The Effects of Sleep Deprivation on Individual Productivity

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ABSTRACT

Being sleepy on the job can have a vital impact on how well workers can do their job. The study examines the effects of partial sleep deprivation on productivity. It included a nonrandom sample of thirty participants, of which, sixty percent were female and eighty percent were Caucasian. All participants were employed and possessed a minimum of a bachelor's degree.

Participants were asked to keep a sleep journal recording behaviors that could possibly affect sleep. Participants were also asked to complete a demographic questionnaire and a task log sheet. The percent of tasks completed daily on the task log sheet was calculated to signify the productivity level.

The results revealed a higher mean productivity rating for individuals who slept more than nine hours. The second highest mean productivity rating was for individuals who slept less than five hours. The two negative correlations found for levels of productivity included nocturnal awakenings and the self-perception of mood in the morning. This suggests that as the number of nocturnal awakening increase, the productivity levels decreased. It also implied that the more an individual feels fatigued in the morning, the lower the productivity level.

CHAPTER 1
INTRODUCTION TO THE STUDY

Sleep is a basic necessity of life. The current 24-hour society, we use precious nighttime hours for daytime activities. In the past century, we have reduced the average sleep time by 20 percent and, in the past 25 years, added a month to the average annual work time (National Sleep Foundation, 1999). The sleep habits of society has changed but the bodies of individuals have not.

Sleep problems have become a modern epidemic that is taking a toll on individual bodies and minds. The National Sleep Foundation (NSF) conducted a Gallup Poll in March 2001 which looked at the relationship between Americans' lifestyles, sleep habits and sleep problems. According to the poll, the majority of American adults (63%) do not get the recommended eight hours of sleep needed for good health, safety, and optimum performance, in fact, nearly one-third (31%) report sleeping less than seven hours each weeknight.

The NSF poll revealed, due in part because our society has become a 24-hour operation, many adults say they now spend more time at work and less time sleeping (40% vs. 38%). More than one-third (38%) responded that they are working fifty hours or more a week.

One in five adults (20%) are so sleepy during the day that it interferes with daily activities a few days a week or more (National Sleep Foundation, 2001). The penalty of sleep-deprived employees is significant distress or impairment in social, occupational, or other important areas of functioning.

The National Commission on Sleep Disorders reported that decreased productivity and accidents in the workplace cost the nation $150 billion a year. A review of literature uncovered research showing that rotating shifts and sleep deprivation lead to mistakes, dips in attention, delayed reactions, accidents in the workplace, crashes on the roadways, reduced productivity and

difficulties in communication (National Sleep Foundation, 1999).

Statement of the Problem

The National Sleep Foundation survey concluded that workers estimate about a 30 percent decline in the quality and quantity of their work when they are sleepy. About a quarter of the workforce (27 percent) report they are sleepy at work two or more days each week. Young people (age 18 to 29) seem to be the sleepiest – 40 percent of them report that they are sleepy at work at least twice a week. Those same young people indicated that 22 percent of them have been late to work because of sleepiness, while the overall total is 14 percent.

Being sleepy on the job, whether the cause is simple sleep deprivation or an undiagnosed or untreated sleep disorder, can have a vital impact on how well workers can do their job. For example, night-shift workers have poorer daytime sleep, reduced night-time alertness and performance, and an increased accident rate. In addition to numerous health problems there is a substantial cost to the economy in terms of decreased efficiency and productivity (Arendt, 2001). The cost of sleepiness-related accidents can vary considerably, but in general, the estimated total cost of such accidents per year in the United States is $16 billion and $80 billion worldwide (Moore-Ede, 1993).

Purpose

The purpose of this study is to determine what effects, if any, mild sleep deprivation has on productivity, which in turn effects the workplace. The researcher is specifically interested in the number of nocturnal awakenings and self-perception of mood in the morning and its correlation to productivity levels.

Hypothesis

Although the review of literature revealed a discrepancy, the majority of articles describe partial sleep deprivation (sleeping less than 5 hours in one 24-hour period) as having negative

effects on cognitive, behavioral, physiological, and emotional measures. From this information it is derived that cognitive, behavioral, physiological, and emotional measures will affect productivity. Therefore, it is hypothesized that partial sleep deprivation and productivity have a negative correlation. Productivity is defined as the percent of tasks completed daily on the task log sheet.

Significance of the study

The significance of this study is that it affects all walks of life. Sleep loss knows no boundaries. It cuts across all cultural, social, economic, religious, educational, ethnic, racial, gender and age lines.

