadon, Dement, & Roth, 2000). REM sleep appears to be about the same length but at the expense of the other sleep stages. Individuals with sleep debt may obtain an average night of sleep or even get

additional sleep; however, they still often complain of daytime sleepiness (Dement & Vaughan, 2000). This type of daytime sleepiness appears to have a major impact on functioning. Adult decision making and logical reasoning skills are negatively impacted by a single night of sleep loss (Blagrove & Akehurst, 2001; Harrison & Horne, 1999). Daytime alertness is theorized to be the primary determinant of how well people function mentally during activities (Dement & Vaughan, 2000). It is of interest to consider how inmates in structured setting who may be bombarded with sleep disturbances throughout the night would compensate for sleep debt.

Evaluation of the minimal amount of sleep needed before behavioral or physical maladies occur is the topic of much research. Early investigations by Wilkinson (1968) found that one night of sleep restriction did not affect performance until sleep was reduced to 2 hours. Wilkinson also found that reducing sleep over two consecutive nights to 5 hours negatively impacts performance. Webb and Agnew (1974) reported that gradual sleep restriction to 5.5 hours per night for 60 days resulted in a poor vigilance during the last 2 weeks of the study. Restricting sleep to 4.5 hours per night did not show a decline in performance (Friedmann, et al., 1977). However, the individuals participating in the study did show more fatigue, less vigor, and perceived their performance outside of the experimental setting as poor. Similar research by Leung and Becker (1992) found that hospital staff workers showed a decline in performance after sleep restriction.

The negative impact PSD does appear to be cumulative (Carskadon & Dement, 1981). Physiological sleepiness increases with accumulated PSD. Some research does suggest there are individual differences in the amount of sleep required to experience

PSD which is most likely related to individual differences in basal sleep needs, the amount of sleep required each night to maintain alertness. Support for individual differences in basal sleep needs was evident in a study of healthy young adults who were physiologically sleepy after 8 hours of sleep but became more alert when allowed 10 hours of sleep per night (Roehrs et al., 1989). These results suggest that some individuals may actually experience PSD at 8 hours of sleep a night.

When PSD occurs, SWS sleep increases after two or more nights of restricted sleep even if PSD continues (Webb & Agnew, 1974). REM, stage 1, and stage 2 sleep are decreased during recovery sleep after PSD. Interestingly, when sleep was restricted to the first 4 hours of normal sleep time over a 4 night period the recovery sleep time for the next 2 nights showed an increase in total sleep time, REM, and a decrease in sleep latency. It appears that recovery sleep following PSD shows an initial SWS recovery period with a secondary REM sleep recovery (Zammit, 2000). Prison inmates restricted to specific sleep schedules may experience sleep disturbances through the night and are not allowed increases in sleep recovery time due to facility schedules. It is possible that prisoners experience PSD on a regular basis due to previously mentioned environmental factors that may disturb sleep.

The effect of PSD on exercise performance has also been examined (Mougin, et al., 1991). Gross motor performances appear to be maintained after partial sleep deprivation. However, a night of 3 hours sleep proved to decrease maximum oxygen consumption and significantly increase heart rate during weight lifting exercise. Lowered oxygen levels are associated with poorer performance during exercise, and excessive

increases in heart rate can be counterproductive (G. Hodges, personal communication, December, 22, 2006).

Performance deficits also occur after sleeping 2 hours or less in one night or sleeping for 5 hours two nights in a row (Zammit, 2000). Additionally, there are minor performance impairments seen in the laboratory setting for up to 8 weeks of experimental sleep deprivation. Animal studies show that rats deprived of 80% of their baseline sleep die within 10 to 30 days of PSD onset (Rechtschaffen et al., 1989). Interestingly, animals that were deprived of only 25% to 30% of their baseline sleep did not show any of the physiological deterioration seen in the rats with severe PSD. It is assumed from these studies that prolonged or severe PSD would also have detrimental physiological effects in humans. This may be of particular concern in the prison setting given the potential for nightly sleep disruptions that can contribute to prolonged PSD.

Total Sleep Deprivation

The impact of total sleep deprivation (TSD) on physiological functioning has been widely studied over the last 45 years, sometimes in an effort to understand the function of sleep (Walsh & Lindblom, 2000). How an individual responds to sleep loss is influenced by a variety of factors including the amount of sleep deprivation, natural circadian rhythms, age, drugs, and motivation. The first signs of sleep deprivation are often subjective reports of sleepiness and mood changes (Johnson, 1982). With increasing sleep deprivation there is an increase in negative mood states, sleepiness, and fatigue. Severe sleep deprivation can result in visual hallucinations, distortions of perception, and paranoia (Walsh & Lindblom, 2000). Generally, at least 2 nights of TSD are needed for visual hallucinations to occur and even longer for paranoia. Interestingly,

mood changes and other psychological symptoms often remit when sleep is obtained (Dement & Vaughan, 2000).

The most common physiological consequence of TSD is physiological sleepiness, the tendency for a person to fall asleep in the absence of competing stimuli (Walsh & Lindblom, 2000). The faster sleep onset occurs, the greater the physiological sleepiness. Sleepiness becomes extreme after the loss of one night of sleep, and most individuals will fall asleep the next day within 2 or 3 minutes if given the opportunity (Rosenthal, Roehrs, Rosen, & Roth, 1993). As sleepiness increases, performing tasks requires increased effort. Recovery sleep time after a night of TSD does increase above the baseline amount of sleep (Rosenthal, Merlotti, & Roehrs, 1991). However, studies suggest that the amount of recovery sleep after sleep loss is less than the debt of lost hours of sleep or sleep debt (Dement & Vaughan, 2000). Individuals who had a 24 hour recovery period following 24 hours of TSD recovered 72% of the total amount of sleep lost (Walsh & Lindblom, 2000). Individuals who received a 24 hour recovery period following 48 hours of TSD recovered 42% of total sleep lost.

Studies involving TSD for at least 8 days found that individuals experience disturbances of the primary central nervous system (Horne, 1975; Kollar, Namerow, Pasnau, & Naitoh, 1968; Quant, 1992; Ross, 1965). Some research participants developed mild neurological symptoms such as tremors, slurred speech, sluggish corneal reflexes, and myopia (Kollar et al., 1968). Ten days of TSD resulted in hyperactive gag reflexes and pain sensitivity increases (Ross, 1965). However, in all cases with development of abnormal central nervous system responses, the neurological signs dissipated after sleep was obtained (Walsh & Lindblom, 2000).

The negative impact of TSD psychologically and physiologically is well documented (Dement & Vaughan, 2000; Walsh & Lindblom, 2000). Reactions are somewhat predictable and can dissipate after sleep recovery (Walsh & Lindblom, 2000). The consequences of TSD are of concern because there appears to be large segments of society who are chronically sleep deprived. Research has yet to determine the overall physiological effects of chronic sleep deprivation over extended periods of time. It is reasonable to assume that from the data gained thus far, there are probably many negative effects of long-term sleep deprivation.

Sleep Quality

Sleep quality is generally considered a construct that is a subjectively reported assessment of good versus poor sleep (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). Sleep quality measures usually contain quantitative aspects of sleep such as sleep latency, sleep duration, and number of nighttime awakenings (Buysse et al., 1989; Urponen, Partinen, Vuori, Hasan, 1991). Additionally, sleep quality also refers to subjective aspects of sleep such as restfulness daytime sleepiness, and depth of sleep. Research shows that in order to maintain normal functioning, quality of sleep rather than quantity of sleep appears to be most important for all age groups (Dement & Vaughan, 2000). Sleep complaints such as daytime sleepiness are often associated with anxiety and stress in adults (Buysse et al., 1989). Sleep quality disturbances are frequently reported in psychiatric disorders including schizophrenia, depression, and substance-related disorders. Individuals who report more daytime sleepiness also report more use of alcohol and marijuana (Jean-Louis et al., 1998).

Research generally indicates that sleep quality is correlated with health and wellbeing. Poor sleep quality is associated with increased physical health complaints, irritability, depression, anxiety, fatigue, subjective impressions of confusion, and lower life satisfaction (Pilcher et al., 1997). The consequences of chronic sleep deprivation diminishes mental sharpness, adversely affects carbohydrate processing, irregulates hormone production, and decreases immune response, energy levels, and stress thresholds (Pilcher et al., 1997; Vignau et al., 1997).

Health and well-being measures correlate higher with sleep quality than sleep quantity (Pilcher et al., 1996). Research shows that health concerns such as heart attacks and cardiovascular disease are linked to poor sleep quality (Partinen, Pukonen, Koskenvuo, & Hilakiv, 1982). Additionally, children with inadequate sleep are more often diagnosed with behavioral and mental health problems (Guilleminault, 1987; National Sleep Foundation, 2000). Adolescents who report decreased sleep quality experience increased feelings of anger and hostility (National Sleep Foundation, 2000; Pilcher et al., 1997). High overall ratings of aggression are actually predictive of poor sleep quality for incarcerated adolescent males (Ireland & Culpin, 2006). Teenagers in general are more likely to report increased injuries and accidents if they have irregular sleep patterns that negatively impact sleeps quality (Acebo & Carskadon, 2002). Poor sleep quality is also associated with reduced quality of life reports in adults over 65 years of age (Asplund, 2000).

The study of sleep quality has recognized several populations affected by sleep difficulties (Buboltz et al., 2001). College students and shift workers have been particularly singled out due to inconsistent schedules, schedules that conflict with

biological rhythms, and the high level of sleep complaints in these populations (Dement & Vaughan, 2000). College students appear to suffer a decreased level of sleep quality when compared to adult populations, possibly due to school demands, stress, and poor sleep habits (Buboltz et al., 2001). Results from this study also indicated that women have more sleep complaints than men.

Another population that appears to have significant levels of poor sleep quality is prison inmates (Elgers, 2003; Ireland & Culpin, 2006; Kjelsberg & Hartvig, 2005). Research with inmates at a Geneva prison determined that several inmates receiving drug treatment for sleep complaints still attained measures of poor sleep quality after 2 months of treatment (Elgers, 2003). Investigators in Norway found that 11% of the nation's prison population experiences sleep disorders (Kjelsberg & Hartvig, 2005). Ireland and Culpin (2006) determined that juvenile inmates in an American detention center had poorer quality of sleep after incarceration with a decline in sleep hygiene activities as well. Like with college students, it is possible that prison inmates experience a decreased level of sleep quality when compared to the general population due to perceived daily stressors and environmental demands.

Sleep quality is more important to normal physiological functioning than sleep quantity (Dement & Vaughan, 2000). Poor sleep quality is linked to negative mood states such as irritability and depression as well as lower life satisfaction (Pilcher et al., 1997). Poor sleep quality affects people of all ages and is especially troublesome in certain populations including college students and shift workers (Buboltz et al., 2001; Monk, 2000). There is also indication that poor sleep quality is prevalent in the prisoner population (Elgers, 2003; Ireland & Culpin, 2006; Kjelsberg & Hartvig, 2005).

Sleep and Psychological Health

Poor sleep has traditionally been a complaint by individuals with mood disorders (Perlis et al., 1996). Research suggests that sleep disturbances previously considered a symptom of depressive disorders may actually precede and be a risk factor for developing depression. In one notable study by Breslau and associates (1996) risks for the onset of major depression was four times greater for participants with a history of insomnia lasting two weeks or more than for subjects without insomnia related complaints. Dryman and Eaton (1991) found that individuals with persistent insomnia were three times more likely to develop depression within one year than individuals without insomnia. Disturbed sleep was also associated with the development of new depressive episodes (Ford & Kamcrow, 1989).

Researchers show that concurrent depressive symptoms and sleep disorders are the most prevalent mental health problems in a Norwegian prison population (Kjelsberg & Hartvig, 2005). Data from studies with adult populations strongly suggests that poor sleep is a precursor for depression and that sleep progressively worsens prior to a recurrent depressive episode (Perlis et al., 1996). Additionally, adults with both depression and insomnia are at greater risk for suicide than those without comorbid disorders (Agargun, Kara, & Solmaz, 1997). Children are not immune from comorbid mental health issues and sleep related difficulties either. Adolescents with sleep disturbances have higher rates of suicidal thoughts than those without sleep complaints (Choquet, Kovess, & Poutignat, 1993). One study found that students in transition from junior high to senior high school with shorter sleep times had higher rates of aggressive behaviors than students with average sleep durations (Wolfson et al., 1995).

Hypersomnia, a condition in which people have difficulty staying awake during the day, also occurs in the course of some psychiatric illnesses (Vgontzas, Bixler, Kales, Criley, & Vela-Bueno, 2000). Hypersomnia is a common symptom of seasonal affective disorder and atypical depression. Substance related disorders are often characterized by hypersomnia during withdrawal phases, as in the case of cocaine withdrawal. Bipolar depressive disorders are also characterized by periods of hypersomnia (Constantin & Parparrigopoulos, 2005). In fact, individuals with Bipolar disorder may present with this as their primary complaint. A reduction in sleep duration may actually have predictive value in the early detection of a manic episode in Bipolar Disorder (Barbini et al., 1996). Additionally, psychosocial distress has been associated with sleep deprivation and may trigger manic episodes in Bipolar Disorder (Ashman et al., 1999).

In addition to affective disorder, sleep disturbances have been correlated with anxiety disorders (Ohayon & Roth, 2003). Patients with panic and generalized anxiety disorders often present with insomnia. Some research even suggests that panic attacks may happen during sleep (Mellman & Uhde, 1989). Anxiety attacks, frequent nightmares, and other sleep disturbance symptoms are characteristic of Posttraumatic Stress Disorder, which requires the presence of sleep disruptions for the diagnosis (American Psychiatric Association, 2000).

Adjustment disorders in prison populations are linked to insomnia complaints as well (Adams, 1977; Anderson et al., 2000; Listwan, Sperber, Spruance, & Van Vorhis, 2004). Aggression associated with adjustment disorders is predictive of sleep disturbances in juvenile prisoners (Ireland & Culpin, 2006). Reduced sleep quality among adolescents actually correlates with increased feelings of anger and hostility

(Pilcher et al., 1997). Adult prison inmates transferred from general population environments to solitary confinement experience adjustment problems and report more insomnia than general population inmates (Anderson et al., 2000). Many prisoners who seek psychiatric services for complaints common to adjustment disorders in the correctional setting request antidepressant medications for sleeplessness and low moods (Szykula & Jackson, 2005).

Sleep stage abnormalities are also associated with some mental health problems. Individuals with Schizophrenia show an increase in brain wave activity during NREM stage of sleep and an increase of REM activity during the first period of the sleep cycle (Beneca et al., 1992; Hiatt, Floyd, Katz, & Feinberg, 1985). Insomnia is a common feature during acute psychotic states in Schizophrenia as well (Benson & Zarcone, 2000). Sleep stage abnormalities are also documented in individuals with Dementia and mental retardation (Constantin & Parparrigopoulos, 2005). Brain wave activity in both of these disorders reflects decreased levels of activity during REM sleep.

Sleep disorders are also closely associated with psychoactive substance use (Gillin & Drummond, 2000). Sleep patterns have been extensively studied in alcohol dependence. The use of alcohol increases the possibility of developing sleep related breathing disorders and periodic limb movements. Interestingly, sleep disturbances can occur for months or years after cessation of alcohol use. Individuals who report reduced sleep quality also report frequent alcohol and marijuana use (Jean-Louis et al., 1998). Sleep disturbances are symptomatic of cocaine, and amphetamine use as well (American Psychiatric Association, 2000). In prison populations, sleep disorders are correlated with a substance use history as well as chronic mental illness (Anderson et al., 2000; Elger,

2003; Ireland & Culpin, 2006; Szykula & Jackson, 2005). It is likely, given the high percentage of inmates that admit to substance use and the comorbidity of mental illness and substance use, that there are more relationships between mental illness and sleep disturbances in this population than is currently known.

Poor sleep not only interacts with concurrent mental health problems, but can negatively impact individuals considered to be psychologically healthy. In adolescents, disturbed sleep correlates with difficulties in psychological functioning and interpersonal relationships (Roberts, Roberts, & Chen, 2000). Irregular sleep patterns were linked to low achievement potential, poor impulse control, intellectual inefficiency and lower sociability in adolescents as well (Taub & Hawkins, 1979). Zammit (1988) reported that after only one night of poor sleep college students experienced more depressive symptoms, anxiety, and somatic complaints. Similarly, college students who report falling asleep fast and few sleep disturbances, experience fewer health difficulties than those with poor sleep (Jenkins, Buboltz, Fowler, & Rosielle, 2002).

The negative impact of sleep difficulties on psychological health is well documented in several populations, including adults, adolescents, and college students (Jenkins et al., 2002; Taub & Hawkins, 1979; Zammit, 1988). While research on psychological health and sleep difficulties in the prison population is limited (Anderson et al., 2000; Elger, 2003; Ireland & Culpin, 2006; Szykula & Jackson, 2005), it is probable that similar results to the general population would be found. Incarcerated individuals have a higher prevalence of chronic mental illness and it is possible that many prisoners may experience transient psychological problems during adjustment to the

restrictions of prison life. This population most likely experiences sleep difficulties associated with psychological maladies and vice versa, similar to the general population.

Psychological health is related to sleep disturbances. Data strongly suggest that poor sleep is a precursor for depression and that sleep progressively worsens prior to a recurrent depressive episode (Perlis et al., 1996). Anxiety, adjustment disorders, aggression, and severe mental illness have all been associated with sleep complaints. Additionally, individuals without psychological distress can be negatively impacted by sleep disturbances. It is clear that mental health can be impacted by and impact sleep patterns.

Sleep and Physical Health

Sleep difficulties are linked to a variety of physical ailments in a wide range of populations (Walsleben, 2000). Insomnia is linked to coronary artery disease, lung disease, chronic pain, diabetes, and cardiovascular disease (Asplund, 2000; Bonnet & Arand, 1998; Hajak, 2000; Tanaka, et al., 2003). Individuals suffering from insomnia have twice as many doctor's visits a year and a higher rate of hospitalizations than individuals without sleep problems (Hajak, 2000). In fact, insomnia is one of the most prevalent complaints in primary medical care situations. In one survey of 10,778 men and women ages 35 to 39, poor male sleepers were more than twice as likely to have ischemic heart disease over the next 6 years (Hyyppa & Kronholm, 1989). Poor sleep has also been associated with reduced physical health in adults over 65 years of age (Asplund, 2000).

Sleep loss has also been associated with impaired immune functioning (Irwin, McClintick, & Costlow, 1996). Individuals who obtain less than 6 hours of sleep show

up to a 50% reduction in immune system natural killer t-cells. Additionally, protein synthesis and growth hormones that have a significant function in physical growth are at their highest levels during REM sleep (Parker, Rossman, & Kripe, 1980). In the absence of REM sleep these physiological processes are disrupted if not stopped completely. Sleep apnea usually associated with breathing problems during sleep results from obstructed airways and subsequent inadequate amounts of circulating oxygen (Thorpy & Yager, 2001). Low levels of circulating oxygen result in nocturnal awakenings throughout the night (Thorpy & Yager, 2001).

Disrupted sleep patterns are also linked to higher somatic complaints and general health concerns. A study conducted with adolescents found that participants with poor sleep also reported lower scores on ratings of general health. Children as young as 5 years old with mild sleep disordered breathing and nocturnal awakenings report a significantly higher number of somatic complaints (Rosen et al., 2002). Moreover, adults with similar sleep disturbances also report poorer general health (Finn et al., 1998). Anecdotal evidence also suggests that prisoners who report a high number of somatic complaints also report sleep difficulties (M. Dauzart, personal communication, October 31, 2006; S. Tucker, personal communication, November 2, 2006).

Studies show significant relationships between shift work and health complications as well (Smith et al., 1996). Individuals who work night shift jobs tend to maintain inconsistent sleep patterns and are at risk for poor sleep quality. Direct links between shift work, headaches, gastric problems, reduced immune functioning, and respiratory tract infections are clear in adult populations (Irwin et al., 1996; Smith et al., 1996). This may be of particular concern to health professionals providing services to

inmates due to the common practice of assigning prisoners to shift work jobs during incarceration (S. Tucker, personal communication, November 2, 2006).

A primary health concern in American society today revolves around weight gain and obesity. There is 60% of the adult population which is considered obese and the incident of obesity in children has doubled since the mid 1970s (Center for Disease Control; 2006). Childhood obesity contributes to a variety of health problems, including sleep apnea (Schonfield-Warden & Warden, 1997). Studies show that 80% of obese children will become obese adults (Falkner, Hassink, Ross, & Gidding, 2002; Leermakers, Dunn, & Blair, 2000).

Reasons for the high incidents of obesity in America include technological, economic, and social changes that have altered activity levels and views of food (Robinson et al., 2006). Participation in physical activity has diminished leading to lowered expended energy which is a contributing factor to obesity (Berthold et al., 2002; Carter, 2002). This is especially true in adolescents and children who show a rise in sleep disorder diagnoses (Robinson et al., 2006). National programs, such as school lunch programs, often provide nutrition that exceeds daily recommended levels of fat intake and high-fat, high calorie foods are often available to children during the school day (Carter, 2002). Because juvenile correctional facilities follow the national school lunch program and often have high-fat and high-calorie snacks available for inmates (Robinson et al., 2006; S. Tucker, personal communication, November 2, 2006), it can be assumed that juvenile inmates too are at risk for developing weight problems and subsequent medical concerns such as sleep apnea.

Research investigating the relationship between sleep and body weight indicates a significant link between poor sleep and obesity in adult and adolescent populations (Taheri, Lin, Austin, & Young, 2004). An association between low sleep duration and body mass index increases was found in several large population samples. Further studies indicate a relationship between short sleep times and future weight gain (Heslop, et al., 2002). The risk of increasing body mass with less sleep appears to be related to hormone changes resulting from reduced amounts of sleep. Further research is needed; however, there seems to be clear link between weight gain and shorter sleep episodes. This is a significant finding in that two-thirds of Americans are overweight with the greatest rise in obesity occurring among 18 to 29 year olds with some college education (Center for Disease Control, 2006).

Adult prison populations are experiencing a greater number of medical problems today than a decade ago (Prison Policy, 2005). This rise is contributed to longer sentencing terms and the aging of the inmate population (Bureau of Justice Statistics, 2005). While there is little research investigating prisoner sleep complaints, it is clear that sleep quality diminishes with age, and it can be assumed that this occurs in the prison population as well (Elgers, 2003; Hobson, 1995). Sleep apnea has become a common medical diagnosis inside of prisons, with correctional facilities spending more revenue to treat sleep disorders (M. Dauzart, personal communication, October 31, 2006; S. Tucker, personal communication, November 2, 2006).

Managing pain disorders and end-of-life care for inmate patients is also a growing concern in correctional institutions (Bick, 2002; S. Tucker, personal communication, November 2, 2006). In fact, many correctional systems are instituting hospice care

programs to care for chronically ill and terminal inmates (S. Tucker, personal communication, November 2, 2006). There is little research involving the treatment of sleep complaints in this population; however, it is well known that sleep quality decreases with age and sleep complaints are common in pain disorders and chronic illness in the general population (Bliwise, 2000; Carskadon et al., 1982; Hobson, 1995). It is likely that the aging prison population and those experiencing pain disorders and chronic terminal physical illnesses are experiencing comparable levels of sleep complaints and disorders to the general population.

Sleep difficulties are linked to a variety of physical illnesses in children, adults and adolescents (Asplund, 2000; Hajak, 2000; Schonfeld-Warden & Warden, 1997). Insomnia is linked to coronary artery disease, chronic pain, diabetes, and cardiovascular disease (Asplund, 2000). Sleep loss is associated with impaired immune functioning, protein synthesis and hormone production necessary for physical growth (Irwin et al., 1996; Parker et al., 1980). Sleep apnea is also associated with a variety of medical problems in adults and adolescents (Robinson et al., 2006; Schonfeld-Warden & Warden, 1997), and has become a common medical diagnosis inside of prisons with a concurrent rise in prisoner ages (Bureau of Justice Statistics, 2005; S. Tucker, personal communication, November 2, 2006). There is a clear relationship between sleep difficulties and medical illness; however, the extent of this relationship has yet to be determined.

Sleep and Cognitive Performance

Individuals who received inadequate sleep may be missing most of their REM sleep because this stage predominates the last 4 hours in the overall sleep period. This

may be a problem in prison inmate populations given the trend towards irregular sleep times, shift work job assignments, and the high prevalence of mental health issues associated with sleep complaints in this population (M. Dauzart, personal communication, October 31, 2006). REM sleep plays a vital role in storing information learned during the day into long-term memory (Smith & Lapp, 1991). Research shows that college students who receive more REM sleep demonstrated increased learning efficiency over students without regular amounts of REM sleep (DeKonick et al., 1989). Individuals who have increased amounts of REM sleep following learning periods are able to recall more recently learned information with fewer errors than individuals without increased amounts of REM sleep. Other stages of sleep were analyzed and did not appear to influence learning. Increased language efficiency was associated only with REM sleep periods.

Studies also show that learning new information and increased amounts of REM sleep extends beyond the night after which information was learned (Smith & Lapp, 1991). One investigation determined that participants engaged in intense learning periods have increased REM activity during the later part of the sleep cycle 3 to 5 days following the learning period. The implication from this study is that individuals who do not get a full night of sleep tend to miss REM sleep that is important to memory consolidation. Additionally, individuals who study the night before for a test may miss possible learning benefits of several nights of increased REM activity.

The fact that memory consolidation is related to getting a full night of sleep may have far reaching effects for prison inmates. There is a trend towards rehabilitative efforts in the American correctional system that included providing educational and

vocational training programs (M. Dauzart, personal communication, October 31, 2006; Prison Policy, 2005; Spangenberg, 2003). Because inmates are often not getting a full night of sleep for a variety of reasons, they may be experiencing cognitive problems. Inmates enrolled in education programs may experience academic problems if they are getting less sleep, having later bedtimes, or irregular sleep schedules.

The influence of sleep on attaining new visual-perceptual skills has also been documented. Research participants who learned a novel visual stimulus and were deprived of SWS or REM sleep later the same day showed deficits in their ability to identify the novel stimulus later (Karni, Tanne, Rubenstein, Askenasy, & Sagi, 1994). Individuals who were deprived of only SWS deprivation or who had a normal night of sleep demonstrated improvement in their ability to identify the novel stimulus. These results suggest that activity during REM sleep facilitates newly learned skills of identification and activity during SWS ensures effective performance on previously learned tasks. Prison inmates who participate in educational vocational training programs may be negatively impacted by these findings in that they have a high probability of poor sleep quality that may negatively impact their ability to learn new skills.

In summary, it is clear that individuals who do not sleep well the night before performance measures will most likely perform inadequately (Pilcher & Walters, 1997). The last half of a full night of sleep appears to play a role in consolidating newly learned information as well (Smith & Lapp, 1991). Individuals who are consistently depriving themselves of the last few hours of sleep in a normal sleep cycle may be impairing their ability to learn new information. While research investigating cognitive performance and sleep complaints with prison inmates is lacking, it is likely that they are experiencing the

same performance problems during daytime hours as a result of inadequate sleep that the general population experiences. This may have far reaching effects on the trend of American prisons to provide educational training programs to prisoners.

Sleep and Substance Use

One of the most commonly used substances in American society is caffeine (National Sleep Foundation, 2005). Many argue that that it is the most widely used and abused substance across all cultures in the United States. There are numerous beverages, foods, and medications that contain caffeine which are consumed by a majority of the population. Caffeine consumption can produce significant changes in sleep quality and patterns (Hauri, 1993). As little as one cup of a caffeinated beverage can increase sleep onset times, reduce total sleep time, increase sleep disturbances, and produce lighter sleep (Bonnet & Arand, 1992; Roehrs & Roth, 1997). Individuals who regularly use caffeine may experience less disruptions than occasional caffeine users; however, they may continue to experience sleep difficulties.

Poor sleepers tend to be more sensitive to caffeine than good sleepers (Roehrs & Roth, 1997). Caffeine may negatively affect sensitive individuals up to 10 hours after consumption. Saliva tests indicate that poor sleepers take longer to eliminate caffeine from their blood stream, which may contribute to their inconsistent consequences of caffeine consumption on sleep quality (Tiffin et al., 1995). It is clear that in the general population, caffeine use may negatively impact sleep quality. However, research in prison inmate populations has not investigated the use of caffeine in relation to sleep complaints. Prisoners do have access to caffeinated beverages throughout the day, and it is probable that a comparable percentage of them experience caffeine related sleep

disturbances to that of the general population (M. Dauzart, personal communication, October 31, 2006; S. Tucker, personal communication, November 2, 2006).

Nicotine use is also a common occurrence in American society (Center for Disease Control, 2006). While there has been significant efforts made to inform the general public about the dangers of smoking, little has been said to the general population about the negative impact of nicotine use on sleep (National Sleep Foundation, 2005). In a survey of over 3,500 adults, smoking was associated with difficulty falling asleep and a greater prevalence of nightmares (Wetter & Young, 1994). Interestingly, ex-smokers reported comparable sleep quality to non-smokers and had better sleep quality than non-smokers. In another study, smokers reported less overall sleep time and greater difficulty falling asleep than non-smokers (Soldatos, Kale, Scharf, Bixler, & Kales, 1980).

With increased understanding of the far reaching negative impact of nicotine use on all aspects of health, there is a national movement to ban smoking in public places (American Lung Association, 2006; Center for Disease Control, 2006). This American societal concern is reflected in the prison system as well (S. Tucker, personal communication, November 2, 2006). While some correctional institutes have banned the use of tobacco products by inmates, others still allow cigarette use. Research investigating the relationship of nicotine use and sleep complaints in correctional settings appears lacking; however, it is likely that sleep difficulties are associated with nicotine use in this population as well.

Unfortunately, for those who seek to quit smoking, sleep difficulties may worsen for up to 6 weeks after smoking cessation due to the effects of nicotine withdrawal (Wetter, Fiore, Baker, & Young, 1995). These effects may be countered or lessened by

the inclusion of nicotine replacement therapies during smoking cessation withdrawal periods. This is significant information for correctional facilities instituting inmate smoking bans to better assist prisoners during withdrawal periods after smoking cessation. However, all studies do not show a decrease in sleep difficulties for smokers attempting to quit nicotine using replacement therapies (Wolter et al., 1996).

Individuals have reported using alcohol as a sleep aid, but it actually reduces sleep quality (Johnson, 1997). Occasional alcohol users experience a quicker onset of sleep, but evidence shows that alcohol suppresses REM sleep (Roehrs, Vogel, & Roth, 1997). As the liver processes alcohol, the sedating effects decrease and lighter sleep ensues with more awakening throughout the sleep cycle. In alcohol dependent individuals, sleep disturbances worsen over time (LeBon et al., 1997; Roehrs et al., 1997). Even after the cessation of alcohol use, poor sleep quality may continue for weeks or months.

People who drink more than two servings of alcohol per day are more likely to experience periodic limb movements during sleep (Aldrich & Shipley, 1993). Alcohol consumption increases the frequency of sleep apneas and hypo apneas (Guilleminault, Silvestri, Mondini, & Coburn, 1984; Mitler, Dawson, Henriksen, Sobers, & Bloom, 1988). Individuals may perceive that alcohol helps sleep difficulties, but in reality it lowers sleep quality.

While access to alcohol is limited or absent during incarceration, prisoners do have a higher rate of alcohol use than the general population prior to entering the correction system (Bureau of Justice Statistics, 2005). Many inmates have also admitted to alcohol use during incarceration (M. Dauzart, personal communication, October 31, 2006). For those prisoners who have access to alcohol consumption during their prison

sentences, they may experience sleep disturbances as a result of alcohol use that are seen in the general population.

Substance use appears to produce significant changes in sleep quality and patterns (Hauri, 1991; Johnson, 1997; National Sleep Foundation, 2005; Wetter & Young, 1994). Commonly used substances such as caffeine, nicotine, and alcohol can disrupt sleep cycles and contribute to poor sleep quality. The negative impact of substance use has been identified in adult populations; however, research investigating sleep complaints and substance use in the prison population is lacking. It is probable that inmates experience similar sleep disturbances to the general population when using substances and may even experience higher rates of sleep complaints, given that many prisoners use more substances prior to incarceration than individuals in the general population.

Sleep and Personality

Personality is generally defined as the enduring ways that people think, feel, and act in response to life situations (Passer & Smith, 2001). Personality traits refer to lasting qualities within a person and include such descriptors as sensitive, creative, impulsive, shy, orderly, and sociable (Coon, 1992). Personality traits are relatively enduring patterns and are therefore predictable (Rowe, 1999). Personality is assessed on two broad dimensions across a continuum of their presence or absence. At one end of the spectrum are general traits and the other abnormal traits, which are considered maladaptive. Assessing for personality traits in relation to behavior is a long standing practice in the field of psychology (Passer & Smith, 2001).

Research relating personality to sleep often focuses on the relationship of personality and sleep length. Webb and Friel (1971) grouped undergraduate students into

categories as either naturally long sleepers or short sleepers, and administered both groups personality test batteries. The results did not show significant differences in personality between long and short sleepers. Further study by McCann and Stewin (1987) initially revealed that long sleepers worry more than short sleepers. However, the results were later found to be statistically insignificant. Other research also demonstrated that there is a weak link at best between sleep length and personality (Pilcher et al., 1997; Verlander et al., 1999).

General patterns of sleep length do not appear to be correlated with personality; however, sleep loss does appear to correlate with personality traits. College students deprived of 29 to 35 hours of sleep had significantly higher scores on personality measures of neuroticism as well as deficits in mood than non-sleep deprived individuals (Blagrove & Akehurst, 2001). Sleep deprivation of one night led to increases in anxiety, sensitivity, and excitability in college students (Vein, Dallakyan, Levin, & Skakun, 1983). Another study found that military pilots who are sleep deprived show increased impulsivity (Sicard et al., 2001).

Irregular sleep patterns and personality appear to be correlated as well. Control subjects score significantly higher than irregular sleepers on measures of leadership ability, persistence, and self-confidence on a measure of personality (Taub & Hawkins, 1979). They also score higher on measure of independent action, self-esteem, and egocentricity. Additionally, regular sleepers score higher on measures of flexibility as it related to adaptability in cognitive processes and social behavior.

Research investigating the relationship between sleep and personality has been most conclusive in linking poor sleep quality to the personality trait of neuroticism

(Bonnet, 1985; Gray & Watson, 2002; Lacks & Morin, 1992). High scores on neuroticism are associated with negative mood states. Studies using college students, junior high students, clinical populations, and adults have all produced similar findings in that neuroticism is associated with impaired daytime functioning and sleep difficulties (Bonnet, 1985; Gau, 2000; Gray & Watson, 2002; Lacks & Morin, 1992; Pilcher & Huffcutt, 1996). Whether negative moods cause sleep difficulties or sleep difficulties cause negative moods remains unclear; however, because sleep difficulties are a common symptom of depression, it is possible that there is a cyclical relationship.

Extroversion is another personality trait associated with sleep quality (Gray & Watson, 2002). Studies suggest that extroverted individuals are more alert later in the day (Larsen, 1985). However, other research shows only a weak relationship between alertness during the day and extroversion (Beaulieu, 1991; Gray & Watson, 2002; Vaidya, 1997). Gray and Watson (2002) found that individuals who maintain a later schedule tend to score lower on personality measures of conscientiousness. Additionally, students who score higher on this personality trait are more successful in academic endeavors (Barrick & Mount, 1991; Gray & Watson, 2002). It is possible that sleep may moderate the relationship between conscientiousness and academic performance.

Other research suggests a relationship between sleep and clinical aspects of personality. Monroe (1967) conducted a study that concluded poor sleepers produce significantly higher scores on the seventh and tenth clinical scales of the Minnesota Multiphasic Personality Inventory. This study also noted that poor sleepers ask more questions during research participation and appear to experience adjustment problems.

There is also a link between sleep quality and type A personalities. The type A personality maintains patterns of behavior with aggressive and incessant struggles to achieve more in the least amount of time (Friedman & Rossman, 1974). Several studies link Type A behavior with decreased sleep duration in college students (Hicks et al., 1979; McKelvie, 1992). Research shows that individuals with higher scores on measures of Type A personality have more sleep disturbances, reports of nightmares, and experience difficulty falling asleep (Koulack & Nesca, 1992).

Antisocial personality disordered individuals have abnormal EEG recordings during times of alertness (Lindberg et al., 2003). Habitually violent adult male prisoners with antisocial personality traits report poor sleep quality with problems falling asleep, nocturnal awakenings, and high levels of sleepiness during daytime hours. Similarly, adolescent males with conduct disorder have a higher percentage of SWS with less REM sleep throughout the night (Coble, 1986). These studies suggest that individuals with maladaptive personality characteristics may experience higher rates of sleep disturbances and poorer quality sleep than individuals without abnormal personality traits.

Treatments for Sleep Difficulties

Psychological interventions for sleep problems produce reliable improvement in sleep patterns for many patients with sleep disorders (Ware & Morin, 2000). Pharmacological treatments demonstrate little effectiveness in treating long-term sleep problems (Lichstein & Riedel, 1994; Morin & Wooten, 1996; Murtagh & Greenwood, 1995). Further evidence demonstrates that pharmacotherapy may even undermine the effectiveness of cognitive-behavioral interventions for sleep problems (Morin, Colecchi, Stone, Sood, & Brink, 1999). Interestingly, pharmacological treatments for sleep

complaints are the primary treatment method in correctional settings (Elger, 2003; Kjelsberg & Hartvig, 2005; Szykula & Jackson, 2005). The expense and side effects of drug treatments may counter the potential benefits for treatments of sleep disturbances (Bootzin & Perlis, 1992). Psychological interventions appear ideal for sleep difficulties with the exception of sleep disturbances that require medical interventions, such as narcolepsy or sleep apnea (Morin & Wooten, 2000).

Some of the most effective psychoeducational interventions for sleep problems require very little intervention. These interventions provide consistent results that are at least as effective as long-term psychotherapeutic interventions and are almost always more effective than drug therapies (Murtagh & Greenwood, 1995). Basic information about activities that promote and inhibit sleep, sleep hygiene, is usually provided as a component to treatments of insomnia (American Sleep Disorders Association, 1990).

Sleep hygiene instructions generally include a list of behaviors that promote or inhibit sleep and can be taught in one or two sittings (National Sleep Foundation, 2005). Education sessions usually recommend the cessation or reduction of caffeine consumption as well as alcohol and nicotine (Riedel, 2000). Discontinuation of naps in the late afternoon, regular exercise activities more than 2 hours before bedtime, regular sleep-wake times, comfortable bedroom arrangements, and avoidance of stressful activities close to bedtime are also recommended in sleep hygiene information sessions. Additionally, recommendations to use bright light therapy to promote consistent sleep-wake cycles may be included (Bootzin & Rider, 1997). The efficacy of sleep hygiene interventions show that individuals who received only one session of sleep hygiene instructions improved sleep at 1, 3, and 12 month follow-ups (Hauri, 1993). Sleep

hygiene instruction produces similar results when compared to relaxation or stimulus control studies as well (Schoicket, Bertelson, & Lack, 1988).

Sleep hygiene education tends to be a combination of clinical experience, logic, and empirical evidence. It is likely that some sleep hygiene instructions may fit certain individuals better than others which may influence views of its effectiveness (Dement & Vaughn, 2000). For example, individuals who commonly use alcohol as a sleep aid may need additional instruction on the negative impact of alcohol use on sleep (Johnson, 1997; National Sleep Foundation, 2005). Likewise, individuals who are habituated to caffeine use may not experience negative consequences of its use on sleep (Nehlig, Daval, & Derby, 1992). However, caffeine consumption needs to be eliminated or limited to morning hours for people complaining of sleep difficulties.

Stimulus control instructions are used to assist individuals with sleep complaints as well. These education sessions increase the association of the bedroom with sleep (Bootzin & Epstein, 2000). People with insomnia are instructed to use their beds only for sleep and sex. They are also instructed to lie down only when sleepy, get up at the same time regardless of time spent asleep, eliminate naps, and get up if unable to sleep after 10 minutes and do something else until sleepiness occurs. These instructions may work because individuals with insomnia associate the bedroom with difficulty falling asleep which increases anxiety levels. This may be an effective intervention in reducing sleep complaints in prisoner populations because many inmates use their beds for activities other than sleeping (Ireland & Culpin, 2006; S. Tucker, personal communication, November 2, 2006).

Meta-analyses of treatment methods suggest stimulus control instructions are among the most effective for the treatment of sleep maintenance insomnia and sleep onset insomnia (Engle-Friedman, Bootzin, Hazelwood, & Tsao, 1992; Lack, 1986; Morin & Wooten, 1996; Murtagh & Greenwood, 1995). This may be an effective treatment because non-sleeping activities in the bedroom result in associating the bedroom with that activity rather than the process of falling asleep (Bootzin & Nicassio, 1991). One-month follow-up studies suggest that stimulus control and relaxation therapies produce superior results to drug therapies (McClusky, Milby, Switzer, Williams, & Wooten, 1991).

Another treatment for sleep difficulties is sleep restriction therapy. This therapy arose from observations that individuals with insomnia, especially older adults, spend excessive amounts of time in bed trying to recover lost sleep (Morin & Wooten, 1996). The less sleep these individuals get, the more inefficient their time spent in bed becomes. Sleep restriction therapy seeks to increase the proportion of time sleeping while in bed. Adjustments in sleep are made until the individual achieves optimal sleep time. For example, if people complain of attaining only 4 hours of sleep, the amount of time spent in bed is limited by 4 hours. When their sleep efficiency exceeds 85% to 90%, the amount of time allowed in bed is increased by 20 minutes. If sleep efficiency falls below 80%, the amount of time in bed is reduced by 20 minutes. This adjustment process continues until optimal sleep is acquired.

In a meta-analysis of research examining the effectiveness of sleep treatments, sleep restriction therapy and stimulus control instructions were the two most effective treatments for sleep difficulties (Morin et al., 1994). When these therapies were combined, patients with sleep maintenance insomnia had fewer night time awakenings,

less time awake in bed, and a general increase in sleep efficiency (Bootzin & Perlis, 1992).

Relaxation training is a psychotherapeutic intervention for sleep disturbances designed to decrease physiological arousal that prevents sleep onset (University of Maryland Medical Center, 2006). Relaxation therapies include behavioral relation therapies such as progressive muscle relaxation and deep breathing exercises. Behavioral techniques work for physical restlessness, and cognitive imagery techniques are effective for worry or ruminations (Morin & Wooten, 1996). Relaxation therapy is likely to work for individuals who are physiological aroused during periods of insomnia (Ware & Morin, 2000). Others may require cognitive therapeutic interventions for anxiety and worry symptoms (Morin & Wooten, 1996).

Many cognitive symptoms contribute to sleep difficulties such as worrying and cognitive intrusions (Ware & Morin, 2000). The most consistently used interventions for these problems are paradoxical intention, cognitive restructuring, and thought stopping techniques (Morin, Kowatch, Berry, & Walton, 1993). These techniques strive to change maladaptive underlying cognitions about sleep. Treatments that focus on changing negative maladaptive beliefs can increase sleep efficiency, reduce night time awakenings, and decrease the time it takes to fall asleep (Morin et al., 1993; Murtaugh & Greenwood, 1995; University of Maryland Medical Center, 2006).