Millions of Americans are suffering from daytime sleepiness so pervasive that it interferes with their daily activities, maintains Thomas Roth, health and science advisor, National Sleep Foundation (NSF). "This trend in daytime sleepiness should raise concerns among parents, health care professionals, educators, safety experts, and employers. Lack of sleep and sleep problems can have serious, life-threatening consequences [as well as] a significant impact on productivity" (National Sleep Foundation, 2001).

Sleep loss is an issue that everyone should be aware of. Whether you are an employer looking out for the safety of your employees or a mother concerned for the welfare, growth, and development of your child. Whether you, your relative, or your friend suffers from sleep loss, it is an issue that is linked to every aspect of your life.

Definition of terms

Terms in this study are defined as the following:

> Sleep: a natural and periodic state of rest during which consciousness of the world is suspended
>
> Adult: a fully developed person from maturity onward

Partial sleep deprivation: sleeping less than 5 hours in one 24-hour period

Short-term total sleep deprivation: no sleep for 24-48 hours

Long-term total sleep deprivation: no sleep for more than 48 hours

Nocturnal awakenings: waking up during a period of sleep

Limitations

As with all correlational studies, the findings from the current study cannot reveal causal relationships between sleep deprivation and personal productivity. Another key limitation has been identified. It is the willingness of the participants to complete the sleep journal and the task log sheet. Because this study is not a controlled experimental design, some participants may forget to keep accurate track of their sleep habits or task log sheet. This limitation may have a negative affect on the results of the study.

CHAPTER 2
REVIEW OF LITERATURE

Physiological Effects of Sleep Deprivation

How an individual responds to sleep loss, whether it is partial deprivation (sleeping less than 5 hours in one 24-hour period), short-term total sleep deprivation (no sleep for 24-48 hours), and long-term total sleep deprivation (no sleep for more than 48 hours) can vary. Pressman, 1997 indicates that sleep deprivation has been shown to impact negatively on a wide range of cognitive, behavioral, physiological, and emotional measures. For example, mood changes including irritability, fatigue, difficulty in concentration, and disorientation to short-term memory alterations due to decreased attention, concentration lapses, and decreased motivation. Illusions, hallucinations, visual misperceptions, and paranoid ideation are also observed with sleep loss.

Similar results were published by Binks (1999). The study concluded that the person deprived of total sleep experiences negative mood, sleepiness, fatigue, and decline in alertness and performance. Some sleep-deprived individuals report visual hallucinations or distortions and feelings of paranoia. Systematic studies of total sleep deprivation have revealed some temporary cognitive deficits but no permanent effects.

Ross (1965) conducted a study on extended total sleep deprivation, a minimum of eight days, which consistently discovered mild neurological signs, such as myopia, tremor, slurred speech, and sluggish corneal reflexes. Ross (1965) detected neurological findings that included a hyperactive gag reflex, hyperactive deep tendon reflexes, and an increased sensitivity to pain. The autonomic nervous system responses to total sleep deprivation produced changes in body temperature, blood pressure, heart rate, and respiratory rate. The majority of research has found a decrease in body temperature. However, the conclusions about blood pressure, heart rate, and

respiratory rate vary from remaining constant to a slight increase or decrease.

Ross (1965) discovered the most significant effect of sleep loss is the physiological sleepiness, or the tendency to fall asleep when there is a lack of stimuli. Sleepiness becomes extreme after the loss of a single night of sleep. Without competing stimuli, an individual lacking a night's sleep can fall asleep within 2 or 3 minutes the next day. This can cause dramatic affects on productivity. After about 48 hours without sleep, micro sleeps become increasingly more common even when participants are physically active. As sleepiness increases, an individual must increase effort to maintain a stable level of performance.

The interpretation of human sleep-deprivation studies is difficult because their findings have been inconsistent. Van Helder and Radomski (1989) reported periods of sleep deprivation up to 72 hours had no effect on strength or motor performance, except for reducing time to exhaustion. The performance of passive, boring tests of cognitive ability – such as simple tests of vigilance (staring at a computer screen looking for signals) – is often disrupted by even a few hours of sleep reduction (Gillberg, 1996); whereas active, demanding tests of cognitive ability are largely immune to disruption by even long period of sleep deprivation. Percival, Horne, and Tilley (1983) found that subjects deprived of sleep for one night displayed no deficits on a battery of abstract reasoning, spatial relations, logical reasoning, and comprehension test that were written under demanding time constraints.