During times of stress, it is common for individuals to have sleep difficulties (Murtaugh & Greenwood, 1995). However, individuals with consistent sleep difficulties due to intrusive thoughts may require cognitive-behavioral interventions. Thought stopping techniques appear to be effective in assisting a more rapid sleep onset (Wolpe,

1973; Levey et al., 1991). Paradoxical intention is another cognitive approach that is more effective than no treatment in reducing anxiety associated with worry about falling asleep (Shoham-Salomon & Rosenthal, 1987). However, this intervention is not as effective as other techniques for reducing unwanted night time awakenings (Murtagh & Greenwood, 1995).

It is clear that psychotherapeutic interventions are effective in reducing sleep complaints (Morin & Wooten, 1996; National Sleep Foundation, 2005; Riedel, 2000). While this is evident in the general population, research in implementing interventions in correctional settings appears minimal (Elgers, 2003; Elgers, 2004; Ireland & Culpin, 2006; Lutz, 1990). It is likely that these interventions would be effective in reducing sleep complaints by prison inmates as well given they experience similar problems to individuals in the general population. Inmates are known to experience insomnia, sleep apneas, medical problems associated with sleep disturbances, and mental health problems associated with sleep difficulties (Bureau of Justice Statistics, 2005; Ireland & Culpin, 2006; S. Tucker, personal communication, November 2, 2006) However, research is needed to determine the impact of sleep education on poor sleep quality for prison inmates.

Hypotheses

The literature suggests that psychotherapeutic interventions for sleep complaints improve sleep quality in adult and college student populations. However, review of the literature produced minimal research examining the relationship between sleep complaints and psychotherapeutic interventions in the incarcerated as compared to research with other populations. While it is evident that prisoners have sleep difficulties,

the exact causes of inmate poor sleep quality is unknown. Prison settings have the potential disruptions that can lead to poor sleep quality and inconsistent sleep habits. There is a need to determine if educational interventions effective for improving sleep quality and habits in other populations work for the incarcerated as well.

This study determined if providing education to prison inmates about the importance of sleep, sleep hygiene knowledge, and relaxation techniques resulted in better sleep hygiene practices, more consistent sleep habits, and improved sleep quality. Based on the research available, the following hypotheses were examined.

Justification for Hypothesis One

Many individuals are unaware of behaviors that promote good sleep quality (Hicks et al., 1999) The efficacy of sleep hygiene interventions show that individuals who receive only one session of sleep hygiene instruction report a greater understanding of the importance of good sleep habits (Brown, 2002).

Hypothesis One

Participants in the sleep hygiene education group will report greater knowledge about the importance of sleep hygiene after participation in the group than participants in the relaxation education group and the control group.

Justification for Hypothesis Two

Studies show that psychoeducational interventions such as sleep hygiene instructions are effective in improving overall sleep quality (Brown, 2002; Murtagh & Greenwood, 1995; Pilcher & Huffcutt, 1996). Even groups that have many external demands experience better sleep quality following psychoeducational sleep interventions (McCurry et al., 1998). It is likely that prisoners will experience better sleep quality after

sleep hygiene education in spite of the potentially stressful environment in which they live.

Hypothesis Two

Sleep hygiene education group participants will report better overall sleep quality at four weeks post-treatment than participants in the control group.

Justification for Hypothesis Three

Relaxation therapies focus on decreasing physiological arousal to ease sleep onset (Ware & Morin, 2000). Studies show that relaxation therapies improve sleep quality by reducing physiological arousal (Bonnet & Arand, 1995; Monroe, 1967).

Hypothesis Three

Participants in the relaxation education group will report better overall sleep quality after participation in the group than participants in the control group.

Justification for Hypothesis Four

Improved sleep quality occurs after participation in sleep hygiene instruction and relaxation training (Bonnet & Arand, 1995; Brown, 2002; Murtagh & Greenwood, 1995; Pilcher & Huffcutt, 1996). However, relaxation instruction appears to work best for individuals who are physiologically hyper-aroused (Bonnet & Arand, 1995). Not all individuals who experience sleep complaints are hyper-aroused.

Hypothesis Four

Sleep hygiene education group participants will report better overall sleep quality than participants in the relaxation education group at four weeks post-treatment.

Justification for Hypothesis Five

Meta-analytic studies with various populations strongly support the efficacy of psychoeducational interventions to improve overall sleep quality, which includes subjective sleep satisfaction, sleep duration, sleep efficiency, and sleep latency (Murtagh & Greenwood, 1995; Pilcher & Huffcutt, 1996).

Hypothesis Five

Participants in the sleep hygiene education group and the relaxation education group will report shorter sleep latency than participants in the control group after completing the education sessions.

Justification for Hypothesis Six

Many individuals lack knowledge of behaviors that promote good sleep habits (Hicks et al., 1999). After participation in sleep hygiene instruction reports of sleep quality improve (Bonnet & Arand, 1995; Brown, 2002; Murtagh & Greenwood, 1995; Pilcher & Huffcutt, 1996). With improved sleep quality, reports of daytime dysfunction decrease (Pilcher & Huffcutt, 1996; Walsh & Lindblom, 2000).

Hypothesis Six

Control group and relaxation education group participants will report more daytime dysfunction than sleep hygiene education group participants at four weeks post-treatment.

CHAPTER 2

Methods

The purpose of this study was to evaluate the effectiveness of a psychoeducational intervention program aimed at improving sleep quality, length, and habits for prison inmates. Evaluation included examination of the program's impact on inmate sleep habits and sleep quality; and prisoner knowledge of the importance of sleep hygiene. Specifically, the extent to which inmate sleep quality, sleep length, and sleep habits changed after participation in the program. Evaluation also included assessment of how inmate participation in sleep hygiene education compared to relaxation education and placebo education in improving inmate sleep quality and sleep hygiene. The study was approved by the Louisiana Department of Corrections Research Review Committee and permission was obtained from the warden and the director of mental health at a local correctional facility to conduct the study (Appendix A). Permission to conduct the study was also granted by the Institutional Review Board of the participating university (Appendix B). The study utilized: a Demographics questionnaire; the Sleep Quality Index (Urponen et al., 1991) as a measure of sleep quality; the Sleep Habits Questionnaire (Brown et al., 2001) to evaluate sleep habits; the Pittsburgh Sleep Quality

Index (Buysse et al., 1989) as a measure of sleep patterns and sleep quality, and the Sleep Hygiene Awareness and Practice Scale (Lacks & Rotert, 1986) to evaluate awareness and practice of sleep hygiene.

Participants

Participants in this study were inmate volunteers from a medium security state department of corrections facility for men in the southern United States. From an initial sample of 75 subjects, data from 74 participants were retained for analysis. One participant was excluded from the study for failure to finish the 4 week post-treatment survey. The study sample was comprised of 61% African Americans, 1% Asian Americans, 34% Caucasian Americans, and 4% chose "other" as the ethnic group with which they most closely identify. Participant current conviction charges included drug related (69%), burglary (14.9%), theft (5.4%); probation violations (4.1%), forgery (2.7%), check fraud (1.4%), escape (1.4%), and weapon possession (1.4%). A total of 46% of the inmate volunteers spent time in prison prior to this incarceration. All participants were non-violent offenders with 12 months or less left on their sentences.

Participation was voluntary with no consequence for declining or dropping out of the study. No compensation was given for participation. All participants were treated in accordance with the ethical guidelines established by the American Psychological Association's *Ethical Principles of Psychologists and Code of Conduct* (2002). A consent form explaining the nature of the study was explained to all volunteers and signed by all participants prior to initiation of treatment groups (Appendix C). All data collected were held strictly confidential and was only viewed by the researcher. Data were used to gather group information and no data was analyzed or reported individually.

Instrumentation

Demographic Questionnaire

The demographic questionnaire (Appendix D) consists of 8 items. These questions inquire about participant age, education level, ethnicity, current criminal conviction, number of prior incarcerations, time spent in prison this sentence, mental health diagnoses, and medical problems.

Sleep Quality Index

The Sleep Quality Index (Appendix E) is an eight-item self-report inventory of general sleep difficulties (Urponen et al., 1991). This inventory has one scale labeled *Sleep Quality*. For question one, respondents have three answer choices related to the time it takes to fall asleep, less than 10 minutes, 11-30 minutes, or more than 30 minutes. Questions 2 through 5 and question 7 ask respondents about the frequency of specific sleep difficulties (e.g. insomnia, difficulty falling asleep, disturbed sleep) providing one of three answers to choose: "no", " less than 3 days per week", and "3-7 days per week." Question 6 inquires about tiredness in the morning and offers 3 possible answers: "very or mostly alert", "don't know", and "very or mostly tired." Question 8 asks if sleep medication has been used during the past 3 months. For each of the eight questions, answers are weighted as 0, 1, or 2, with 2 representing the most severe or common symptom. The *Sleep Quality* score is calculated by summing all questions to derive a total. Scores of 0 or 1 indicate good sleep quality, scores from 2 to 8 indicate occasional sleep difficulties, and scores of 9 to 16 equal poor sleep quality. Initial support for the validity of the Sleep Quality Index is provided by a significant relationship between subjective health and sleep quality (Urpon et al., 1991).

Sleep Habits Questionnaire

The Sleep Habits Questionnaire (Brown et al., 2001) consists of 9 open-ended items (Appendix F). Respondents report their usual amount of sleep, wake-up times, bedtimes, and other sleep-wake habits for the weekend and week. Questions also request respondents to report their ideal quantity of sleep during the week and on the weekends.

The Pittsburg Sleep Quality Index

The Pittsburg Sleep Quality Index (Appendix G) is a 19-item self-report questionnaire designed to measure sleep quality and disturbances over a one month period (Buysse et al., 1989). The first four items are fill-in-the-blank format and ask respondents for their usual bedtime, wake time, sleep latency, and sleep length. Remaining items ask how often respondents experienced specific symptoms within the past month. Responses to these items include: "not during the past month", "less than once a week", "once or twice a week", or "three or more times a week". Symptoms evaluated include: cannot get to sleep in less than 30 minutes, have to get up to use the bathroom, had bad dreams, and how often have you taken medication to help you sleep.

The summation of the 19 items scored yield a *Global Sleep Quality* score, ranging from 0, indicating no difficulty, to 21, indicating severe sleep difficulties. The *Global Sleep Quality* score is derived by summing each of the 7 component scores: *subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication,* and *daytime dysfunction*. The component scores labeled *subjective sleep quality, sleep duration,* and *use of sleep medication* are scored from single items. The component scores labeled *sleep latency, habitual sleep efficiency, sleep disturbances,* and *daytime dysfunction* are derived by adding specific item scores.

Component scores range from 0, indicating no problem, to 3 indicating severe difficulties (see Appendix G for component and global score details). Question 10 is not included in the component score measures and will be omitted for this study. This question inquires about bed partners and is not applicable to the study population.

The Pittsburg Sleep Quality Index (Buysse et al., 1989) has good internal consistency (Cronbach's $\alpha = .83$) and acceptable global test-retest reliability ($r = .85$). The component scores have moderate internal consistencies with Cronbach's α ranging from .76 for *subjective sleep quality*, to a rather low score of .35 for *sleep disturbances*. Test-retest reliabilities are acceptable for most of the component scores, ranging from a Pearson's $r = .84$ for *sleep latency* to $r = .65$ for medication use. All of the component scores are significantly correlated with the *Global Sleep Quality* score (*habitual sleep efficiency* $r = .85$; *sleep quality* $r = 83$; sleep duration $r = .80$; *sleep latency* $r = .72$; *daytime dysfunction* $r = .63$; *sleep medication* $r = .62$; *sleep disturbance* $r = .46$). The authors did not report the correlations between component scores; however, these scores were derived from prior empirical research and are considered part of the total *Global Sleep Quality* score rather than discrete factors. The use of component scores in this way receives support from the higher total inter-item reliability as compared to the component score item inter-item reliability.

This instrument effectively discriminates between individuals with sleep complaints and individuals without sleep complaints. Buysse et al. (1989) reported that a cutoff score of 5 correctly identified 84.4% of disorders involving the initiation and maintenance of sleep, 97% of depressive disorders, and 88% of excessive sleepiness

disorders in the standardization sample. This cutoff score also correctly identified 88% of all patients and controls in the standardization sample (kappa = .75, $p < .001$).

The Pittsburg Sleep Quality Index (Buysse et al., 1989) has been used in numerous studies since the original standardization research in a variety of populations (Lockley et al., 1997; Nokes & Kendrew, 2001; Phillips & Skelton, 2001; Pilcher et al., 1997; Pilcher & Ott, 1998; Smith, Perlis, Smith, Giles, & Carmody, 2000). Widespread use of the Pittsburg Sleep Quality Index facilitates comparison of results from the present study with previous research. This is a well documented measure of sleep quality with verifiable reliability and validity.

Sleep Hygiene Awareness and Practice Scale

The Sleep Hygiene Awareness and Practice Scale (Appendix H) was developed in a study comparing sleep hygiene of established insomniacs and good sleepers (Lacks & Rotert, 1986). This instrument measures awareness of sleep hygiene and current practices. It is a self-report questionnaire divided into 2 sections. The first section, the Awareness section, is divided into two subsections labeled Sleep Hygiene Awareness and Caffeine Awareness. The second section, the Practice section, contains 19 items related to sleep hygiene practices.

The Sleep Hygiene Awareness subsection inquires about respondent knowledge of daytime behavior effects on sleep. There are 13 questions that list a variety of behaviors (e.g. daytime napping, smoking, sleep medication, caffeine use, alcohol consumption) that are rated from 1, beneficial to sleep, to 7, disruptive to sleep. Responses are given 1 point if correct, 2 points if not answered, and 3 points if incorrect.

Scores can range from 13-39 with higher scores indicating less sleep hygiene knowledge (see Appendix H for scoring information).

The second subsection of the Awareness section, Caffeine Awareness, evaluates caffeine knowledge by asking respondents to identify common foods, beverages, and nonprescription drugs as caffeinated or non-caffeinated. Respondents write "Y" if the substance contains caffeine, "N" if it does not contain caffeine and "X" if they are unfamiliar with the substance. Scores range from 0-100, which corresponds to the percentage of correct responses. Higher scores indicate more knowledge about substances that contain caffeine.

The Practice section lists 19 questions about sleep hygiene practices. Respondents are asked to identify the number of days per week (0-7) that they have had the experience or engaged in the activity listed (e.g. take a nap, worry prior to bedtime, exercise 2 hours before bedtime, relax before bed). Responses are scored one point for each day of the activity from 0, indicating never, to 7, indicating every day or night. Scores range from 0 to 133 with higher scores less indicative of good sleep hygiene practices.

Lacks and Rotert (1986) did not supply reliability information for the Sleep Hygiene Awareness and Practice scale. Internal and test-retest reliability was determined by another study (Brown et al., 2001). Internal reliability was measured for each section of the instrument. The Sleep Hygiene Awareness subsection had good internal reliability (Cronbach's $\alpha = .78$), the Caffeine Knowledge subsection had poor internal reliability (Cronbach's $\alpha = .47$), and the Practices section had poor internal reliability (Cronbach's $\alpha = .55$). Test-retest reliabilities measured with Pearson's Product-Moment Correlations

revealed good test-retest reliability for the Sleep Hygiene Awareness subsection (r = .76, $p < .001$) and the Practice section (r = .74, $p < .001$). The test-retest reliability for the Caffeine Knowledge subsection was poor (r = .50, $p < .001$).

Sleep Hygiene Education Program

The Sleep Hygiene Education Program (Appendix I) is based on information commonly provided in sleep hygiene education literature (Brown, 2002; Dement, 1999; National Sleep Foundation, 2005; Pressman & Orr, 2000). It includes a 30-minute oral presentation and participant handouts: *Sleep Hygiene Guidelines*, *Substances with Caffeine*, and *Stimulus Control Instructions*. The oral presentation begins with an introductory paragraph briefly describing the prevalence of sleep difficulties in prisoner populations. The following paragraphs focus on consequences that individuals may experience due to inadequate amounts of sleep, inconsistent sleep habits, and poor sleep quality. These paragraphs include brief summaries of empirical data that lend credence to the importance of sleep. The script then proceeds to review the *Sleep Hygiene Guidelines, Substances with Caffeine, and Stimulus Control Instructions* handouts with additional emphasis on the reasons for the information provided.

Sleep Hygiene Guidelines are 10 behaviors that either promote or inhibit sleep. They are commonly part of clinical practice and receive substantial support for effectiveness in dealing with sleep difficulties (Lacks, 1987; Morin et al., 1994; Murtagh & Greenwood, 1995; National Sleep Foundation, 2005). These instructions guidelines review common sleep hygiene practices including the importance of consistent morning exposure to sunlight or artificial light sources (Bootzin et al., 1991; Lacks, 1987; National Sleep Foundation, 2005).

The *Substances with Caffeine* handout provides information about commonly used products that contain caffeine. This list includes beverages, foods, and medications. The amount of caffeine each substance contains is also provided (Nehlig et al., 1992; Roehrs & Roth, 1997; Tiffin, Ashton, Marsh, & Kamali, 1995).

Relaxation Education Program

The Relaxation Education Program (Appendix J) was based on commonly taught relaxation training information (Cleveland Clinic, 2006; Spine Health.com, 2006; Smith, 2002; University of Maryland Medical Center, 2006). It includes a 30-minute oral presentation and handouts: *Benefits of Relaxation Exercises* and *Relaxation Techniques*. The oral presentation begins with an introductory paragraph explaining the purpose of relaxation education. The next paragraph describes the prevalence of problems associated with the absence of relaxation and the likelihood of increased stress. The following paragraphs focus on consequences that individuals may experience due to an inability to relax with a focus on increased anxiety and stress levels. The script then proceeds to review the *Benefits of Relaxation Exercises* and *Relaxation Techniques* handouts with additional emphasis on the reason for the education session and examples of technique implementation.

The *Benefits of Relaxation* handout reviews the use of relaxation techniques as helpful tools for coping with stress and promoting long-term health. This information is provided in accordance with common clinical practice that outlines how the human body reacts to demands and the need to counter the ill effects of accumulated stress (Ornish et al., 1998; Smith, 2002). The negative impact of stress is highlighted along with the benefits of relaxation in assisting with mental and physical ailments (e.g. pain disorders,

anxiety, high blood pressure, headaches, hyperactivity, irritability, irritable bowl syndrome).

The *Relaxation Techniques* handout provides a description of commonly taught techniques in clinical practice to assist individuals (Smith, 2002; University of Maryland Medical Center, 2004). Relaxation techniques were selected due to the simplicity in which they can be explained and the ease in which they can be implemented. The techniques provided discuss learning how to relax include progressive muscle relaxation, toe tensing, deep breathing, and stretching exercises.

Control Group Education

The control group education (Appendix K) is a means to compare treatment groups. It is based on information obtained from psychoeducational materials (Finley & Lenz, 1999; Gorski & Grinstead, 2000) and the *Diagnostic and Statistical Manual of Mental Disorders* (*4th edition) text revision* (American Psychiatric Association, 2000). It includes a 30-minute oral presentation on substance abuse prevention and handouts: *Signs of Alcohol and Drug Use Problems* and *Where to Get Help for Substance Related Disorders.* The oral presentation begins with an introductory paragraph explaining the purpose of prevention education. The next paragraph describes the prevalence of problems associated with substance-related disorders. The following paragraphs focus on consequences that individuals may experience as a result of alcohol or drug use. The script then proceeds to review information provided on the treatment for substance-related problems and where to get help for alcohol and drug problems.

The *Signs of Alcohol and Drug Use Problems* handout provides a list of common issues associated with excessive alcohol use and illicit/illegal drug use. It contains

information related to the negative impact on all areas of life that substance use, abuse, or dependence can produce. The *Where to Get Help for Substance-Related Disorders* handout provides general information for treatment programs and how to find treatment programs in different regional areas. This information sheet also provides a list of self-help recovery programs that may be of assistance. Additional information is provided specific to inmates about how to access mental health services/treatment within the prison system and when self-help meetings are available.

Procedure

Prior to collection of data, the Institutional Review Board of the participating university approved this study. There were 75 participants recruited from the general population of a medium security state department of corrections facility for men in the southern United States. Interested parties in the study signed up for voluntary participation through recruiting efforts and attended a group meeting on a specified date with information that participation was completely voluntary, there was no compensation for participation, and all data collected would be stored separately from consent forms to ensure anonymity. After agreeing to participate, a consent form was signed by each participant and each was randomly assigned to one of three groups with each group containing 25 participants. Once assigned, each participant received notification of his assigned time to participate in study activities.

Each group met at their assigned times and received a survey packet containing the Demographic Questionnaire, Sleep Habits Survey, Pittsburg Sleep Quality Index, and the Sleep Hygiene Awareness and Practice scale with instructions on how to complete the forms correctly. Participants were asked to write an easily remembered four digit number

in the ID blank that they could remember for pre-test and post-test data collection. They were instructed to write their best estimates and use one answer rather than a range of answers for fill in the blank items. Participants turned over their surveys when completed and remained quiet until all materials were collected.

Once the surveys were completed in each group, participants were informed that any concerns about information provided during the education sessions would be addressed at the end of the study in four weeks. The researcher moderated the first half of the educational lecture and provided the handouts appropriate to each group format (Sleep Hygiene Education, Relaxation Training Education, Control Group Education). Each session was held for 45 minutes on the same date.

A second 45 minute session was scheduled with verbal and written notification given to each participant. The remaining education lectures were conducted two days later. The third session was conducted four weeks later with all groups meeting separately to complete the post-test survey packet with a review of directions for proper completion. Participants were asked to place an "X" next to their ID number if they had watched on television, read, or otherwise sought information regarding sleep quality, sleep habits or relaxation techniques. This measure was taken to increase the likelihood that changes were due to the treatments provided. None of the participants placed an "X" next to their names. However, if an individual had done so, they would have been excluded from data analysis. After the surveys were collected, participants were given time to ask brief questions and received debriefing information about the study.

Data Analysis

Several levels of statistical analysis were conducted. Frequency and percentages were calculated for ethnicity, education level, criminal convictions, prior incarcerations, and number of months spent in prison. Means, standard deviations, and ranges were calculated for participant ages. Internal consistencies, means, and standard deviations were calculated for the instruments used.

Hypothesis one was tested using a multivariate analysis of variance (MANOVA). The categorical independent variable was the 3 groups: Sleep Hygiene Education Program group, Relaxation Education Program group, and the Control Education group. The dependent variable was the scores on the *sleep hygiene knowledge* component score of the Sleep Hygiene Awareness and Practice Scale (Lacks & Rotert, 1986). Results were evaluated for a statistically significant effect size using the common guidelines (.01 = small, .06 = moderate, .14 = large effect) proposed by Cohen (1988).

Hypotheses two, three, and four were tested using a MANOVA. The categorical independent variable was the 3 groups: Sleep Hygiene Education Program group, Relaxation Education Program group, and the Control Education group. The continuous dependent variable was the scores on the *sleep quality* scale of the Sleep Quality Index (Urponen et al., 1991). Results were evaluated for a statistically significant effect size using the common guidelines (.01 = small, .06 = moderate, .14 = large effect) proposed by Cohen (1988).

Hypothesis five was tested with a MANOVA. The categorical independent variable was the 3 groups: Sleep Hygiene Education Program group, Relaxation Education Program group, and the Control Education group. The continuous dependent

variable was the component score labeled *sleep latency* on the Pittsburg Sleep Quality Index (Buysse et al., 1989). Results were evaluated for a statistically significant effect size using the common guidelines (.01 = small, .06 = moderate, .14 = large effect) proposed by Cohen (1988).

Hypothesis six was tested using a MANOVA. The categorical independent variable was the 3 groups: Sleep Hygiene Education Program group, Relaxation Education Program group, and the Control Education group. The continuous dependent variable was the scores on the *daytime dysfunction* component scale of the Pittsburg Sleep Quality Index (Buysse et al., 1989). Results were evaluated for a statistically significant effect size using the common guidelines (.01 = small, .06 = moderate, .14 = large effect) proposed by Cohen (1988).

CHAPTER 3

Results

The purpose of this chapter is to present the evaluation of a sleep hygiene education program to improve inmate sleep quality. Sample characteristics are presented first. Reliability for the scales used in the current study is then discussed. Next, means, standard deviations, and reliabilities of the variables are provided. Finally, the results of the current study are presented by hypotheses.

Participants

Participants in this study were inmate volunteers from a medium security state department of corrections facility in the southern United States. From an initial sample of 75 subjects, data from 74 participants were retained for analysis. One participant was excluded from the study for failure to finish the four week post-treatment survey. The study sample was comprised of 61% African Americans, 1% Asian Americans, 34% Caucasian Americans, and 4% chose "other" as the ethnic group with which they most closely identify. All participants were convicted of nonviolent offenses and had 12 months or less to serve on their sentence. Participant current conviction charges included drug related (69%), burglary (14.9%), theft (5.4%); probation violations (4.1%), forgery (2.7%), check fraud (1.4%), escape (1.4%), and weapon possession (1.4%). A total of

46% of the inmate volunteers spent time in prison prior to this incarceration. Table 1 presents the means and standard deviations of further demographic information.

Table 1

Participant Demographic Means and Standard Deviations

Variables	M	SD
Age		
Total Sample	24.19	4.62
Sleep Hygiene Group	24.20	5.21
Relaxation Group	24.16	4.33
Control Group	24.21	4.46
Years of Education		
Total Sample	10.96	1.79
Sleep Hygiene Group	10.24	1.69
Relaxation Group	11.36	1.82
Control Group	11.29	1.68
Months in Prison for Current Charge		
Total Sample	9.12	5.46
Sleep Hygiene Group	10.68	6.24
Relaxation Group	9.96	5.02
Control Group	6.63	4.23

Means, Standard Deviations, and Internal Consistencies

Table 2 presents the means, standard deviations, and internal consistencies for the Sleep Quality Index (Urponen et al., 1991), Sleep Hygiene Awareness and Practice Scale (Lacks & Rotert, 1986), Sleep Latency and Daytime Dysfunction component scales of the Pittsburg Sleep Quality Index (Buysse et al., 1989). Frequencies are provided for the total sample and each group prior to and at 4 weeks after participation in the education groups.

Table 2

Means, Standard Deviations, and Internal Consistencies for the Sample

Variables by Group	Initial			4 Weeks		
	M	*SD*	*α*	*M*	*SD*	*α*
Sleep Quality						
Total Sample	7.22	3.33	.6879	6.62	3.49	.7530
Sleep Hygiene Group	8.00	2.53	.4482	6.64	3.45	.7605
Relaxation Group	7.80	2.90	.6088	7.32	3.02	.6716
Control Group	5.79	4.06	.7981	5.88	3.94	.7891
Sleep Hygiene Knowledge						
Total Sample	26.78	6.06	.7631	27.00	6.30	.7804
Sleep Hygiene Group	25.40	6.64	.8268	25.32	7.93	.8872
Relaxation Group	26.78	5.40	.6809	27.72	4.24	.5171
Control Group	28.17	6.04	.7546	28.00	6.07	.7318
Sleep Latency						
Total Sample	1.61	.89	.6313	1.39	.89	.5981
Sleep Hygiene Group	1.52	.82	.7273	1.40	.87	.6502
Relaxation Group	1.92	.81	.7974	1.72	.84	.5789
Control Group	1.38	.97	.4364	1.04	.86	.5017
Daytime Dysfunction						
Total Sample	1.16	.92	.4013	1.11	.92	.5363
Sleep Hygiene Group	1.24	.93	.5563	1.00	.96	.7404
Relaxation Group	1.16	.85	.0030	1.12	.67	.1157
Control Group	1.08	1.02	.5511	1.21	.93	.5547

Note: Initial = scores prior to participation in the education groups, 4 weeks = scores 4 weeks after participation in the education groups, M = Mean, SD = Standard Deviation, *α* = *alpha,* Sleep Quality is measured by the Sleep Quality Index, Sleep Hygiene Knowledge is measured by the Sleep Hygiene Awareness and Practice Scale, Sleep Latency and Daytime Dysfunction are component scales of the Pittsburg Sleep Quality Index.

Table 3 presents the prevalence of selected symptoms on the Sleep Quality Index (Urponen et al., 1991) for the sample at four weeks after participation in the education groups. The percentage of the participants rated with poor sleep quality is also presented. Items are outlined separately to highlight the frequency of sleep complaints reported.

Table 3

Sleep Quality Index Response Review

Responses	Total (%)
Difficulties falling asleep 3 to 7 days per week	
Total Sample	21.6
Sleep Hygiene Group	20.0
Relaxation Group	24.0
Control Group	20.8
Disturbed nights sleep 3 to 7 days per week	
Total Sample	32.4
Sleep Hygiene Group	36.0
Relaxation Group	20.0
Control Group	41.7
Tiredness in the morning (very or mostly tired)	
Total Sample	45.9
Sleep Hygiene Group	44.0
Relaxation Group	64.0
Control Group	29.2
Poor sleep quality	
Total Sample	30.0
Sleep Hygiene Group	28.0
Relaxation Group	32.0
Control Group	29.3

Note: Total (%) = the total percent of responses

Results for Hypotheses

Hypothesis One

The first hypothesis stated that participants in the sleep hygiene education group would report greater knowledge about the importance of sleep hygiene four weeks after participation in the group than relaxation and control group participants. A multivariate analysis of variance (MANOVA) was performed to investigate group differences in sleep hygiene knowledge at four weeks post-treatment. Two dependent variables were used: sleep hygiene awareness prior to participation in the education groups and sleep hygiene awareness four weeks after group participation. The independent variable, education group, has three levels including sleep hygiene education, relaxation education and control group education. The groups did not differ significantly in sleep hygiene awareness prior to participation in the education sessions or at four weeks after treatment, $F(4, 140) = .916, p = .457$. These results, shown in Table 4, did not confirm hypothesis one.

Table 4

Multivariate Analysis of Variance for Sleep Hygiene Knowledge

Effect	*df*	*F*	Error *df*	α
Education group	4	0.916	140	.457

Hypothesis Two

Hypothesis two proposed that sleep hygiene education group participants would report better overall sleep quality at four weeks post-treatment than control group

participants. A MANOVA was performed to investigate group differences in sleep quality four weeks after group participation. Two dependent variables were used: sleep quality prior to participation in the education groups and sleep quality four weeks after group participation. The independent variable, education group, had three levels including sleep hygiene education, relaxation education and control group education. Analysis of the dependent variables did not show any significant differences among the groups, F (4, 140) = 2.31, p = .061. These results, shown in Table 5, did not confirm hypothesis two.

Table 5

Multivariate Analysis of Variance for Sleep Quality

Effect	*df*	*F*	Error *df*	α
Education group	4	0.916	140	.061

Hypothesis Three

Hypothesis three stated that relaxation education group participants would report better overall sleep quality at four weeks after treatment than control group participants. Multivariate analysis of variance was performed to investigate group differences in sleep quality 4 weeks after group participation. Two dependent variables were used: sleep quality prior to participation in the education groups and sleep quality four weeks after group participation. The independent variable, group, had three levels including sleep hygiene education, relaxation education and control group education. Analysis of the

dependent variables did not show any significant differences among the groups, F (4, 140) = 2.31, p = .061. These results, shown in Table 5, did not confirm hypothesis three.

Hypothesis Four

Hypothesis four proposed that sleep hygiene education group participants would report better overall sleep quality than relaxation group participants at four weeks post-treatment. A MANOVA was conducted to investigate group differences in sleep quality four weeks after group participation. Two dependent variables were used: sleep quality prior to participation in the education groups and sleep quality four weeks after group participation. The independent variable, education group, had three levels: sleep hygiene education, relaxation education and control group education. Results of the MANOVA did not show any significant differences among the groups prior to education participation or at four weeks after participation, F (4, 140) = 2.31, p = .061. These results, shown in Table 5, did not confirm hypothesis four.

Hypothesis Five

Hypothesis five stated that participants in the sleep hygiene education and relaxation education groups would report shorter sleep latency than participants in the control group after completing the education sessions. A MANOVA was conducted to investigate group differences in sleep latency four weeks after group participation. Two dependent variables were used: sleep latency prior to participation in the education groups and sleep latency four weeks after group participation. The independent variable, education group, had three levels including sleep hygiene education, relaxation education and control group education. Analysis did not show any significant differences among the groups in sleep latency before or at four weeks after participation in the education

groups, F (4, 140) = 2.15, p = .077. Results of the MANOVA, shown in Table 6, did not confirm hypothesis five.

Table 6

Multivariate Analysis of Variance for Sleep Latency

Effect	*df*	*F*	Error *df*	α
Education group	4	2.16	140	.077

Hypothesis Six

Hypothesis six stated sleep hygiene education group participants would report less daytime dysfunction than control and relaxation education group participants at four weeks post-treatment. A MANOVA was performed to investigate group differences in sleep latency four weeks after group participation. Two dependent variables were used: daytime dysfunction prior to participation in the education groups and daytime dysfunction four weeks after group participation. The independent variable, education group, had three levels including sleep hygiene education, relaxation education and control group education. Multivariate analysis of variance did not show any significant differences between the groups in daytime dysfunction before or at four weeks after participation in the education groups, F (2, 140) = 1.02, p = .400. The results, shown in Table 7, did not confirm hypothesis six.

Table 7

Multivariate Analysis of Variance for Daytime Dysfunction

Effect	*df*	*F*	Error *df*	α
Education group	4	1.02	140	.400

CHAPTER 4

Discussion

The focus of the current study was to evaluate the effectiveness of a sleep hygiene program to improve inmate sleep quality, sleep length, and sleep habits. The hypotheses were designed to identify how participation in a sleep hygiene education group, relaxation education group, and a control group would impact reports of sleep quality. Specifically, that participation in a sleep hygiene education group would improve sleep quality and sleep habits more than participation in a relaxation education group or a control group. Additionally, components of sleep quality including sleep latency and daytime dysfunction would also improve after participation in sleep hygiene education.

The discussion of the study results will begin with a summary of the demographic and descriptive data. Next is the review of the six formal hypotheses. A general discussion follows, highlighting the findings and implications. The study limitations are discussed next. Finally, suggestions for future investigation are explored.

Demographic and Descriptive Data

The study sample included 74 inmate volunteers from a medium security prison for men in the southern United States. The majority of participants were African Americans (61%) followed by 34% Caucasian, 1% Asian Americans, and 4% of the individuals who identified their ethnicity as "other." Their ages ranged from 18 to 44

with the average age of 24. The average education level of participants was 11 years with a range of 8 to 16 years. Participants had spent an average of 9 months in prison prior to participation in this study with 46% having served time previously on different charges. All of the participants were incarcerated for non-violent offenses and were due to be released in 12 months or less. The majority (59%) of the participants were serving time for drug related convictions.

Hypotheses

Hypothesis One

The first hypothesis stated that participants in the sleep hygiene education group would report greater knowledge about the importance of sleep hygiene 4 weeks after participation in the group than relaxation and control group participants. Results did not show any significant differences in sleep hygiene knowledge among the groups at 4 weeks after participation in the education groups. The results of this study did not confirm hypothesis one. Additionally, participants did not demonstrate an understanding of good sleep hygiene knowledge. On a measure of sleep hygiene knowledge with The Sleep Hygiene Awareness and Practice Scale (Lacks & Rotert, 1986), participants averaged a score of 42% correct. A test of proportions ($z = 2.58$, $p < .05$) determined there was a significant difference between this average score and that of a college student sample with an average score of 57% correct (Hicks, et al., 1999). This study sample shows less good sleep hygiene knowledge than a previously studied population.

While sleep hygiene education is generally simple to learn and implement, the sleep hygiene education conducted during the current study was at a Flesch-Kincaid grade level equivalent of 9 years. Participants had an average education level of 11

years. In hindsight, the material presented was at a higher level than was appropriate for some of the participants which could have potentially hindered the learning process for some participants influencing the study results. Additionally, some participants may not have been motivated to pay attention during education sessions, using the opportunity instead to avoid regularly scheduled prison activities. Most inmates at the study location who volunteer for research activities are assigned daily routines which are postponed during study participation. Hence, some participants may have ulterior motives for volunteering, like avoiding daily chores, and may not be committed to all study activities.

Hypotheses Two, Three, and Four

Hypotheses two, three, and four involved the relationship of sleep hygiene education and sleep quality. Hypothesis two proposed that sleep hygiene education group participants would report better overall sleep quality at four weeks post-treatment than control group participants. Hypothesis three stated that relaxation education group participants would report better overall sleep quality at four weeks post-treatment than control group participants. Hypothesis four proposed that sleep hygiene education group participants would report better overall sleep quality than relaxation group participants at four weeks post-treatment. Each of these hypotheses was evaluated utilizing a single multivariate statistical analysis (MANOVA).

Results did not show a significant difference in sleep quality among the study groups at four weeks after participation in education sessions. Hypotheses two, three, and four were not confirmed by these results. However, it is of interest to note that sleep quality results, as measured by the Sleep Quality Index (Urponen et al., 1991), show that only 1% of participants reported good sleep quality. Occasional sleep difficulties were

reported by 69% of the participants and 30% reported poor sleep quality. It is possible that inmates are exhibiting poor sleep quality at such a high rate due to the stress associated with highly restrictive environments.

Environmental factors beyond inmate control may have contributed to the lack of change in sleep quality even after participation in the sleep hygiene education. The present study was conducted at a correctional facility with dormitory style sleeping quarters containing bunk beds, open bathroom facilities, and an average of 40 inmates per room. Lights are turned out at the same time every night but inmates may use toilets, drink water, or read with small private night lights after lights out. Study results show that 32% of participants had a disturbed night's sleep more than 3 days a week. Disturbances may occur due to activities by other inmates which negatively impacts overall sleep quality. Similarly, 32% of participants reported difficulty falling asleep which may also result from noise or distractions in the sleeping quarters that are beyond an individual's control.

Even with sleep hygiene or relaxation training, the prison environment may be inherently disruptive to sleep. In addition to noise disturbances by other inmates during sleep times, guards are a potential source of sleep disruption. Guards patrol the dormitory regularly during sleeping hours, walking down the rooms, speaking to each other, and turning lights on occasionally. The arrangement of sleeping quarters is not conducive to good sleep hygiene aside from the noise. Inmates spend time in their bunks during daytime hours engaged in activities other than sleeping. They often write letters, read, or visit with one another during free time in their dormitories. Individuals with sleep complaints that impact sleep quality are often told to limit activities in bed to

sleeping (Brown, 2002; Hicks et al., 1999; Morin & Wooten, 1996). This may not be possible in the prison environment. Sleep hygiene education to reduce sleep complaints and improve sleep quality for inmates may need to be more involved than brief education sessions given the unique restrictions faced by inmates which are not encountered by other populations.

Hypothesis Five

Hypothesis five stated that participants in the sleep hygiene education and relaxation education groups would report shorter sleep latency than participants in the control group after completing the education sessions. Results of the present study did not show significant differences among the groups in sleep latency 4 weeks after participation in the education sessions. Hypothesis five was not confirmed by these results.

Environmental influences may have contributed to the lack of differences in sleep latency among the groups. As mentioned previously, the dormitory style sleeping arrangements allow for more external disturbances during sleep and distractions during sleep onset. Additionally, inmates are allowed telephone time to speak with family and friends shortly before bedtime. Some individuals may regularly ruminate or experience worry about recent telephone conversations while trying to go to sleep.

Exercise routines may also negatively impact sleep latency in the prison setting. Participants in this study have access to more anaerobic exercise activities with little cardiovascular exercise and often are allowed to exercise only in the evening hours. Sleep hygiene instruction generally advises against evening exercise to allow for physiological relaxation. In addition to environmental disruptions and the potential for

anxiety prior to bedtime, participant exercise routines may also negatively impact sleep latency in the prison setting.

Hypothesis Six

The sixth hypothesis stated sleep hygiene education group participants would report less daytime dysfunction than control and relaxation education group participants at 4 weeks post-treatment. Daytime dysfunction is a component of sleep quality and would be expected to improve along with sleep quality after participation in a sleep hygiene education program. However, results did not show significant differences among the study groups in reports of daytime dysfunction 4 weeks after participation in the education sessions. Hypothesis six was not confirmed by these results.

Because results did not show any significant improvement in sleep quality for participants after completion of the education sessions, it is not surprising that daytime dysfunction did not improve either. Results of the present study show that 46% of the participants reported feeling very or mostly tired in the mornings and 32% have sleep disruptions more than 3 days a week. Daytime dysfunction is generally a result of sleep difficulties which may exacerbate other problems. Inmates with sleep disturbances will likely report daytime dysfunction due to the negative impact of poor sleep quality on daytime functioning.

Findings and Implications

Evaluation of a sleep hygiene education program to improve inmate sleep quality was the purpose of this study. Participants evidenced no increase in knowledge about the importance of sleep hygiene to maintaining good sleep quality. Inmates in this sample did not show any significant changes in sleep quality, sleep length, or sleep habits after

participation in the program. Sleep hygiene education previously successful in reducing sleep complaints and improving sleep quality in adult and college student populations was not effective for participants in this study.

Results of this evaluation did show that 30% of the inmates reported poor sleep quality. Results also indicated that 37% of participants experience sleep disturbances, 30% have night time awakenings, 46% are tired in the morning, 22% experience difficulties falling asleep, and 8% report insomnia 3 to 7 days a week. Inmates in this sample were experiencing sleep disturbances and poor sleep quality at a high rate.

Similar to recent research by Ireland and Culpin (2006), this investigation found that sleep disturbances are reported by the inmate population. Interventions effective in reducing sleep complaints and improving sleep quality in other populations (Brown, 2002; Hicks et al., 1999; Morin & Wooten, 1996) did not impact this sample of inmates. It is clear, however, that sleep interventions are needed given the high percentage of the current study participants who reported sleep difficulties and poor sleep quality.

It is possible that effective sleep hygiene intervention programs for adults and college students are not applicable to inmates due to environmental differences. The restrictive nature of prison may tend to exacerbate difficulties that would be manageable in outside society. Community style sleeping arrangements, the potential for sleep disruptions by a plethora of external stimuli, mandatory sleep schedules that may be different from natural biological rhythms (i.e., waking up too early in the morning), and the potential for adjustment difficulties may reflect the need for specialized interventions specific to sleep difficulties in the prison environment.

Results of this study also suggest that tailoring common sleep hygiene education for content is warranted due to demographic differences between the prison and general populations. In this sample, the average education level was 11 years. The educational information provided was at a grade equivalent of 9 years and may have been too difficult for some participants. Additionally, the inmate population is aging with associated medical problems and has a higher percentage of mental health problems than the general population (Bureau of Justice Statistics, 2005). Poor sleep quality and sleep complaints are associated with medical issues and mental health difficulties (Asplund, 2000; Dryman & Eaton, 1991; Ford & Kamcrow, 1989; Hyyppa & Kronholm, 1989; Irwin et al., 1996; Jenkins et al., 2002; Perlis et al., 1996). Sleep hygiene education for inmates may need to include specific information regarding the relationships between medical problems, mental health issues, and sleep quality.

The findings of the current study add to the literature on the prevalence of inmate sleep difficulties and poor sleep quality. The results also offer suggestions to professionals interested in addressing sleep complaints for the incarcerated. There are relatively few prior studies on inmate sleep habits as compared to the general population (Elgers, 2003; Elgers, 2004; Lutz, 1990). The current study provides further evidence of a little known problem in the prison population that is most likely impacting all aspects of inmate activities.