An increasing workplace for many is the military. Goh, Tong, Lim, Low, & Lee (2001) studied the effects of sleep deprivation in the military. According to the authors, the study was conducted because of the "need for the development of reliable investigative techniques to study how sleep deprivation affects performance, which, in turn, could provide ideas for the formulation of measures to reduce sleep-related accidents." The authors hypothesize that "the detrimental effects of sleep deprivation on performance are apparently related linearly to the

amount of sleep loss, such that the longer the duration of sleep deprivation, the more pronounced the disturbance." The study tested the effects of sleep deprivation on productivity and performance using the rotary pursuit test. During the rotary pursuit test the participants were asked to place a stylus tip in contact with the rotating target and maintain contact at all times. The sleep-deprived group performed better than the control group; however, there was no significant interaction found. Tracking performance improved throughout the day for both groups. Performance declined significantly during the second day of the study regardless of the sleep condition (Goh, Tong, Lim, Low, & Lee, 2001).

Sleep Deprivation and the Workplace

Millions of Americans are suffering from daytime sleepiness so pervasive that it interferes with their daily activities, maintains Thomas Roth, health and science advisor, National Sleep Foundation (NSF). "This trend in daytime sleepiness should raise concerns among parents, health care professionals, educators, safety experts, and employers. Lack of sleep and sleep problems can have serious, life-threatening consequences [as well as] a significant impact on productivity" (National Sleep Foundation, 2001).

Many people suffering from routine sleep loss are not even aware of it, and many who do realize they are not getting enough sleep are not aware of what it is costing them. Sleep loss creates sleepiness, which can be associated with decrements in vigilance, reaction time, memory, psychomotor coordination, information processing, and decision-making. With increasing sleepiness, individuals demonstrate poorer performance despite increased effort, and they may report indifference regarding the outcome of their performance (Behavioral Medicine, 1996). Behavior Medicine illustrates that not getting enough sleep affects the person in several ways:

1. **Problem solving skills are impaired**. Sleep loss noticeably impairs our ability to comprehend rapidly changing situations, increases the likelihood of distraction,

makes us think more rigidly and less flexibly, and reduces our ability to produce innovative solutions to problems.

2. **Communication skills suffer**. Sleep loss reduces the words in vocabulary both verbally and in writing.

3. **Learning and memory suffer**. Sleep loss diminishes scores on tests of memory, verbal fluency and overall creativity.

4. **Motor skills are impaired**. Studies show there is a direct connection between sleepiness and impaired hand-eye coordination. The degree of impairment has led researchers to compare it in severity to drunkenness.

Until recently, sleep deprivation in the workplace was unrecognized, although supervisors regularly see its effects first-hand: a) superior performing employees turning in mediocre work, inexplicably moving through their jobs at half speed; b) lower morale, measured by barometers such as tardiness, absenteeism and an increased number of grievances; and c) ever-mounting sick leave requests and, in some instances, increased disability claims (Romani, 2001).

Sleep deprivation causes individuals to feel so sleepy during the day that their concentration and performance suffer. For example, sleep deprivation often leads to an increase in the incidence of motor vehicle accidents. One study found that individuals suffering from fatigue due to sleep apnea are six more likely to have a motor vehicle accident than persons who are not suffering from fatigue. They also are more disposed to industrial accidents than non-apnea workers (Bonvallet, n.d.). According to the medical journal Chest (2000), the bill to society due to loss of productivity, industrial accidents and medical bills owing to sleep deprivation is $60 billion per year. This is a good reason to shed light on the silent thief of our workforce's vitality. With more than 20 million people in the United States suffering from sleep deprivation, most unaware they are suffering from it, management is in a position to perform a public service of tremendous value and, secondarily, increase productivity by educating its

personnel on the issue (Romani, 2001).

One thing is for certain, that chronic sleep loss may lead to deterioration of mood and motivation; decrease in attention, energy, and concentration; and an increase in fatigue, irritability, tension, anxiety, and depression. Individuals suffering from sleep deprivation may have an increased incidence of psychophysical problems such as stomach problems, menstrual irregularities, headaches, and increased muscle tension (National Sleep Foundation, 1999). Any one of these consequences of sleep deprivation can seriously affect productivity and performance.