Limitations

Several limitations may have affected the results of this study. The sample of inmates limits generalizing the results to other populations. Participants were non-violent male offenders incarcerated for an average of nine months in a medium security state

department of corrections facility in the southern United States. In this geographic area, ethnic diversity is somewhat restricted. The correctional facility serves as a reception center for inmates newly processed into the state system as well as a rehabilitation center. Only non-violent offenders with 12 months or less left on their sentence active in facility rehabilitation programs were eligible to volunteer for participation in the study. Additionally, the average age of study participants (24) is not reflective of the average age of inmates (36) incarcerated in this states correctional system. Given the nature of this sample, results from this study should not be generalized to females, other geographical areas, ethnic backgrounds, age groups, or offender categories.

Several inherent limitations are involved when conducting research in a prison setting. In addition to restrictions on inmate activities with relatively few eligible to volunteer, mandated facility guidelines regarding the ratio of guards to inmates restricted the number of volunteers allowed to be in the room during study activities. Due to prison schedules and staffing ratios, only three groups, one of each treatment type, were approved for the study. Perhaps if the current study had a larger number of participants, results may have been different.

The method used in this study may also be a limitation. Self-report surveys were used and assume that participants are providing accurate information about themselves. The study is limited by the trust in the accuracy of participant's responses. Purely random responses are undetectable. There is also a possibility that participants are not being sincere in their responses. Complicating factors are present in all self-report studies. A thorough effort was made to reduce inaccuracy by excluding incomplete surveys.

Instrumentation used in this study may present as a limitation as well. Studies investigating the reliability and validity of the Sleep Quality Index (Urponen et al., 1991) and the Sleep Hygiene Awareness and Practice Scale (Lacks & Rotert, 1986) are limited.

Suggestions for Future Research

The current study results suggest that sleep difficulties and poor sleep quality are common for this sample of inmates. Future evaluations might investigate the prevalence and pathology of sleep disturbances in a larger sample of prisoners. A survey of male and female inmates with a range of convictions, age groups, sentence lengths, and ethnicities from different regions of the country might be informative. Obtaining study participants from federal and state correctional facilities would also increase the diversity of the sample. Broadening the scope of the sample population in future studies would expand the potential for results to be generalized. Information gained from such a study would inform psychoeducational interventions for inmates with sleep difficulties by identifying the most prevalent complaints and any sub-population characteristics of importance. There are many types of prison environments and sleep quality may vary among them.

In addition to obtaining general information about sleep issues specific to the prison environment, investigations into effective psychoeducational interventions are warranted. The current study evidenced the ineffectiveness of brief sleep hygiene education and relaxation training to impact the sleep quality of this inmate sample . Perhaps stimulus control, cognitive therapy, or even longer sleep hygiene education programming with supportive style group therapy would be of assistance in improving inmate sleep quality.

Future research might even develop a measure of sleep quality specific to inmates. Self-report measures of inmate sleep quality could be combined with physiological measures to provide a more thorough and accurate picture of the construct. Given the extensive impact that sleep difficulties can have on all aspects of functioning, it would be beneficial to evaluate sleep quality for all inmates. This evaluation could be added to the intake process already in place at most correctional facilities when inmates first arrive. Given the national trend towards rehabilitative efforts in the prison system to reduce recidivism, improving inmate sleep quality may have a positive effect on other educational efforts.

In conclusion, the current study found a sleep hygiene program to improve sleep quality ineffective with this inmate sample. Study participants did not evidence an increase in sleep hygiene knowledge or any statistically significant improvements in components of or general sleep quality. However, the study sample did reflect a 30% rate of poor sleep quality and reports of regular sleep difficulties. Perhaps providing support to the idea that inmates do experience sleep disturbances. Further research is needed to identify the prevalence of inmate sleep difficulties and psychoeducational interventions that will affectively assist inmates with poor sleep quality.

REFERENCES

Acebo, C., & Carskadon, M. (2002). Regulation of sleepiness in adolescents: Update, insights, and speculations. *Sleep, 25*, 606-614.

Adams, T. C. (1977). Characteristics of state prisoners who demonstrate severe adjustment problems. *Journal of Clinical Psychology, 33*, 1100-1103.

Adams, K., & Oswald, I. (1977). Sleep is for tissue restoration. *Journal of the Royal College of Physicians, 11,* 376-388.

Agargun, M. Y., Kara, H., & Solmaz, M. (1997). Subjective sleep quality and suicidality in patients with major depression. *Journal of Psychiatric Research, 31*, 377-381.

Aldrich, M. S. (2000). Cardinal manifestations of sleep disorders. In M. H. Kryger, T. Roth, & W. C. Dement (Eds.), *Principles and practice of sleep medicine* (pp. 526-533). Philadelphia: W. B. Saunders Company.

Aldrich, M. S., & Shipley, J. E. (1993). Alcohol use and periodic limb movements of sleep. *Alcoholism: Clinical and Experimental Research, 17*, 192-196.

Alliance for Education. (2006, August). *Saving futures, saving dollars: The impact of education on crime reduction and earnings.* Washington, DC: Author.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed.) Text Revision. Washington, DC: Author.

American Psychological Association. (2002). Ethical principles of psychologists and code of conduct. *American Psychologist, 57,* 1060-1073. American Sleep Disorders Association. (1990). *The international classification of sleep disorders: Diagnostic and coding manual.* Rochester, MN: Author.

Antrobus, J. S. (1986). Dreaming: Cortical activation and perceptual thresholds. *Journal of Mind and Behavior, 7,* 193-211.

Aschoff, J. (1979). Circadian rhythms: General features and endocrinological aspects. In D. T. Krieger (Ed.), *Endocrine Rhythms.* New York: Raven Press.

Ashman, S. B., Monk, T. H., Kupfer, D. J., Clark, C. H., Myers, F. S., & Frank, E. (1999). Relationship between social rhythms and mood in patients with rapid cycling bipolar disorder. *Psychiatry Research, 86,* 1-8.

Asplund, R. (2000). Sleep and hypnotic use in relation to perceived somatic and mental health among the elderly. *Archives of Gerontology & Geriatrics, 31,* 199-205.

Barbini, B., Bertelli, S., Colombo, C., & Smeraldi, E. (1996). Sleep loss, a possible factor in augmenting manic episodes. *Psychiatry Research, 65,* 121-125.

Barrick, M. R., & Mount, M. K. (1991). The big five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44,* 1-26.

Beaulieu, R. P. (1991). Peak activation time, extraversion, and student's achievement. *Perceptual Motor Skills, 73,* 1217-1218.

Benca, R. M., Obermeyer, W. H., Thisted, R. A., & Gillin, J. C. (1992). Sleep and psychiatric disorders: A meta-analysis. *Archives of General Psychiatry, 49,* 651-668.

Benson, K. L., & Zarcone, V. P. (2000). Schizophrenia. In M. H. Kryger, T. Roth, & W. C. Dement (Eds.), *Principles and practice of sleep medicine* (pp. 1159-1167). Philadelphia: WB Saunders.

Blaygrove, M., & Akehurst, L. (2001). Personality and the modulation of effects of sleep loss on mood and cognition. *Personality and Individual Differences, 30*, 819-828.

Bonnet, M. H. (2000). Sleep deprivation. In M.H. Kryger, T. Roth, & W.C. Dement (Eds.) *Principles and practice of sleep medicine* (3rd ed., pp. 53-71). Philadelphia: W. B. Saunders Company.

Bonnet, M. H., & Arand, D. L. (1992). Caffeine use as a model of acute and chronic insomnia. *Sleep, 15, 526-536.*

Bootzin, R. R., & Epstein, D. R. (2000). Stimulus control. In K. L. Lichstein & C. M. Morin (Eds.), *Treatment of late life insomnia.* Thousand Oaks, CA: Sage Publications.

Bootzin, R. R., & Nicassio, P. (1991). Behavioral treatments for insomnia. In M. Hersen, R. M. Eisler, & P. M. Miller (Eds.), *Progress in behavior modification* (pp. 1-45). New York: Academic Press.

Bootzin, R. R., & Perlis, M. (1992). Nonpharmacological treatments of insomnia. *Journal of Clinical Psychiatry, 53*, 37-41.

Bootzin, R. R., & Rider, S. P. (1997). Behavioral techniques and biofeedback for insomnia. In M. R. Pressman & W. C. Orr (Eds.), *Understanding sleep: The evaluation and treatment of sleep disorders* (pp. 315-338). Washington, D. C.: American Psychological Association.

Bowersox, S. S., Kaitin, K. L., & Dement, W. C. (1985). EEG spindle activity as a function of age: Relationship to sleep continuity. *Brain Research, 63*, 526-539.

Breslau, N., Roth, T., Rosenthal, L., & Andreski, P. (1996). Sleep disturbance and psychiatric disorders. *Biological Psychiatry, 39*, 411-318.

Brown, F. C. (2002). *Development and evaluation of the sleep treatment and education program for students (STEPS).* Unpublished doctoral dissertation, Louisiana Tech University, Ruston.

Brown, F. C., Soper, B., & Buboltz, W.C. (2001). Prevalence of Delayed Sleep Phase Syndrome in university students. *College Student Journal, 35,* 472-477.

Buboltz, W. C., Brown, F. C., & Soper, B. (2001). Sleep habits and patterns of college students: a preliminary study. *Journal of American College Health, 50,* 131-135.

Buboltz, W. C., Loveland, J. C., Jenkins, S. M., Brown., F. C., Soper, B., & Hodges, J. (2005). *College student sleep: Relationship to health and academic performance.* Manuscript submitted for publication.

Bureau of Justice Statistics. (2005). *Bureau of statistics sourcebook 2004.* Retrieved January 19, 2007 from www.ojp.usdoj.gov/bjs/bssb/2004

Bureau of Justice Statistics. (Nov., 2005). *Prisoners in 2005.* Retrieved January 19, 2007 from www.ojp.usdoj.gov/bjs/abstract/p05.htm.

Busby, K., & Pivik, R. T. (1983). Failure of high intensity auditory stimuli to affect behavioral arousal during the first sleep cycle. *Pediatric Research, 17*, 802-805.

Buysse, D. J., Reynolds, C. F., Monk, T. A., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburg sleep quality index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28*, 193-213.

Cajochen, C., Kraeuchi, K, & Wirz-Justice, A. (1997). The acute soporific action of the daytime melatonin administration: Effects on the EEG during wakefulness and subjective alertness. *Journal of Biological Rhythms, 12*, 63-643.

Caldwell, J. P. (2003). *Sleep: The complete guide to sleep disorders and a better night's sleep.* Buffalo, NY: Firefly Books, Inc.

Campbell, S. S., & Murphy, P. J. (1988). Extraocular circadian phototransduction in humans. *Science, 279*, 396-399.

Campbell, S. S., & Zulley, J. (1989). Napping in time-free environments. In D. F. Dinges & R. J. Broughton (Eds.), *Sleep and alertness: Chronobiological, behavioral, and medical aspects of napping* (pp. 121-138). New York: Raven Press.

Carlson, N.R. (2004). *Foundations of physiological psychology* (4th Ed.). Needham Heights, MA: Allyn & Bacon.

Carskadon, M., Brown, E., & Dement, W. (1982). Sleep fragmentation in the elderly: Relationship to daytime sleep tendency. *Neurobiology and Aging, 3*, 321-327.

Carskadon, M. A., & Dement, W. C. (1981). Cumulative effects of sleep restriction on daytime sleepiness. *Psychophysiology, 18*, 107-113.

Carskadon, M. A., & Dement, W. C. (1987). Sleepiness in the normal adolescent. In C. Guilleminault (Ed.), *Sleep and its disorders in children* (pp. 53-66). New York: Raven Press.

Carskadon, M. A., & Dement, W. C. (2000). Normal human sleep: An overview. In M. H. Kryger, T. Roth, & W.C. Dement (Eds.), *Principles and practice of sleep medicine* (3rd ed., pp. 15-25). Philadelphia: W. B. Saunders Company.

Carskadon, M. A., & Taylor, J. F. (2000). Public policy and sleep disorders. In M. R. Pressman & W. C. Orr (Eds.), *Understanding sleep: The evaluation and treatment of sleep disorders* (pp. 111-122). Washington, DC: American Psychological Association.

Center for Disease Control. (2006). *Overweight prevalence*. Retrieved January 17, 2007, from http://www.cdc.gov/nccdphp/dnpa.htm.

Choquet, M., Kovess, V., & Poutignat, N. (1993). Suicidal thoughts among adolescents: An intercultural approach. *Adolescence, 28*, 649-59.

Cleveland Clinic. (n.d.). *Stress: How can I cope?* Retrieved September, 23, 2006, from www.clevelandclinic.org/health/health-info/docs/0000/0069.asp

Cohen, R. A., & Albers, H. E. (1991). Disruption of human circadian and cognitive regulation following a discrete hypothalamic lesion: A case study. *Neurology, 41*, 726-729.

Constantin, R. S., & Paparrigopoulos, T. J. (2005). Sleep physiology and pathology: Pertinence to psychiatry. *International Review of Psychiatry, 17*, 213-228.

Coren, S. (1994). The prevalence of self-reported sleep disturbances in young adults. *International Journal of Neuroscience, 79*, 67-73.

DeKonick, J., Lorrain, D., Christ, G., Proulx, G., & Coulombe, D. (1989). Intensive language learning and increases in rapid eye movement sleep: Evidence of a performance factor. *International Journal of Psychophysiology, 8*, 43-47.

Dement, W. C., & Vaughn, C. (2000). *The promise of sleep: a pioneer in sleep medicine explores the vital connection between health, happiness, and a good night's sleep.* New York: Delacore Press.

Dunleavy, D. L., Oswald, L., Brown, P., & Strong, J. A. (1974). Hyperthyroidism, sleep, and growth hormone. *Electroencephalography Clinical Neurophysiology, 36*, 259-263.

Dryman, A., & Eaton, D. (1991). Affective symptoms associated with onset of major depression in the community: Findings from the US National Institute of Mental Health Epidemiologic Catchment Area Program. *Acta Psychiatrica Scandanavia, 84*, 1-5.

Elgers, B. S. (2003). Does insomnia in prison improve with time? Prospective study among remanded prisoners using the Pittsburg Sleep Quality Index. *Medicine, Science, and the Law, 43*, 334-344.

Elgers, B. S. (2004). Management and evolution of insomnia complaints among non-substance-misusers in a Swiss remand prison. *Swiss Medical Weekly, 134*, 486-499.

Ellman, S., & Antrobus, J. S. (1991). *The mind in sleep*. New York: Wiley.

Engle-Friedman, M., Bootzin, R. R., Hazelwood, L., & Tsao, C. (1992). An evaluation of behavioral treatments for insomnia in the older adult. *Journal of Clinical Psychology, 48*, 77-90.

Everson, C. A. (2000). Sleep deprivation and the immune system. In M. R. Pressman & W. C. Orr (Eds.), *Understanding sleep: The evaluation and treatment of sleep disorders* (pp. 401-424). Washington, DC: American Psychological Association.

Finley, J. R., & Lenz, B. S. (1999). *The chemical dependence treatment documentation sourcebook*. New York: John Wiley & Sons, Inc.

Finn, L., Young, T., Plata, M., Fryback, D. G., & Dennis, R. (1998). Sleep-disordered breathing and self-reported general health status in the Wisconsin Sleep Cohort Study. Sleep: *Journal of Sleep Research and Sleep Medicine, 21*, 701-706.

Ford, D. E., & Kamerow, D. B. (1989). Epidemiological study of sleep disturbances and psychiatric disorders. An opportunity for prevention? *Journal of the American Medical Association, 262*, 1479-1484.

Freud, S. (1900). *Interpretation of dreams*. New York: Random House (1950).

Friedman, J., Globus, G., Huntley, A., Mullaney, D., Naitoh, P., & Johnson, L. (1977). Performance and mood during and after gradual sleep reduction. *Psychophysiology, 14*, 245-250.

Friedman, L., Bliwise, D. L., Yesavage, J. A., & Salom, S. R. (1991). A preliminary study comparing sleep restriction and relaxation treatments for insomnia in older adults. *Journal of Gerontology, 46*, 1-8.

Friedman, M., & Rosenman, R. (1974). *Type A behavior and your heart*. New York: Knopf.

Gau, S. F. (2000). Neuroticism and sleep-related problems in adolescence. *Sleep, 23*, 495-502.

Gillin, C. J., & Drummond, S. P. (2000). Medication and substance abuse. In M. H. Kryger, T. Roth, & W. C. Dement (Eds.), *Principles and practice of sleep medicine* (pp. 1176-1195). Philadelphia: WB Saunders.

Gorski, T. T., & Grinstead, S. F. (2000). *Denial management counseling*. Independence, MO: Herald House Independence Press.

Gray, E. K., & Watson, D. (2002). General and specific traits of personality and their relation to sleep and academic performance. *Journal of Personality, 70*, 177-206.

Grosvenor, A., & Lack, L. (1984). The effect of sleep before or after learning on memory. *Sleep, 7,* 155-167.

Guilleminault, C. (Ed.). (1987). *Sleep and its disorders in children.* New York: Raven Press.

Guilleminault, C., Silvestri, R., Mondini, S., & Coburn, S. (1984). Aging and sleep apnea: Action of benzodiazepine, acetazolamide, alcohol, and sleep deprivation in a healthy elderly group. *Journal of Gerontology, 39*, 655-661.

Guyton, R., Corbin, S., & Zimmer, C. (1989). College students and national health objectives for the year 2000: A summary report. *Journal of American College Health, 38,* 9-14.

Haberman, S., & Luffey, D. (1998). Weighing in college students' diet and exercise behaviors. *Journal of American College Health, 46,* 189-91.

Hahak, G. (2000). Insomnia in primary care. *Sleep, 23*, 854-863.

Harrison, "Y., & Horne, J. A. (1999). The impact of sleep deprivation on decision making: A review. *Journal of Experimental Psychology, 6*, 236-249.

Hartman, E. (1973). *The function of sleep.* New Haven, CT: Yale University Press.

Harvey, A. G. (2000). Sleep hygiene and sleep-onset insomnia. *Journal of Nervous & Mental Disease, 188*, 53-55.

Hauri, P. J. (1993). Consulting about insomnia: A method and some preliminary data. *Sleep, 16*, 344-350.

Hauri, P., & Fisher, J. (1986). Persistent psychophysiologic (learned) insomnia. *Sleep, 9*, 38-53.

Heslop, P., Smith, G. D., Metcalfe, C., Macleod, J., & Hart, C. (2002). Sleep duration and mortality: The effect of short or long sleep duration on cardiovascular and all-cause mortality in working men and women. *Sleep Medicine, 3*, 305-314.

Hiatt, J. F., Floyd, T. C., Katz, P. H., & Feinberg, I. (1985). Further evidence of abnormal NREM sleep in schizophrenia. *Archives of General Psychiatry, 42*, 797-802.

Hicks, R. A., & Lucer-Gorman, K., & Baustista, J. (1999). Ethnicity, sleep hygiene knowledge, and sleep practices. *Perceptual and Motor Skills, 88*, 1095-1096.

Hicks, R. A., Pellegrini, R. J., Martin, S., Garbesi, L., Elliot, D., & Hawkins, J. (1979). Type A behavior and normal habitual sleep duration. *Bulletin of the Psychonomic Society, 14*, 185-186.

Hirshkowitz, M., Moore, C. A., Hamilton, C. R., Rando, K. C., & Karacan, I. (1992). Polysomnography of adults and elderly: Sleep architecture, respiration, and leg movements. *Journal of Clinical Neurophysiology, 9*, 56-63.

Hirshkowitz, M., Moore, C. A., & Minhoto, G. (1997). The basics of sleep. In M. R. Pressman & W. C. Orr (Eds.), *Understanding sleep: The evaluation and treatment of sleep disorders.* Washington, D.C.: American Psychological Association.

Hobson, J. A. (1995). *Sleep.* New York: W. H. Freedman and Company.

Horne, J. A. (1975). Binocular convergence in man during total sleep deprivation. *Biological Psychology, 3*, 309-319.

Horne, J. A. (1988). *Why we sleep: The functions of sleep in humans and other mammals.* Oxford, England: Oxford University Press.

Horne, J. A., & Mindard, A. (1985). Sleep and sleepiness following a behaviorally active day. *Ergonomics, 28*, 567-575.

Human Rights Watch. (2006). *Human rights abuses against prisoners*. Retrieved January 7, 2007, from http://www.hrw.org/prisons/abuses.html

Hyyppa, M. T., & Kronholm, E. (1989). Quality of sleep and chronic illness. *Journal of Clinical Epidemiology, 42*, 633-638.

Ireland, J. L., & Culpin, V. (2006). The relationship between sleeping problems, and aggression, anger, and impulsivity in a population of juvenile and young offenders. *Journal of Adolescent Health, 38*, 649-655.

Irwin, M., McClintick, J., & Costlow, C. (1996). Partial night sleep deprivation reduces natural killer and cellular immune response in humans. *The FASEB Journal, 10,* 643-645.

Jean-Louis, G., Von Gizycki, H., Zizi, F., & Nunes, J. (1998). Mood states and sleepiness in college students: Influence of age, sex, habitual sleep and substance use. *Perceptual and Motor Skills, 87*, 507-512.

Jenkins, S. M. (2005). Sleep habits and patterns of college students and their relationship to selected personality characteristics. Unpublished doctoral dissertation, Louisiana Tech University, Ruston.

Jenkins, S. M., Buboltz, W. C., & Fowler, W. C., & Rosielle, L. (2002, June). *Sleep quality impacts aspects of college student health.* Poster session presented at the Annual Conference of the America Psychological Society, New Orleans, Louisiana.

Johnson, J. E. (1997). Insomnia, alcohol, and over-the-counter drug is in old urban women. *Journal of Community Health Nursing, 14*, 181-188.

Johnson, L. C. (1982). Sleep deprivation and performance. In W. B. Webb (Ed.), *Biological rhythms, sleep, and performance*. (pp. 111-142). New York: Wiley.

Karni, A., Tanne, D., Rubenstein, B., Askenasy, J., & Sagi, D. (1994). Dependence on REM sleep of overnight improvement of perceptual skill. *Science, 265,* 679-682.

Kjelsberg, E., & Hartvig, P. (2005). Can morbidity be inferred from prescription drug use? Results from a nation-wide prison population study. *European Journal of Epidemiology, 20*, 587-592.

Kollar, E. J., Namerow, N., Pasnau, R. O., & Naitoh, P. (1968). Neurologic findings during prolonged sleep deprivation. *Neurology, 18*, 836-840.

Koulack, D., & Nesca, M. (1992). Sleep parameters of type A and B scoring college students. *Perceptual and Motor Skills, 74*, 723-726.

Lack, L. C. (1986). Delayed sleep and sleep loss in university students. *College Health, 35,* 105-110.

Lacks, P., & Morin, C. M. (1992). Recent advances in the assessment and treatment of insomnia. *Journal of Consulting and Clinical Psychology, 60*, 586-594.

Lacks, P., & Rotert, M. (1986). Knowledge and practice of sleep hygiene techniques in insomniacs and good sleepers. *Behaviour Research Therapy, 24*, 365-368.

LeBon, O., Verbanck, P., Hoffman, G., Murphy, J. R., Staner, L., DeGroote, D., Mampunza, S., Dendulk, A., Vacher, C., Korneich, C., & Pelc, I. (1997). Sleep in detoxified alcoholics. *Journal of Studies on Alcohol, 58*, 30-36.

Leung, L., & Becker, C. E. (1992). Sleep deprivation and house staff performance: Update 1984-1991. *Journal of Medicine, 34*, 1153-1159.

Levey, A. B., Aldaz, J. A., Watts, F. N., & Coyle, K. (1991). Articulatory suppression and the treatment of insomnia. *Behavior Research and Therapy, 29*, 85-89.

Lichstein, K. L., & Riedel, B. W. (1994). Behavioral assessment and treatment of insomnia: A review with an emphasis on clinical application. *Behavior Therapy, 25*, 659-688.

Lindberg, N., Pekka, T., Appleberg, B., Stenberg, D., Naukkarinen, H., Rimon, R., Porkka-Heiskanen, T., & Virkkunen, M. (2003). Sleep among habitually violent offenders with antisocial personality disorder. *Neuropsychobiology, 47*, 198-205.

Listwan, S. J., Sperber, K. G., Spruance, L. M., & Van Voorhis, P. (2004). High anxiety offenders in correctional settings; It's time for another look. *Federal Probation, 68*, 43-50.

Louisiana Department of Public Safety and Corrections (2005). *First quarter 2005 current population by offender class adult incarceration report.* Cajun NT.

Lozoff, B., Wolf, A. W., & Davis, N. S. (1985). Sleep problems seen in pediatric practice. *Pediatrics, 75*, 477-483.

Lutz, S. J. (1990). The effect of relaxation training on sleep, state anxiety, and sick call in a jail population. *Journal of Prison and Jail Health, 1(9)*, 55-71.

Lutze, F. E., & Murphy, D. W. (1999). Ultramasculine prison environments and inmates' adjustment: It's time to move beyond the "boys will be boys" paradigm. *Justice Quarterly, 16*, 709-733.

Machado, E., Varelle, V., & Andrade, M. (1998). The influence of study schedules and work on the sleep-wake cycle of college students. *Biological Rhythm Research, 29,* 578-584.

MacNish, R. (1834). *The philosophy of sleep.* New York: Appleton & Company.

Mauer, M. (2004). Thinking about prison and its impact in the twenty-first century. *Ohio State Journal of Criminal Law, 2,* 607-618.

McCann, S., & Stewin, L. (1987). Worry, anxiety, and preferred length of sleep. *Journal of Genetic Psychology, 149,* 413-418.

McClusky, H. Y., Milby, J. B., Switzer, P. K., Williams, V., & Wooten, V. (1991). Efficacy of behavioral versus triazolam treatment in persistent sleep-onset insomnia. *American Journal of Psychiatry, 148,* 121-126.

McCurry, S. M., Logsdon, R. G., Vitiello, M. V., & Teri, L. (1998). Successful behavioral treatment for reported sleep problems in elderly caregivers of dementia patients: A controlled study. *Journal of Gerontology, 53B,* 122-129.

McKelvie, S. J. (1992). Sleep duration and self-reported type A behavior: A replication. *Journal of Psychology, 126,* 285-289.

McNiel, D. E., Binder, R. L., & Robinson, J. C. (2005). Incarceration associated with homelessness, mental disorder, and co-occurring substance abuse. *Psychiatric Services, 56,* 840-846.

Meddis, R. (1977). *The sleep instinct.* London: Rutledge & Kegan Paul.

Mellman, T. A., & Uhde, T. W. (1989). Sleep panic attacks: New clinical findings and theoretical implications. *American Journal of Psychiatry, 146,* 1204-1207.

Mindell, J. A. (2000). Children and sleep. In M. R. Pressman & W. C. Orr (Eds.), *Understanding sleep: The evaluation and treatment of sleep disorders* (pp. 427-439). Washington, DC: American Psychological Association.

Mitler, M. M., Dawson, A., Henriksen, S. J., Sobers, M., & Bloom, F. E. (1988). Bedtime ethanol increases resistance of upper airways and produces sleep apneas in asymptomatic snorers. *Alcoholism: Clinical and Experimental Research, 12*, 801-805.

Monk, T. H. (2000). Shift work. In M. R. Pressman & W. C. Orr (Eds.), *Understanding sleep: The evaluation and treatment of sleep disorders* (pp. 249 - 266). Washington, DC: American Psychological Association

Monroe, L. A. (1967). Psychological differences between good and poor sleepers. *Journal of Abnormal Psychology, 72*, 255-264.

Morin, C. M., Colecchi, C., Stone, J., Sood, R., & Brink, D. (1999). Behavioral and pharmacological therapies for late-life insomnia. *Journal of the American Medical Association, 281*, 991-999.

Morin, C. M., Culbert, J. P., & Schwartz, S. M. (1994). Nonpharmacological interventions for insomnia: A meta-analysis of treatment efficacy. *American Journal of Psychiatry, 151*, 1172-1180.

Morin, C. M., Kowatch, R. A., Barry, T., & Walton, E. (1993). Cognitive-behavior therapy for late-life insomnia. *Journal of Consulting and Clinical Psychology, 61*, 137-146.

Morin, C., & Wooten, V. (1996). Psychological and pharmacological approaches to treating insomnia: Critical issues in assessing their separate and combined effects. *Clinical Psychology Review, 16,* 521-542.

Mougin, F., Simon-Rigaud, M. L., Davenne, D., Renaud, A., Garnier, A., Kantelip, J. P., & Magnin, P. (1991). Effects of sleep disturbances on subsequent physical performance. *European Journal of Applied Physiology, 63,* 77-82.

Murtaugh, D. R., & Greenwood, K. M. (1995). Identifying effective psychological treatments for insomnia: A meta-analysis. *Journal of Consulting and Clinical Psychology, 63,* 79-89.

National Commission on Sleep Disorders Research. (1993). *Wake up America: A national sleep alert. Executive summary and executive report.* Washington, DC: Author.

National Sleep Foundation. (2000). Adolescent sleep needs and patterns: Research report and resources guide. Retrieved December, 18, 2006, from http://www.Sleep foundation.org/adolescent

National Sleep Foundation (2002). *NSF 2002 Sleep in America poll highlights and messages.* Retrieved December 19, 2006, from http://www.sleepfoundation.org.

National Sleep Foundation (2005). *NSF 2005 Sleep in America poll.* Retrieved December 18, 2006, from http://www.sleepfoundation.org/hottopics.

Nehlig, A., Daval, J., & Debry, G. (1992). Caffeine and the central nervous system mechanisms of action, biochemical, metabolic, and psychostimulant effects. *Brain Research Review, 17,* 139-170.

New Freedom Commission on Mental Health. (2003, April, 3). *The president's new freedom commission on mental health final report.* Retrieved January 12, 2007, from http://www.mentalhealthcommission.gov/reports/reports.htm

Ohay, M. M., & Roth, T. (2003). Place of chronic insomnia in the course of depressive and anxiety disorders. *Journal of Psychiatric Research, 37*, 9-15.

Parker, D. C., Rossman, L. G., & Kripe, D. F. (1980). Endocrine rhythms across sleep wake cycles in normal young men under basal conditions. In J. Orem & C. D. Barnes (Eds.), *Physiology in sleep* (pp. 146-180). New York: Academic Press.

Parmagginani, P. L. (1994). The autonomic nervous system in sleep. In M. H. Kryger, T. Roth, & W. C. Dement (Eds.), *Principles and practice of sleep medicine* (pp. 194-203). Philadelphia: Saunders.

Partinen, M., Pukonen, P. T., Koskenvuo, M., & Hilakiv, I. (1982). Sleep disorders in relation to coronary heart disease. *Scandinavian Medicine*, 660, 123-136.

Passer, M. W., & Smith, R. E. (2001). *Psychology: Frontiers and applications*. New York: McGraw Hill.

Perlis, M. L., Giles, D. E., Buysse, D. J., Tu, X., & Kupfer, D. J. (1996). Self-reported sleep disturbance as a prodromal symptom in recurrent depression. *Journal of Affective Disorders, 42*, 209-212.

Perlis, M. L., Smith, M. T., Andrews, P. J., Orff, H., & Giles, D. E. (2001). Beta/Gamma EEG activity in patients with primary and secondary insomnia and good sleeper controls. *Sleep, 24*, 110-117.

Pilcher, J., Ginter, D., & Sadowsky, B. (1997). Sleep quality versus sleep quantity: Relationships between sleep and measures of health, well being, & sleepiness in college students. *Journal of Psychosomatic Research, 42,* 583-596.

Pilcher, J., & Huffcutt, A. (1996). Effects of sleep deprivation on performance: A meta-analysis. *Sleep, 19,* 138-326.

Pilcher, J., & Walters, A. S. (1997). How sleep deprivation affects psychological variables related to college students' cognitive performance. *Journal of American College Health, 46,* 121-126.

Pressman, M. R., Gollomp, S., Benz, R. L., & Peterson, D. D. (2000). Sleep and sleep disorders in noncardiopulmonary medical disorders. In M. R. Pressman & W. C. Orr (Eds.), *Understanding sleep: The evaluation and treatment of sleep disorders* (pp. 427-439). Washington, DC: American Psychological Association.

Prinz, P. N., Peskind, E. R., & Vitaliano, P. P. (1982). Changes in the sleep and waking EEGs of nondemented and demented elderly subjects. *Journal of the American Geriatric Society, 30,* 86-93.

Prison Policy. (2005). *American prison facts and figures.* Retrieved December 5, 2006, from http//www.prisonpolicy.org

Quant, J. P. (1992). The effect of sleep deprivation and sustained military operations on near visual performance. *Aviation, Space, and Environmental Medicine, 63,* 172-176.

Ralph, M. R., & Lehman, M. N. (1991). Transplantation: A new tool in the analysis of the mammalian hypothalamic circadian pacemaker. *Trends in Neuroscience, 14,* 362-366.

Rechtschaffen, A., Bergmann, B. M., Everson, C. A., Kushida, C. A., & Gilliland, M. A. (1989). Sleep deprivation in the rat: Integration and discussion of the findings. *Sleep, 12*, 68-87.

Rechtschaffen, A., Gilliland, M. A., Bergmann, B. M., & Winter, J. B. (1983). Physiological correlates of prolonged sleep deprivation in rats. *Science, 221*, 182-184.

Rechtschaffen, A., & Kales, A. (1968). *A manual of standardized terminology, techniques, and scoring system for sleep stages of human subjects*. Los Angeles, CA: UCLA Brain Research Institute.

Refinetti, R. (2000). *Circadian physiology*. Boca Raton, Fl: CRC Press

Refinetti, R., & Menaker, M. (1992). The circadian rhythm of the body temperature. *Physiology & Behavior, 51*, 613-637.

Reich, P., Geyer, S. J., & Karnovsky, M. L. (1972). Metabolism of the brain during sleep and wakefulness. *Journal of Neurochemistry, 19*, 487-497.

Reinoso-Suarez, F., Andres, I., Rodrigo-Angulo, M. L., & Garzon, M. (2001). Brain structures and mechanisms involved in the generation of REM sleep. *Sleep Medicine Reviews, 5*, 63-77.

Riedel, B. W. (2000). Sleep hygiene. In K. L. Lichstein & C. M. Morin (Eds.), *Treatment of late life insomnia.* Thousand Oaks, CA: Sage Publications.

Riedel, B., Durrence, H., Lichstein, K., Taylor, D., & Bush, A. (2004). The relation between smoking and sleep: The influence of smoking level, health, and psychological variables. *Behavioral Sleep Medicine, 2,* 63-78.

Roberts, R. E., Robert, C. R., & Chen, I. G. (2000). Ethnocultural differences in sleep complaints among adolescents. *Journal of Mental Disorders, 188*, 222-229.

Roehrs, T., Carskadon, M. A., Dement, W. C., & Roth, T. (2000). Daytime sleepiness and alertness. In M. H. Kryger, T. Roth, & W. C. Dement (Eds.), *Principles and practice of sleep medicine* (pp. 43-52). Philadelphia, PA: W. B. Saunders Company.

Roehrs, T., & Roth, T. (1997). Hypnotics, alcohol, and caffeine: Relation to insomnia. In M. R. Pressman & W. C. Orr (Eds.), *Understanding sleep: The evaluation and treatment of sleep disorders*. Washington, DC: American Psychological Association.

Roehrs, T., Timms, V., Zwyghuizen-Dorrenbos, A., & Roth, T. (1989). Sleep extension in sleep and alert normals. *Sleep, 12*, 449-457.

Roehrs, T, Vogel, G., & Roth, T. (1990). Rebound insomnia: It's determinants and significance. *American Journal of Medicine, 88,* 39-42.

Roehrs, T, Vogel, G., & Roth, T. (1997). Hypnotics, alcohol, and caffeine: Relation to insomnia. In M. Pressman & W. Orr (Eds.), *Understanding sleep: the evaluation and treatment of sleep disorders.* Washington, DC: America Psychological Association.

Roffwarg, H. P., Muzio, J. N., & Dement, W. C. (1966). Ontogenetic development of the human sleep-dream cycle. *Science, 152*, 604-619.

Rosen, C. L., Palermo, T. M., Larkin, E. K., & Redline, S. (2002). Health-related quality of life and sleep-disordered breathing in children. *Sleep: Journal of Sleep and Sleep Disorders Research, 25*, 648-654.

Rosenthal, L., Merlotti, L., & Roehrs, T. A. (1991). Enforced 24-hour recovery following sleep deprivation. *Sleep, 14*, 448-453.

Rosenthal, L., Roehrs, T. A., Rosen, A., & Roth, T. (1993). Level of sleepiness and total sleep time following various time in bed conditions. *Sleep, 16*, 226-232.

Ross, J. J. (1965). Neurologic findings after prolonged sleep deprivation. *Archives of Neurology, 12*, 399-403.

Rothenberg, S. A. (2000). Introduction to sleep disorders. In M. R. Pressman & W. C. Orr (Eds.), *Understanding sleep: The evaluation and treatment of sleep disorders* (pp. 57 - 72). Washington, DC: American Psychological Association.

Sassin, J. F., Parker, D. C., & Johnson, L. C. (1969). Effects of slow wave sleep deprivation on human growth hormone release in sleep: Preliminary study. *Life Sciences, 8*, 1299-1307.

Schoicket, S. L., Bertelson, A. D., & Lacks, P. (1988). Is sleep hygiene a sufficient treatment for sleep maintenance insomnia? *Behavior Therapy, 19*, 183-190.

Schonfield-Warden, N., & Warden, C. H. (1997). Obesity. *Pediatrics, 44*, 339-361.

Schredl, M., Weber, B., & Hauser, M. (1998). REM sleep and memory. *Psychologische Beitrage, 40*, 340-349.

Shoham0Salomon, V., & Rosenthal, R. (1987). Paradoxical interventions: A meta-analysis. *Journal of Consulting and Clinical Psychology, 55*, 22-28.

Sicard, B., Jouve, E., & Blin, O. (2001). Risk propensity assessment in military special operations. *Military Medicine, 166*, 871-74.

Siegel, J. M., & Rogawaski, M. A. (1988). A function for REM sleep: Regulation of noradrenergic receptor sensitivity. *Brain Research Review, 13*, 213-233.

Sleep Research Society. (1993). *Basics of sleep behavior*. Los Angeles: UCLA and the Sleep Research Society.

Smith, C. (1996). Sleep states, memory processes and synaptic plasticity. *Behavioural Brain Research, 78,* 49-56.

Smith, C., & Lapp, L. (1991). Increases in number of REMS and REM density in humans following an intensive learning period. *Sleep, 14,* 325-330.

Smith, C. S., Robie, C., Folkard, S., Barton, J., Macdonald, I., Smith, L., Spelten, E., Totterdell, P., & Costa, G. (1999). A process model of shiftwork and health. *Journal of Occupational Health Psychology, 4,* 207-218.

Spangenberg, G. (2004, Feb.). *Current issues in correctional education: A compilation and discussion.* (Available from the Council for Advancement of Adult Literacy, 1221 Avenue of the Americas, New York, NY 20020)

Spine Health.com. (2006). *Psychological approaches for insomnia.* Retrieved February 21, 2007, from http://www.spine-health.com/topics/conserv/insomnia/html

Strubbe, J. H., & Woods, S. C. (2004). The timing of meals. *Psychological Review, 111,* 128-141.

Szykula, S. A., & Jackson, D. F. (2005). Managed mental health care in large jails: Empirical outcomes on cost and quality. *Journal of Correctional Health Care, 11,* 223-240.

Taheri, S., Lin, L., Austin, D., & Young, T. (2004). Short sleep duration is associated with reduced leptin, elevated ghrelin, and increased body mass index. *PLOS Medicine,* 1, 210-217.

Tanaka, H., Taira, K., Arakawa, M., Masuda, A., Yamamoto, Y., Komoda, Y., Kadegaru, H., & Shirakawa, S. (2003). An examination of sleep health, lifestyle, and mental health in junior high school students. *Psychiatry & Clinical Neuroscience, 56,* 235-236.

Taub, J. M. (1978). Behavioral and psychophysiological correlates of irregularity in chronic sleep routines. *Biological Psychology, 7,* 37-53.

Taub, J. M., & Berger, R. J. (1978). The effects of changing the phase and duration of sleep. *Journal of Experimental Psychology, 2,* 30-41.

Taub, J., & Hawkins, D. (1979). Aspects of personality associated with irregular sleep habits in young adults. *Journal of Clinical Psychology, 35,* 296-304.

Thorpy, M. (1991). History of sleep and man. In M. Thorpy & J. Yager (Eds.), *The encyclopedia of sleep and sleep disorders.* New York: Facts on File.

Thorpy, >, & Yager, J. (2001). *The encyclopedia of sleep and sleep disorders* (2nd ed.). New York: Facts on File.

Tiffin, P., Ashton, H., Marsh, R., & Kamali, F. (1995). Pharmacokinetic and pharmacodynamic responses to caffeine in poor and normal sleepers. *Psychopharmacology, 121,* 494-502.

Totterdell, P., & Costa, G. (1997). A process model of shift work and health. *Journal of Occupational Health Psychology, 4,* 207-218.

Travis, J. (Oct., 2003). *The hidden costs of incarceration and reentry.* Retrieved December 5, 2006, from http://www.urban.org/Uploaded PDF/310882_families _left_behind.pdf

Trinder, J., Paxton, S.J., Montgomery, I., & Fraser, G. (1985). Endurance as opposed to power training: Their effect on sleep. *Psychophysiology, 22*, 668-673.

Trockel, M., Barnes, M., & Egget, D. (2000). Health-related variables and academic performance among first-year college students: Implications for sleep and other behaviors. *Journal of American College Health, 49,* 125-132.

University of Maryland Medical Center. (2006). *Relaxation techniques*. Retrieved January 23, 2007, from http//www.umm.edu/cgi-bin/printpage.cgi.

Urponen, H., Partinen, M., Vuori, I., & Hasan, J. (1991). Sleep quality and health: Description of the sleep quality index. In J. H. Peter (Ed.), *Sleep and health risk* (pp. 555-558). Berlin: Springer.

Vaidya, J. G. (1997). *Circadian typology and its relationship to personality, mood, and well-being,* Unpublished manuscript, University of Iowa, Iowa City.

Vein, A. M., Dallakyan, I. G., Levin, Y. I., & Skakun, K. E. (1983). Physiological and psychological consequences of single sleep deprivation. *Human Physiology, 8*, 392-396.

Verlander, L. A., Benedict, J. O., & Hanson, D. P. (1999). Stress and sleep patterns in college students. *Perceptual and Motor Skills, 88*, 193-898.

Vgontzas, A. N., Bixler, E. O., Kales, A., Criley, C., & Vela-Bueno, A. (2000). Differences in nocturnal and daytime sleep between primary and psychiatric hypersomnia: Diagnostic and treatment implications. *Psychosomatic Medicine, 62*, 220-226.

Vignau, J., Bailey, D., Duhamel, A., Vervaecke, P., Beuscart, R., & Collinet, C. (1997). Epidemiologic study of sleep quality and troubles in French secondary school adolescents. *Journal of Adolescent Health, 21*, 343-350.

Vogel, G. (1999). REM sleep deprivation and behavioral changes. In B. N. Mallick, & S. Inoue (Eds.). *Rapid eye movement sleep* (pp. 355-366). London: Narasa Publishing House.