Chapter 3
Methods

Subjects

Nonrandom participants in this study were selected from one graduate level course at Marshall University, employees of Andrx Laboratories, American Electric Power, Western-Southern Life Insurance, and several other organizations in Huntington, WV. The population contained approximately 30 employees. The population will be both male and female participants from various locations around the Huntington, WV area. A variety of ages, race, marriage status, socioeconomic backgrounds, and education levels are studied as they appear in the population.

Instruments

Three instruments were used to collect data. The first was a demographic questionnaire created by the researcher. The questionnaire consists of seven questions (Please see appendix A). Gender, race/ ethnicity, marriage status, highest educational level completed, occupation, number of years in occupational field, and number of miles driven to commute to work will be deduced from the questionnaire. The content was chosen based on a review of related literature. It was then evaluated and approved by a panel of experts. A demographic questionnaire is being used to see how closely the sample replicates the known population and to allow analysis of sub-groups of those responding to the survey.

Sleep deprivation was measured using a second instrument, a sleep journal. According to P. Britz, Program Director for the National Sleep Foundation (personal communication, January 22, 2003) the author and publisher of the National Sleep Foundation (NSF) sleep diary is the National Sleep Foundation. It is a public education brochure and has not been tested for reliability or validity. It was, however, reviewed and approved by sleep scientists (Please see

appendix B). This instrument was chosen because it allows the researcher to measure levels of sleep deprivation in an unobtrusive manner.

The final instrument is a task log sheet developed by the researcher produced from a review of related literature. The task log sheet was then evaluated and approved by a panel of experts (Please see appendix C). It was used to measure productivity. Participants list activities they wish to accomplish for each day of the study. At the end of the day, the participant check the appropriate box to signify if the activity was completed or not completed. The percent of tasks completed daily signifies the productivity level.

Design

The study was qualitative and self-reporting. The correlational predictive study included 30 nonrandom participants. The participant's responses on the sleep journal were calculated to determine if partial sleep deprivation has occurred. Partial sleep deprivation was considered sleeping less than 5 hours in a 24-hour period. The task log sheet was used to identify the productivity level of the participants. A Pearson's Product Moment was used to conclude if a negative correlation exists between sleep deprivation and productivity.

Procedures

Thirty participants, from one graduate level course at Marshall University, employees of Andrx Laboratories, American Electric Power, Western-Southern Life Insurance, and other organizations located in Huntington, WV took part in the study. Participants were asked to keep a sleep journal recording behaviors that could possibly affect sleep, such as, when they wake up, go to sleep, how many times during the night they woke up, how they felt when they woke and the number of hours slept during the night. This was conducted for the time period of two weeks. This information generated whether a participant has suffered from partial sleep deprivation.

Participants were also asked to complete a demographic questionnaire and a task log sheet. The task log sheet listed activities they wish to accomplish for each day of the study and whether or not the activity was completed or not completed. The percent of tasks completed daily on the task log sheet was calculated to signify the productivity level.

Data Analysis

After all instrumentation was collected from participants, the researcher converted qualitative data on demographic questionnaire and sleep journal to numerical symbols. Scores were obtained for each variable. Productivity was calculated by the percent of tasks completed per day on the task log sheet. All data was entered into SPSS software program. A correlation coefficient was computed using the Pearson's product moment. The correlation coefficient was interpreted to determine if the prediction study supports the hypothesis that partial sleep deprivation and productivity have a negative correlation. A comparison of means was ran to compare the mean productivity levels of various amounts of hours sleep acquired in a 24 hour period.

Chapter 4
Results

Demographic data

Of the thirty participants, 12 were male (40%) and 18 were female (60%). Thirty-seven percent (37%) of all participants were single (meaning never been married), 10% were single (meaning living with a partner), 37% were married, and 16% were divorced. As regards to education, 8% had attended or were attending college, 50% had graduated college, and 42% had attended graduate school or more. Sixteen percent of the participants were African/African American, 4% were Asian/Asian American, and 80% were Caucasian/European American.

The participant's occupations included a wide variety of areas (see Table 4.1).

Table 4.1 Distribution of Participant's Occupations.

Occupation	Frequency
Academic Advisor	1
Accountant	1
Administrative Assistant	2
Billing Clerk	1
Bookkeeper	1
Case Manager	1
Coach	2
Counselor	2
Director	3
Director of Student Services	1
Emergency Inspector	1
Graduate Assistant	3
Instructor	3
Insurance Salesman	1
Music Director	1
Pastor	1
Pharmaceutical Representative	1
Sales Clerk	1
Student	2
Weight Watcher Leader	1

Correlations among the predicting variables

First, the intercorrelations between the predicting variables were tested to avoid the possibility of multicollinearity. Pearson's correlations among the predictors (number of hours slept, number of times woken up during the night, and feelings of fatigue) were computed (see Table 4.2). The significant correlations ranged between –0.1 and 0.3. This range is considered free of multicollinearity, according to Tabachnick and Fidell's (1996) criteria.