Walsh, J. K., & Lindblom, S. S. (2000). Psychophysiology of sleep deprivation and disruption. In M. R. Pressman & W. C. Orr, (Eds.), *Understanding sleep: The evaluation and treatment of sleep disorders* (pp. 73-110). Washington DC: American Psychological Association.

Webb, W. B., & Agnew, H.W. (1974). Sleep and waking in a time-free environment. *Aerospace Medicine, 45*, 617-622.

Webb, W. B., & Friel, J. (1971). Sleep stage and personality characteristics of "natural" long and short sleepers. *Science, 171*, 587-588.

Wetter, D. W., Fiore, M. C., Baker, T. B., & Young, T. B. (1995). Tobacco withdrawal and nicotine replacement influence on objective measures of sleep. *Journal of Consulting and Clinical Psychology, 63*, 658-667.

Wetter, D. W., & Young, T. B. (1994). The relation between cigarette smoking and sleep disturbance. *Preventive Medicine, 23*, 328-334.

Wilkinson, R. T. (1968). Performance tests for partial and selective sleep deprivation. *Progress in Clinical Psychology, 8*, 28-43.

Williams, R. L., Karacan, I., & Hursch, C. J. (1974). *EEG of human sleep: Clinical applications*. New York: Wiley.

Wingard, D. L., & Berkman, L. F. (1983). Mortality risk associated with sleeping patterns among adults. *Sleep, 6*, 102-107.

Wolfson, A. R., & Carskadon, M. A. (1998). Sleep schedules and daytime functioning in adolescents. *Child Development, 69*, 875-887.

Wolpe, J. (1973). *The practice of behavior therapy* (2nd ed.). New York: Pergamon Press.

Wolter, T. D., Hauri, P. J., Schroeder, D. R., Wisbey, J. A., Croghan, I. T., Offord, K. P., Dale, L. C., & Hurt, R. D. (1996). Effects of 24-hour nicotine replacement on sleep and daytime activity during smoking cessation. Preventive Medicine, 25, 601-610.

Wood, J. M., Bootzin, R. R., Kihlstrom, J. F., & Schacter, D. L. (1992). Implicit and explicit memory for verbal information presented during sleep. *Psychological Science, 3*, 236-239.

World Health Organization. (1992). *The ICD-10 classification of mental and behavioral disorders: Clinical descriptions and diagnostic guidelines.* Geneva: author.

Zammit, G. K. (1988). Subjective ratings of the characteristics and sequelae of good and poor sleep in normals. *Journal of Clinical Psychology, 44,* 123-130.

Zammit, G. K. (2000). Delayed sleep phase syndrome and related conditions. In M. R. Pressman & W. C. Orr (Eds.), *Understanding sleep: The evaluation and treatment of sleep disorders* (pp. 229 - 248). Washington, DC: American Psychological Association

Zeman, A., & Reading, P. (2005). Sleep. *Clinical Medicine, 5*, 97-100.

Zeplin, H. (1994). Mammalian sleep. In M. H. Kryger, T. Roth, & W. C. Dement (Eds.), *Principles and practice of sleep medicine* (pp. 69-80). Philadelphia: Saunders.

Zeplin, H., & Rechtschaffen, A. (1974). Mammalian sleep, longevity, and energy conservation. *Brain, Behavior, and Evolution, 10*, 425-470.

APPENDIX A

Louisiana Department of Corrections Approval Form

Approval to Conduct Dissertation Research at David Wade Correctional Center

Title: Evaluation of a Sleep Hygiene Program for Inmates to Improve Sleep Quality
Dissertation Researcher: Jennifer Hodges-Crowder, LAC, Ph.D. Candidate
Supervisor: Susan Tucker, Ph.D., Director of Mental Health

Purpose of Study/Project:

Complaints of sleep difficulties are becoming more common among prison inmates. Psycho-educational interventions are among the most effective methods for reducing sleep difficulties and are significantly better than medication interventions. Research has shown that sleep hygiene education has been successful in improving sleep habits and reducing sleep complaints in the general population. While members of the prison population often complain of sleep difficulties and request pharmacological treatments regularly, the effectiveness of psycho-educational interventions in this population is absent from the research literature. The purpose of this study is to evaluate the effectiveness of a psycho-educational intervention to improve sleep habits (sleep hygiene) and reduce sleep complaints in the prison population.

Procedure, Subjects, & Assurance of Confidentiality, Anonymity:

Participation in the study will be voluntary by inmates at Forcht Wade Correctional Facility. Inmates will be solicited for voluntary participation through the use of a sign up sheet, with clear instructions that they may decline participation without penalty. Volunteers will complete a pre-treatment survey packet that will be coded with numbers and participants will not be asked to place identifying information on the packets. Volunteers will be asked to sign a consent form for use of their data. Participants will be notified that group findings not individual results will be reported. Ninety volunteers will be obtained and then randomly placed in 3 groups. Each group will meet separately 3 times. Group one will receive sleep hygiene education, group two will receive anxiety reduction education, and group three will be a control group that receives substance abuse prevention education. Session one (45 minutes) will include the completion of a pre-treatment survey packet and half of the education lecture. Session two (45 minutes) will conclude the education lecture. The post-treatment survey packet will be completed during session three (45 minutes) four weeks later with debriefing information provided. Volunteers will be advised that they may end their participation in the study at any time without penalty. There are no known risks associated with participation in this study. There will be no direct compensation for participants in this study. If any study treatments are found effective, then all group participants will receive opportunity to receive that education at the conclusion of the study in a final fourth group.

Safeguards of Physical and Emotional Well-being:

Data will not be collected until permission is obtained from the Human Subjects Review Committee at Louisiana Tech University. Prospective subjects and participants will receive opportunities to ask questions of the Project Directors or members of the Human Subject Review Committee if they have further concerns. Data will be stored in a secure area and hard copies destroyed once data is entered for computer analysis. The

computer data will be securely stored for a period of five years and will then be destroyed.

Approval:

The dissertation research proposed by Jennifer Hodges-Crowder entitled *Evaluation of a Sleep Hygiene Program for Inmates to Improve Sleep Quality*, has been reviewed and was found to provide reasonable and adequate safeguards against possible risk involving human subjects. Approval has been granted to conduct this research at Forcht Wade Correctional Facility under the supervision of Susan Tucker, Ph.D. upon approval from the University Human Subject Use Review Committee.

2-8-07

Anthony Batson, Assistant Warden Date

2-8-07

Susan Tucker, Ph.D. Date
Director of Mental Health FWCC

APPENDIX B

University Institutional Review Board Approval Form

LOUISIANA TECH
UNIVERSITY

OFFICE OF UNIVERSITY RESEARCH

MEMORANDUM

TO: Dr. Walter Buboltz, Ms. Jennifer Hodges-Crowder, and Dr. Barlow Soper

FROM: Barbara Talbot, University Research

SUBJECT: HUMAN USE COMMITTEE REVIEW

DATE: March 5, 2007

In order to facilitate your project, an EXPEDITED REVIEW has been done for your proposed study entitled:

"Evaluation of a Sleep Hygiene Program
for Inmates to Improve Sleep Quality"

HUC-364

The proposed study's revised procedures were found to provide reasonable and adequate safeguards against possible risks involving human subjects. The information to be collected may be personal in nature or implication. Therefore, diligent care needs to be taken to protect the privacy of the participants and to assure that the data are kept confidential. Informed consent is a critical part of the research process. The subjects must be informed that their participation is voluntary. It is important that consent materials be presented in a language understandable to every participant. If you have participants in your study whose first language is not English, be sure that informed consent materials are adequately explained or translated. Since your reviewed project appears to do no damage to the participants, the Human Use Committee grants approval of the involvement of human subjects as outlined.

Projects should be renewed annually. ***This approval was finalized on February 23, 2007 and this project will need to receive a continuation review by the IRB if the project, including data analysis, continues beyond February 23, 2008.*** 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 C

Consent Form

HUMAN SUBJECTS CONSENT FORM

The following is a brief summary of the project in which you are asked to participate. Please read this information before signing the statement below.

TITLE OF PROJECT: Evaluation of a Sleep Hygiene Program for Inmates to Improve Sleep Quality

PURPOSE OF STUDY/PROJECT: Evaluate the effectiveness of a psychoeducational intervention program aimed at improving sleep quality, length, and habits for prison inmates.

PROCEDURE: Volunteers will complete a confidential survey, participate in 3 group education sessions and complete a final confidential survey.

INSTRUMENTS: This study will utilize a Demographics Questionnaire, the Sleep Quality Index, the Sleep Habits Questionnaire, the Pittsburgh Sleep Quality Index, the Sleep Hygiene Awareness and Practice Scale.

RISKS/ALTERNATIVE TREATMENTS: There are no known risks for participation in this study. All participants will receive debriefing information at the conclusion of the study.

BENEFITS/COMPENSATION: There will be no compensation for participants. Any psychoeducational information found to be effective in improving sleep quality, length, and/or habits for inmates will be provided to all study participants.

I, _____, attest with my signature that I have read and understood the following description of the study, "Evaluation of a Sleep Hygiene Program for Inmates to Improve Sleep Quality", and its purposes and methods. I understand that my participation in this research is strictly voluntary and my participation or refusal to participate in this study will not affect my relationship with Forcht Wade Correctional Center, Louisiana Department of Corrections, or Louisiana Tech University. Further, I understand that I may withdraw at any time or refuse to answer any questions without penalty. Upon completion of the study, I understand that the results will be freely available to me upon request. I understand that the results of my survey will be confidential, accessible only to the principal investigators, myself, or a legally appointed representative. I have not been requested to waive nor do I waive any of my rights related to participating in this study.

_____ _____

Signature of Participant or Guardian **Date**

CONTACT INFORMATION: The principal experimenters listed below may be reached to answer questions about the research, subjects' rights, or related matters.
Jennifer F. Hodges-Crowder, Ph.D. Candidate
Walter C. Buboltz, Jr., Ph.D.
Barlow Soper, Ph.D.
(318) 257-4315

Members of the Human Use Committee of Louisiana Tech University may also be contacted if a problem cannot be discussed with the experimenters:
Dr. Les Guice (318) 257-3056
Dr. Mary M. Livingston (318) 257-2292

Dr. Susan Tucker, Director of Mental Health for the Wade Correctional System, may also be contact with any questions. You may reach her at Forcht Wade Correctional Facility through farm mail.

APPENDIX D

Demographic Questionnaire

DEMOGRAPHIC QUESTIONNAIRE

PLEASE PROVIDE THE FOLLOWING INFORMATION BY FILLING IN THE BLANK OR CIRCLING THE APPROPRIATE ANSWER

1. How old are you (age in years)? _____
2. How many years of school did you complete (Circle One)? (High school or GED is 12 years.)

   1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18

3. With which ethnic group do you **most** identify (circle one)?

   African American Asian American Caucasian American

   Hispanic/Latino Native American Other

4. For what conviction are you currently serving time? _____
5. How much time have you spent in prison for your current sentence/conviction? ____
6. How many times have you been incarcerated (in prison) prior to this sentence/conviction?_____
7. Do you have any mental health problems for which you are currently receiving treatment (Circle One)?

   YES NO

8. If yes, please list your diagnosis: _____
9. Do you have any physical/medical problems for which you are currently receiving treatment (Circle One) ?

   YES NO

10. If yes, please list your medical problems: _____

APPENDIX E

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.**

   less than10 minutes 11-30 minutes more than 30 minutes

2. **Suffered from insomnia during the past 3 months**

   No less than 3 days per week 3-7 days per week

3. **Difficulties falling asleep during the past 3 months**

   No less than 3 days per week 3-7 days per week

4. **Disturbed night sleep during the past 3 months**

   No less than 3 days per week 3-7 days per week

5. **Nocturnal awakenings during the past 3 months**

   No less than 3 days per week 3-7 days per 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 less than 3 days per week 3-7 days per week

8. **Use of sleeping medication during the past 3 months**

   No Occasionally At least once per week

APPENDIX F

Sleep Habits Questionnaire

SLEEP HABITS QUESTIONNAIRE

********************Please answer the following questions. ***********************

1. On the average what time during the week do you go to bed? _____

2. On the average what time during the week do you wake up? _____

3. On the average what time during the weekend do you go to bed? _____

4. On the average what time during the weekend do you wake up? _____

5. On the average how many hours of sleep do you get during the week? _____

6. On the average how many hours of sleep do you get on the weekend? _____

7.Ideally I would like to get _____ hours of sleep during the week each night.

8. Ideally I would like to get _____ hours of sleep on the weekend each night.

9. About how many minutes does it take you to fall asleep after lying down in bed?
_____

APPENDIX G

Pittsburg Sleep Quality Index

PITTSBURG SLEEP QUALITY INDEX

The following questions relate to your usual sleep habits during the last 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 a night? (This may be different than the number of hours you spent in bed.) _____

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

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

(a) Cannot get to sleep within 30 minutes

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

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

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(c) Have to get up to use the bathroom

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(d) Cannot breathe comfortably

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(e) Cough or snore loudly

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(f) Feel too cold

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(g) Feel too hot

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(h) **Had bad dreams**

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(i) **Have pain**

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(j) **Other reason(s), please describe**_____

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

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

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

Very good ____ Fairly good ____ Fairly bad _____ Very bad____

7. **During the 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 enough enthusiasm to get things done?**

No problem at all____	Only a very slight problem____	Somewhat of a problem____	A very big problem ____

10. **Do you have a bed partner or roommate?**

No bed partner or roommate _____
Partner/roommate in other room _____
Partner in same room, not same bed _____
Partner in same bed _____

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

(a) loud snoring

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(b) Long pauses between breaths while asleep

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(c) Legs twitching or jerking while you sleep

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(d) Episodes of disorientation or confusion during sleep

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

(e) Other restlessness while you sleep: please describe_____

Not during the past month____	Less than once a week____	Once or twice a week____	Three or more times a week ____

Scoring Instructions for the Pittsburg Sleep Quality Index

The Pittsburg Sleep Quality Index (PSQI) contains 19 self-rated questions and 5 questions rated by the bed partner or roommate (if one is available). Only self-rated questions are included in the scoring. The 19 self-rated items are combined to form seven "component" scores, each of which has a range of 0-3 points. In all cases, a score of "0" indicates no difficulty, while a score of "3" indicates severe difficulty. The 7 component scores are then added to yield one "global" score, with a range of 0-21 points, "0" indicating no difficulty and "21" indicating severe difficulty in all areas. Scoring proceeds as follows:

Component 1: Subjective sleep quality

Examine question 6, and assign scores as follows:

Response	Component 1 score
Very good	0
Fairly good	1
Fairly bad	2
Very bad	3

Component 1 score: _____

Component 2: Sleep latency

1. Examine question 2, and assign scores as follows:

Responses	Score
Less than 15 minutes	0
16-30 minutes	1
31-60 minutes	2
Greater than 60 minutes	3

Question 2 score _____

2. Examine question 5a, and assign scores as follows:

Response	Score
Not during the past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Question 5a score _____

3. Add question 2 score and question 5a score.

Sum of 2 and 5a _____

4. Assign component 2 score as follows:

Sum of 2 and 5a	Component 2 score
0	0
1-2	1
3-4	2
5-6	3

Component 2 score: _____

Component 3: Sleep duration

Examine question 4, and assign scores as follows:

Response	Component 3 score
More than 7 hours	0
6-7 hours	1
5-6 hours	2
Less than 5 hours	3

Component 3 score: _____

Component 4: Habitual sleep efficiency

1. Write the number of hours slept (question 4) here: _____

2. Calculate the number of hours spent in bed:
   Getting up time (question 3): _____
   Bedtime (question 1): -_____
   _____
   =Number of hours spent in bed _____

3. Calculate habitual sleep efficiency as follows:
(Number of hours slept/Number of hours spent in bed) x 100 = Habitual Sleep Efficiency
(_____ / _____) X 100 = _____%

4. Assign component 4 score as follows:

Habitual sleep efficiency %	Component 4 score
Greater than 85%	0
75-84%	1
65-74%	2
Less than 65%	3

Component 4 score: _____

Component 5: Sleep disturbances

1. Examine questions 5b-5j and assign scores for each question as follows:

Response	Score
Not during the past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

5b = _____ 5c = _____ 5d = _____
5e = _____ 5f = _____ 5g = _____
5h = _____ 5i = _____ 5j = _____

2. Add the scores for questions 5b-5j:

Sum of 5b-5j: _____

3. Assign component 5 score as follows:

Sum of 5b-5j	Component 5 score
0	0
1-9	1
10-18	2
19-27	3

Component 5 score: _____

Component 6: Use of sleep medication

Examine question 7 and assign scores as follows:

Response	Score
Not during the past month	0
Less than once a week	1
Once or twice a week	2
Three or more times a week	3

Component 6 score: _____

Component 7: Daytime dysfunction

1. Examine question 8, and assign scores as follows:

Response	Score
Not during the past month	0
Less than once a week	1
Once or twice each week	2
Three or more times each week	3

Question 8 score: _____

2. Examine question 9, and assign scores as follows:

Response	Score
No problem at all	0
Only a very slight problem	1
Somewhat of a problem	2
A very big problem	3

Question 9 score: _____

3. Add the scores for question 8 and 9:

Sum of 8 and 9: _____

4. Assign component 7 score as follows:

Sum of 8 and 9	Component 7 score
0	0
1-2	1
3-4	2
5-6	3

Component 7 score: _____

Global PSQI Score:

Add the seven component scores together

Global PSQI score: _____

APPENDIX H

Sleep Hygiene Awareness and Practice Scale

SLEEP HYGIENE AWARENESS AND PRACTICE SCALE

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

8. Setting aside time to relax before bed _____

9. Consuming food, beverages, or medications containing caffeine _____

1. Exercising in the afternoon or early evening _____

2. Waking up at the same time each day _____

3. Going to bed at the same time each day _____

4. Drinking 3 ounces of alcohol in the evening (e.g. mixed drinks, 3 beers, 3 glasses of wine) _____

For each item on the following list, indicate whether you believe it contains caffeine or another stimulant by placing a Y (yes) or an N (no) in the space provided. If you are not sure, make your best guess, If you have never heard of an item please place an X in the space.

_____ 7-up Soft Drink	_____ Lemonade	_____ Mountain Dew
_____ Regular Tea	_____ Root Beer	_____ Cola Soft Drinks
_____ Dristan Cold Remedy	_____ Chocolate Cake	_____ Dexatrim
_____ Aspirin	_____ Regular Coffee	_____ Tylenol
_____ Dr. Pepper	_____ Excedrin	_____ Aqua Ban
_____ Midol Menstrual Relief	_____ Sudafed	_____ Sprite Soft Drink

For each of the following behaviors state the number of days per week (0-7) that you engage in the activity or have that experience. Base your 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 (prescription or over the counter) _____
6. Drink beverages containing caffeine (e.g. coffee, tea, colas) within 4 hours of bedtime _____
7. Drink more than 3 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 within 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 bed partner _____ (put NA if no partner)
16. Sleep approximately the same length of time each night _____
17. Set aside time to relax before bed _____
18. Exercise in the afternoon or early evening _____
19. Have a comfortable nighttime temperature in your bed/bedroom _____

Scoring for the Sleep Hygiene Awareness and Practice Scale

Sleep Hygiene Knowledge Scale

Correct answers = 1 point
Omitted items = 2 points
Incorrect answers = 3 points

Items 1-6, 9, and 13 are disruptive to sleep.
Incorrect responses = 1, 2, 3, or 4 scored as incorrect with 3 points
Correct responses = 5, 6, or 7 score as correct with 1 point

Items 7, 8, 10, 11, and 12 are beneficial to sleep.
Incorrect responses = 4, 5, 6, or 7 scored as incorrect with 3 points
Correct responses = 1, 2, or 3 scored as correct with 1 point

Scores on this scale may range from 13-39. Higher scores indicate less sleep hygiene knowledge.

Caffeine Knowledge

Substances that contain caffeine (yes answers)

Mountain dew	Regular tea
Cola soft drinks	Dristan Cold Remedy
Chocolate cake	Dexatrim Diet Pills
Regular Coffee	Dr. Pepper soft drink
Excedrin	Aqua Ban diuretic
Midol Menstrual Relief	Sudafed Decongestant

Substances that do not contain caffeine (no answers)

7-Up Soft Drink	Lemonade
Root Beer	Aspirin
Tylenol	Sprite Soft Drink

The score is the number correct divided by the number answered and then multiplied by 100. Scores may range from 0 to 100. A higher score indicates better knowledge.

Sleep Hygiene Practice

The total score is the sum of the answers to all of the items. Reverse the scores for items 16-19 (i.e., 0=7,1=6, 2=5, 3=4, 4=3, 5=2, 6=1, 7=0). Scores may range from 0-133. Higher scores indicate less healthy sleep hygiene practices.

APPENDIX I

Sleep Hygiene Education Program

SLEEP HYGIENE EDUCATION PROGRAM

We are here today to talk about sleep difficulties. Studies show that millions of Americans are affected by sleep difficulties and that sleep disorders affect all age groups. This includes individuals in the prisoners system. Insomnia, trouble falling or staying asleep, is one of the most common complaints in prison. Doctors have traditionally prescribed sleep medication to treat sleep problems. However, as many of you may know, they are less likely to do so today. While medication has been the most common treatment for sleep complaints both inside and outside of prison, there are non-medical ways to deal with sleep disturbances. We will talk about ways to reduce sleep complaints during our time together. Before we do, let's talk about the basics of sleep first.

Sleep is a structured physiological process which influences and is influenced by a wide variety of factors. Sleep occurs in all animals and is essential for survival. Everyone must sleep but sleep lengths differ from person to person. Some people are long sleepers, some are short sleepers, some sleep during the day rather than at night, and some take naps. Although sleep is a big part of our lives, most people know little about the process of sleep or its importance to normal daytime functioning.

Why We Sleep- The Functions of Sleep

- There is no definitive answer to this question but we do know some reasons that sleep is important.