Table 4.2. Person's Correlations Among the Predicting Variables. (number of hours slept, number of times woken up during the night, and feelings of fatigue)

	1	2	3
1 Hours slept	___	-.143**	-.268**
2 Awakenings		___	.301**
3 Feelings			___

**p<.01

Notes: Hours slept – number of hours slept taken from the sleep log; Awakenings – number of times awoken during night taken from sleep log; Feelings – subjective assessment of feelings of fatigue.

Predictions of productivity from independent variables

The mean productivity levels were determined by a Pearson's correlation. The decision was made to categorize the participants in the following five groups: less than 5 hours, 6 to 6.9 hours, 7 to 7.9 hours, 8 to 8.9 hours and 9 or more hours of sleep. The highest level of productivity was produced by participants who slept more than 9 hours. The second highest productivity level was produced by participants who slept less than 5 hours (see Table 4.3).

Table 4.3. Means Comparisons Among Productivity Levels.

Hours slept	% of Productivity
less than 5	78.822
6 to 6.9	73.250
7 to 7.9	72.919
8 to 8.9	78.240
9 or more	84.967

CHAPTER 5
DISCUSSION

As anticipated, the demographic questionnaire determined that the sample replicates the known population of Huntington, WV. It also allowed analysis of sub-groups of those responding to the survey. A mean comparison was performed for the sub-groups of marital status, education level, race, and gender.

The productivity levels for marital status were evenly distributed. The results imply that regardless if an individual is single, living with someone, married, separated, widowed, or divorced does not profoundly affect productivity levels.

Those participants currently attending college were found to have a substantially higher productivity level. This could be due, in part, to the idea that college students have a greater number of immediate deadlines. In other words, besides the task of work and home life, college students have strict syllabi to follow with impending deadlines. They may organize their time better to complete the tasks on time, which would account for the considerably higher productivity level.

Asian/Asian Americans were found to have a higher productivity level compared to African/African Americans and Caucasian/European Americans. One explanation may be the impeccable reputation of the Asian work ethic. Asian workers are known to be hard workers, have cohesive family units, value education, and respect authority. Productivity levels may be enhanced by these characteristics.

The productivity levels for gender were evenly distributed. Men and women generated very similar production rates. The results indicate that gender does not significantly affect levels of productivity.

The intercorrelations between the predicting variables were tested, using a Pearson's

correlation, to avoid the possibility of multicollinearity. According to Tabachnick and Fidell's (1996) criteria, the researcher determined that the study was free of multicollinearity.

The researcher investigated the impact of partial sleep deprivation (less than five hours of sleep) on the aspect of personal productivity. The decision was made to categorize the participants in the following five groups: less than 5 hours, 6 to 6.9 hours, 7 to 7.9 hours, 8 to 8.9 hours and 9 or more hours of sleep. The highest level of productivity was produced by participants who slept more than 9 hours (84.967% productive). The second highest productivity level was produced by participants who slept less than 5 hours (78.822% productive). The third highest level was produced by participants who slept 8 to 8.9 hours (78.240% productive). The lowest levels of productivity were recorded for participants who slept 6 to 7.9 hours of sleep. The pattern of findings suggest that to have the highest level of productivity, that a participant must receive at least 9 hours of sleep per night. If he or she is not going to receive at least 9 hours of sleep, then they are better off sleeping less than 5 hours per night.

The mean comparison between partial sleep deprivation (less than 5 hours of sleep per night) and productivity levels are not in agreement with previous studies (e.g. Pressman, 1997). Similar results were published by Binks (1999). The study concluded that the person must be deprived of total sleep to experiences negative mood, sleepiness, fatigue, and a decline in alertness and performance. The ability to acquire a few hours of sleep showed no decline in alertness or performance.

Another study suggests that with increasing sleepiness, individuals demonstrate poorer performance despite increased effort, and they may report indifference regarding the outcome of their performance (Behavioral Medicine, 1996). According to our study, the increase of sleepiness (fewer hours slept) showed a decline in productivity (with the exception of individuals who slept nine hours or more).