- *Adaptive Theory*
    - Formulated from study of sleep in animals
    - Sleep is an adaptive response.
        - Animals that are vulnerable during day sleep during the day
        - Night vision is an adaptive response
- *Developmental Theory*
    - Sleep has a vital role in brain development
    - Comes from observation infants sleep more and sleep decreases as we age
- *Learning Theory*
    - Main function of sleep is to facilitate memory
    - Sleep aids in learning = animals deprived of sleep learn more slowly
- *Restorative Theory*
    - Sleep replenishes our minds and bodies from daily activities.
    - Most commonly given reason for the process of sleep.

Sleep Need- How much sleep do we need?

- No definitive answer
- Varies from 4 hours a day to 10 hours a day. Average is 7 to 8 hours
- Best answer is to let your body tell you. If you do not get enough sleep then you will be sleepy during the day.
- Most people get less sleep than they need. (Prison times as an example)
- Sleep debt is created with a lack of sleep (sleep deprivation).

Sleep Deprivation

- Studies show that even when people are forced to stay awake the body rebels and people experience microsleep, brief 2 to 5second burst of sleep.
- *Partial Sleep Deprivation*: blurred vision, anxiety, irritability, memory deficits, personality changes, depression (sleep deprivation as a predictor of depression), slow cognitive processing.
- *Total Sleep Deprivation*: perceptual disturbances, hallucinations, neurological problems
- *Chronic Sleep Deprivation*: poor cognitive functioning, fatigue, lowered productivity; impaired reaction times; poor vigilance; aggressive behaviors; increased moodiness
- *Examples of Sleep Debt Disasters & Problems*
    - Exxon Valdez 1989 – attributed to sleep deprivation, man had only 6 hours of sleep in the previous 48 hours
    - Challenger Explosion 1980s – attributed to error of severe sleep deprivation of NASA managers
    - Sleep in America Poll (NSF, 2005):
        - ¾ of Americans report at least one symptom of a sleep problem (e.g. snoring, waking during the night)
        - ½ said tired & 3 in 10 adults miss work or made errors at work
    - Drowsy Driving:
        - 2002 NSF ½ of all surveyed admitted to driving when sleepy
        - Yearly: 100,000 car crashes; 71,000 injuries; 1550 deaths

Problems Associated With Sleep Complaints

- Medical conditions: HBP, arthritis, heartburn, chronic pain
- Psychological Conditions: anxiety, depression, moodiness, irritability, adjustment issues
- Chronic mental illness: Bipolar Disorder, Major Depression, Anxiety Disorders, Schizophrenia

Education for the Treatment of Sleep Disturbances/Difficulties/Complaints

- Sleep Hygiene Guidelines: Improving sleep habits can help to reduce sleep problems.
- Common Ways to Improve Sleep Hygiene
    1) Go to bed and wake up at the same time every day
    2) Avoid napping during the daytime
    3) Exercise daily at least 4-6 hours before bedtime
    4) Avoid large meals before bedtime.
    5) Go to bed only for rest or sleep. Do not do other activities such as reading in your bed.
    6) Do not have a clock within view of your bed when you lie down
    7) Reduce external noise as much as possible when you are trying to sleep (ear plugs are helpful).
    8) Reduce stimulant use such as caffeine or nicotine.

- Caffeine should be eliminated or limited to consumption before noon.
- Nicotine/Cigarettes stimulate the body and should be avoided prior to bedtime.

9) Prepare for bedtime half an hour before you lie down to sleep. Relaxation exercises can be helpful in preparing for bed.

10) If your mind is racing when you lay down, make yourself think about happy memories, a time when life was good and calm.

Substances with Caffeine

- Caffeine is the most commonly used stimulant in the world
- It takes about 3 to 7 hours for caffeine to be reduced in the body
- The average American consumes 211mg of caffeine per day
- Caffeine lengthens the time it takes to fall asleep and reduces total sleep time

Common Substances with Caffeine

FOOD	AVERAGE CAFFEINE CONTENT
ESPRESSO	200mg
8 OUNCE CUP OF COFFEE	130mg
8 OUNCES INSTANT COFFEE	75mg
8 OUNCES DECAFFEINATED COFFEE	3mg
8 OUNCES OF TEA	60mg
12 OUNCES COCA-COLA	35mg

FOOD	AVERAGE CAFFEINE CONTENT
12 OUNCES MOUNTAIN DEW	56mg
HERSHEY'S CANDY BAR	10mg
1 NO-DOZ PILL	100mg
1 EXCEDRIN PILL	130mg
1 MIDOL PILL	32mg

SLEEP HYGIENE GUIDELINES HANDOUT

There are a variety of different techniques that promote a good night's sleep. Improving sleep habits, also known as sleep hygiene, can reduce sleep complaints and improve overall sleep. Suggestions for improving sleep quality are listed below.

Good Sleep Hygiene Guidelines

1) Go to bed and wake up at the same time every day
2) Avoid napping during the daytime
3) Exercise daily at least 4-6 hours before bedtime
4) Avoid large meals before bedtime.
5) Go to bed only for rest or sleep. Do not do other activities such as reading in your bed.
6) Do not have a clock within view of your bed when you lie down
7) Reduce external noise as much as possible when you are trying to sleep (ear plugs are helpful).
8) Reduce stimulant use such as caffeine or nicotine.
    - Caffeine should be eliminated or limited to consumption before noon.
    - Nicotine/Cigarettes stimulate the body and should be avoided prior to bedtime.
9) Prepare for bedtime half an hour before you lie down to sleep. Relaxation exercises can be helpful in preparing for bed.
10) If your mind is racing when you lay down, make yourself think about happy memories, a time when life was good and calm.

SUBSTANCES WITH CAFFEINE HANDOUT

- Caffeine is the most commonly used stimulant in the world
- It takes about 3 to 7 hours for caffeine to be reduced in the body
- The average American consumes 211mg of caffeine per day
- Caffeine lengthens the time it takes to fall asleep and reduces total sleep time

Common Substances with Caffeine

FOOD	AVERAGE CAFFEINE CONTENT
ESPRESSO	200mg
8 OUNCE CUP OF COFFEE	130mg
8 OUNCES INSTANT COFFEE	75mg
8 OUNCES DECAFFEINATED COFFEE	3mg
8 OUNCES OF TEA	60mg
12 OUNCES COCA-COLA	35mg
12 OUNCES MOUNTAIN DEW	56mg
1 HERSHEY'S CANDY BAR	10mg
1 NO-DOZ PILL	100mg
1 EXCEDRIN PILL	130mg
1 MIDOL PILL	32mg

APPENDIX J

Relaxation Education Program

Relaxation Education Program

Life is fast paced which often causes people to push their minds and bodies to the limit, often at the expense of mental and physical well-being. As a result of all the daily demands that most Americans face, most individuals experience stress. Stress is a contributing factor to poor health and emotional problems. Many times stress, physical, and emotional problems can be related to sleep complaints. Sleep difficulties are common to over 50% of the general population. Reports of sleep problems are also common in prison. Disturbances of the normal sleep cycle can be caused by many factors. The most common method of treating sleep disorders in American society has been through the use of sleep medications. However, physicians are reducing the number of prescriptions given to inmates for sleep complaints due to a variety of reasons.

There are other ways to reduce sleep difficulties aside from sleep medications. In fact, the use of sleep medication is not always the most effective way to improve sleep quality for most sleep complaints. Inmates complain of insomnia most often. Insomnia is a disruption in the sleep cycle. Insomnia can result from difficulty falling asleep, waking during the night, or early morning awakenings. We will talk about ways to reduce sleep complaints using relaxation techniques during our time together. Before we do, let's talk about the basics of sleep first.

Sleep is a structured physiological process which influences and is influenced by a wide variety of factors. Sleep occurs in all animals and is essential for survival. Everyone must sleep but sleep lengths differs from person to person. Some people are long sleepers, some are short sleepers, some sleep during the day rather than at night, and

some take naps. Although sleep is a big part of our lives, most people know little about the process of sleep or its importance to normal daytime functioning.

Why We Sleep- The Functions of Sleep

- There is no definitive answer to this question but we do know some reasons that sleep is important.
- *Adaptive Theory*
    - Formulated from study of sleep in animals
    - Sleep is an adaptive response.
        - Animals that are vulnerable during day sleep during the day
        - Night vision is an adaptive response
- *Developmental Theory*
    - Sleep has a vital role in brain development
    - Comes from observation infants sleep more and sleep decreases as we age
- *Learning Theory*
    - Main function of sleep is to facilitate memory
    - Sleep aids in learning = animals deprived of sleep learn more slowly
- *Restorative Theory*
    - Sleep replenishes our minds and bodies from daily activities.
    - Most commonly given reason for the process of sleep.

Sleep Need- How much sleep do we need?

- No definitive answer

- Varies from 4 hours a day to 10 hours a day. Average is 7 to 8 hours
- Best answer is to let your body tell you. If you do not get enough sleep then you will be sleepy during the day.
- Most people get less sleep than they need. (Prison times as an example)
- Sleep debt is created with a lack of sleep (sleep deprivation).

Sleep Deprivation

- Studies show that even when people are forced to stay awake the body rebels and people experience microsleep, brief 2 to 5second burst of sleep.
- Partial Sleep Deprivation: blurred vision, anxiety, irritability, memory deficits, personality changes, depression (sleep deprivation as a predictor of depression), slow cognitive processing.
- Total Sleep Deprivation: perceptual disturbances, hallucinations, neurological problems
- Chronic Sleep Deprivation: poor cognitive functioning, fatigue, lowered productivity; impaired reaction times; poor vigilance; aggressive behaviors; increased moodiness
- Examples of Sleep Debt Disasters & Problems
    - Exxon Valdez 1989 – attributed to sleep deprivation, man had only 6 hours of sleep in the previous 48 hours
    - Challenger Explosion 1980s – attributed to error of severe sleep deprivation of NASA managers
    - Sleep in America Poll (NSF, 2005):

- ¾ of Americans report at least one symptom of a sleep problem (e.g. snoring, waking during the night)
- ½ said tired & 3 in 10 adults miss work or made errors at work

o Drowsy Driving:

- 2002 NSF ½ of all surveyed admitted to driving when sleepy
- Yearly: 100,000 car crashes; 71,000 injuries; 1550 deaths

Problems Associated With Sleep Complaints

- Medical conditions: HBP, arthritis, heartburn, chronic pain
- Psychological Conditions: anxiety, depression, moodiness, irritability, adjustment issues
- Chronic mental illness: Bipolar Disorder, Major Depression, Anxiety Disorders, Schizophrenia

Relaxation Techniques for the Treatment of Sleep Complaints

People with difficulties falling or staying asleep may become anxious prior to bedtime. The more they try to sleep, the more anxious they become which turns occasional sleep difficulties into more permanent problems. Stress can also cause sleep disturbances. Relaxation techniques can help reduce anxiety and stress which promotes better quality sleep.

Relaxation techniques slow down the body and quiet the mind. Such techniques generally allow one to refocus attention, tune in to the body, and relax. The more relaxed an individual becomes, the more likely sleep will occur.

Relaxation Techniques

- Progressive Relaxation:
    - Sit or lie down comfortably and close your eyes
    - Feel your feet, their weight. Consciously relax them from your toes to ankles. Feel them sink into the bed.
    - Feel your knees and sense their weight. Consciously relax them and feel them sink into the bed.
    - Feel your thighs, their weight. Consciously relax them and feel them sink.
    - Feel your stomach and chest. Pay attention to your breathing. Will your upper body to relax as it becomes heavy and sinks.
    - Feel your hands, how heavy they have become. Consciously relax them and feel them sink down on your heavy legs.
    - Feel your shoulders, sense their weight. Consciously relax them and feel them sinking into relaxation.
    - Feel your neck and head, sense their weight. Consciously relax them and feel them loosening, relaxing.
    - Mentally scan your body. Is there any tension? Focus on that spot of tension, feel the weight, consciously relax this spot to total relaxation.
- Toe Tensing:
    - Sit or lie down and close your eyes.
    - Feel your toes.
    - Pull all 10 of your toes back towards your face and count to 10 slowly.
    - Now relax you toes, gently move them back down.

- Count to ten slowly. Repeat the above cycle 10 times or until relaxed.

- Deep Breathing
  - Sit or lie down in a comfortable position.
  - Inhale slowly through your nose if possible. Fill the lower part of your chest first, then the middle and top part of your chest. Breathe in slowly to the count of 10.
  - Hold your breath for a count of 5 and then quietly let the air out slowly to the count of 10.
  - Wait a few seconds and repeat the cycle until you feel the tension leaving your body with each breath you exhale.
  - If you feel dizzy, you are overdoing it. Slow down.

- Stretching Exercises
  - Stretch the whole body before lying down to sleep can induce relaxation and help with sleep

BENEFITS OF RELAXATION HANDOUT

What are relaxation techniques?

Life is fast paced which often causes people to push their minds and bodies to the limit, often at the expense of mental and physical well-being. As a result of pushing ourselves to the limit, most of us experience stress. Stress is a contributing factor to poor health and emotional problems. Many times stress, physical, and emotional problems can be related to sleep complaints. Sleep difficulties are common to over 50% of the general population. Reports of sleep problems are also common in prison. Relaxation techniques are helpful tools for coping with stress and promoting long-term health including good quality sleep. These tools assist us in combating the negative effects of stress.

How do relaxation techniques work?

When we become stressed, our bodies prepare for the fight or flight response. This response is a natural instinct that assist us in surviving, but prolonged states of stress keep us in a constant fighting mode. This can cause increased heart rate, high blood pressure, high cholesterol levels, intestinal disturbances, and immune system problems. Fortunately, we also possess the relaxation response which is the opposite of the fight or flight response. This response occurs when the body is in a deep state of relaxation. The relaxation response can counter the ill effects of long term stress. We can induce the relaxation response through the use of relaxation techniques.

Benefits of Relaxation Exercises

- Decreasing blood pressure
- Lowering heart rate
- Reducing muscle tension
- Feeling calm
- Improve sleep quality
- Reduce stress hormones
- Reduce the perception of pain

RELAXATION TECHNIQUES HANDOUT

Progressive Relaxation:

- Sit or lie down comfortably and close your eyes
- Feel your feet, their weight. Consciously relax them from your toes to ankles. Feel them sink into the bed.
- Feel your knees and sense their weight. Consciously relax them and feel them sink into the bed.
- Feel your thighs, their weight. Consciously relax them and feel them sink.
- Feel your stomach and chest. Pay attention to your breathing. Will your upper body to relax as it becomes heavy and sinks.
- Feel your hands, how heavy they have become. Consciously relax them and feel them sink down on your heavy legs.
- Feel your shoulders, sense their weight. Consciously relax them and feel them sinking into relaxation.
- Feel your neck and head, sense their weight. Consciously relax them and feel them loosening, relaxing.
- Mentally scan your body. Is there any tension? Focus on that spot of tension, feel the weight, consciously relax this spot to total relaxation.

- Toe Tensing:
  - Sit or lie down and close your eyes.
  - Feel your toes.
  - Pull all 10 of your toes back towards your face and count to 10 slowly.
  - Now relax you toes, gently move them back down.
  - Count to ten slowly. Repeat the above cycle 10 times or until relaxed.

- Deep Breathing
  - Sit or lie down in a comfortable position.
  - Inhale slowly through your nose if possible. Fill the lower part of your chest first, then the middle and top part of your chest. Breathe in slowly to the count of 10.
  - Hold your breath for a count of 5 and then quietly let the air out slowly to the count of 10.
  - Wait a few seconds and repeat the cycle until you feel the tension leaving your body with each breath you exhale.
  - If you feel dizzy, you are overdoing it. Slow down.

- Stretching Exercises
  - Stretch the whole body before lying down to sleep can induce relaxation and help with sleep

APPENDIX K

Control Group Education

CONTROL GROUP EDUCATION

Substance Abuse Prevention

Substance abuse prevention education is designed to inform you about the risks associated with drug and alcohol use. There are many risks for prisoners not only during incarceration but upon parole as well. Parolees are often held accountable at a level that the general population does not experience. This often includes drug testing and other required stipulations in order to maintain freedom. Illicit and illegal substance use can jeopardize that freedom and many prisoners have a false sense of security about what they will or will not be able to handle once released. Someone who used drugs prior to incarceration, remains abstinent during prison, and returns to the community may face pressure to return to drug using lifestyles. Substance abuse prevention education can help prepare inmates for the challenges they may face when released from prison.

In 2004 nearly a third of State and quarter of Federal prisoners committed their offenses under the influence of drugs. Over 17% of inmates committed their crimes to obtain money for drugs. In 2004, 79% of all federal prisoners and 83% of state prisoners admitted to using drugs the month prior to incarceration. One in four violent offenders in prison committed their offenses under the influence of drugs. Drug use is a tremendous problem in our society and the result of this social problem is reflected in our prisons. Many inmates may not have had opportunity for drug treatment on the outside and many do not have the opportunity for substance related-disorders treatment in prison.

Because of the high number of inmates that have used illegal or illicit substances in our prison system, it is important to begin to educate them about the nature of substance abuse and where to get help for problems. Even when assistance is provided in prison, there are many obstacles to face upon release back into the community. The first priority for substance abuse prevention is to teach warning signs of problems. The next task is to determine where help is available when needed.

Substance Abuse

Substance use leading to significant distress over a 12-month period with at least one of the following symptoms:

1. Recurrent substance use that interferes with major responsibilities (home, work, school, family).
2. recurrent substance use in situations in which it is physically hazardous (e.g., driving an automobile or operating a machine when impaired by substance use)
3. Drug or alcohol related legal problems
4. Continued substance use despite having recurrent problems caused by or made worse by alcohol or drug use.

Substance Dependence

Substance use that causes significant distress, over a 12-month period with at least 3 of the following problems:

1. Tolerance, as defined by either of the following:
    a. a need for markedly increased amounts of the substance to achieve intoxication or desired effect
    b. markedly diminished effect with continued use of the same amount of the substance
2. withdrawal, as manifested by either of the following:
    a. the characteristic withdrawal syndrome for the substance
    b. the same (or a closely related) substance is taken to relieve or avoid withdrawal symptoms
3. using more of the substance or using over a longer period of time than was intended
4. inability to cut down or control substance use
5. a great deal of time is spent in activities necessary to obtain the substance or recovering from its effects
6. no longer participating in normal social, occupational, or recreational activities because of substance use
7. the substance use is continued despite knowledge of having persistent or recurrent problems

Assistance for Substance-Related Disorders

Arkansas Alcohol and Drug Abuse Prevention

4313 West Markham

Little Rock, Arkansas 72205

Telephone (501) 686-9867

Arkansas Mental Health Services 1-877-227-0007

Louisiana Office For Addictive Disorders

628 North 4th Street, Baton Rouge, Louisiana 70821-2790

Toll free: 877-664-2248

Louisiana Office of Mental Health

P.O. Box 4049, Bin #12, Baton Rouge, LA 70821

Toll Free: 800-654-1373

Texas Council on Alcohol and Drug Abuse

909 West 45th Street, Austin, TX 78758

Toll free: 866-378-8440

Texas Department of Mental Health

4900 N. Lamar Blvd Austin , TX 78751-2316

Toll-Free: 800-252-8263 (Statewide)

Self-Help Twelve Step Recovery Program

Alcoholics Anonymous

Cocaine Anonymous

Narcotics Anonymous

SIGNS OF ALCOHOL AND DRUG USE PROBLEMS HANDOUT

Substance Abuse

Substance use leading to significant distress over a 12-month period with at least one of the following symptoms:

1. recurrent substance use that interferes with major responsibilities (home, work, school, family).

2. recurrent substance use in situations in which it is physically hazardous (e.g., driving an automobile or operating a machine when impaired by substance use)

3. Drug or alcohol related legal problems

4. continued substance use despite having recurrent problems caused by or made worse by alcohol or drug use.

Substance Dependence

Substance use that causes significant distress, over a 12-month period with at least 3 of the following problems:

1. tolerance, as defined by either of the following:
   a. a need for markedly increased amounts of the substance to achieve intoxication or desired effect
   b. markedly diminished effect with continued use of the same amount of the substance

2. withdrawal, as manifested by either of the following:
   a. the characteristic withdrawal syndrome for the substance
   b. the same (or a closely related) substance is taken to relieve or avoid withdrawal symptoms

3. using more of the substance or using over a longer period of time than was intended

4. inability to cut down or control substance use

5. a great deal of time is spent in activities necessary to obtain the substance or recovering from its effects

6. no longer participating in normal social, occupational, or recreational activities because of substance use

7. the substance use is continued despite knowledge of having persistent or recurrent problems

HELP FOR SUBSTANCE-RELATED DISORDERS HANDOUT

Arkansas Alcohol and Drug Abuse Prevention
4313 West Markham
Little Rock, Arkansas 72205
Telephone (501) 686-9867

Louisiana Office For Addictive Disorders
628 North 4th Street
Baton Rouge, Louisiana 70821-2790
Telephone: 225-342-6717
Toll free: 877-664-2248

Texas Council on Alcohol and Drug Abuse
909 West 45th Street, Austin, TX 78758
Telephone: 512-206-5000
Toll free: 866-378-8440

STATE MENTAL HEALTH SERVICES

Arkansas Mental Health Services 1-877-227-0007

Louisiana Office of Mental Health
P.O. Box 4049, Bin #12
Baton Rouge, LA 70821
Phone: (225) 342-2540
Toll Free: 800-654-1373

Texas Department of Mental Health
4900 N. Lamar Blvd Austin , TX 78751-2316
Phone: 512-438-3011
Toll-Free: 800-252-8263 (Statewide)
Local Referral Information Line: 211 (Statewide)

SELF-HELP TWELVE STEP RECOVERY PROGRAMS

Alcoholics Anonymous Cocaine Anonymous Narcotics Anonymous
(Each of these organizations is listed in any telephone book)