Two negative correlations were found for levels of productivity. These included nocturnal awakenings and the self-perception of mood in the morning. The Pearson's correlations suggest that as the number of nocturnal awakening increase, the productivity levels decreased. It also implied that the more an individual feels fatigued in the morning, the lower the productivity level.

The negative correlations found for nocturnal awakenings and productivity are consistent with previous studies. Arendt (2001) discovered that night-shift workers that have poorer daytime sleep have reduced night-time alertness and performance, and an increased accident rate. Nocturnal awakenings may hinder individual's ability to obtain adequate sleep. This in turn can produce a consequence of lower production ratings.

Limitations

A key limitation is the variations of occupations and the assessment of personal productivity. Because of the different occupations, individuals have different task lists, which is a subjective way to measure productivity. The solution would be a study that included participants of one particular occupation that had a more reliable (objective) measure of productivity.

A second constraint of the data collection process was an environmental issue. A few days into the sleep deprivation study, sixty percent of the participants lived in a region, that suffered a severe ice storm. Most participants were without electricity for several days, some even weeks. A number of participants were forced to leave their homes to seek shelter. Others could not return to work for several days. Most participants commented that this natural disaster did affect their sleep habits as well as their task lists.

The final weakness of the current study is that due to a relatively low rate of participation in the survey. The researcher can only conclude that the findings are relevant to adults who are

employed and possess a college education. Despite this restriction, the marginally significant correlations between sleep and productivity highlight the importance of the issue.

Recommendations for future studies

If studying the issue of partial sleep deprivation in the future, a more comprehensive study should be conducted using a longitudinal design. The study should consist of a larger sample of participants over a longer period of time. It would be to the advantage of the researcher to conduct the study for a minimum of one to two months. This length of time will allow for a more consistent analysis of sleep patterns.

Other elements that should be addressed are the demographics of the participants. It would be beneficial to the researcher to know the age of the subjects and not only the marital status, but whether or not the individual has children.

The last recommendation, possibly the most crucial to the study, is to observe individuals that have one particular occupation in common. This would allow for a more reliable and objective measure of productivity.

Implications

This study illustrates the need for employers to be aware of how productivity is affected by sleep deprivation and fatigue. Being sleepy on the job, whether the cause is simple sleep deprivation or an undiagnosed or untreated sleep disorder, can have a vital impact on how well workers can do their job.

One in five adults (20%) are so sleepy during the day that it interferes with daily activities a few days a week or more (National Sleep Foundation, 2001). This not only affects employers and the workforce but individuals and their families and friends. Individuals who suffer from sleep loss experience impaired problem solving, communication, and motor skills as well as a deficiency in learning and memory. These indicators can have a lasting effect on

personal relationships, educational endeavors, and personal growth.

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APPENDIX A

Demographic Survey

Instructions: Please circle the most appropriate answer for each question.

1. Gender:

   A.male
   B. female

2. Are you:

   A. Single, meaning never been married
   B. Single, living with a partner
   C. Married
   D. Separated
   E. Widowed
   F. Divorced

3. Education level (please circle the highest level completed):

   A. Less than high school graduate
   B. High school graduate
   C. Attended or attending college
   D. Graduated college
   E. Graduate school or more
   F. Technical school/Other

4. Race/ Ethnicity:

   A. African/ African American
   B. Asian/ Asian American
   C. Caucasian/ European American
   D. Hispanic/ Hispanic American
   E. Native American
   F. Other (specify): _____

5. What is your occupations? _____

6. How long have you worked in your occupation:

   A. less than 6 months
   B. 6 months to 1 year
   C. 1 to 3 years
   D. 3 to 5 years
   E. 5 to 10 years
   F. more than 10 years

7. How many miles per day do you travel that is work related:

   A. under 10 miles
   B. 10 to 50 miles
   C. 50 to 100 miles
   D. 100 to 200 miles
   E. more than 200 miles

APPENDIX B

Sleep Journal

Fill out days 1-7 below	COMPLETE IN MORNING					
	I went to bed last night at:	I got out of bed this morning at:	I woke up during the night: (Record number of times)	When I woke up for the day, I felt: (Check one)	Last night I slept for a total of: (Record number of hours)	My sleep was disturbed by: (List any mental, emotional, physical, or environmental factors that affected your sleep, e.g. stress, snoring, physical discomfort, temperature)
Thursday Feb. 20	_____ PM/AM	_____ AM/PM	_____ Times	___ Refreshed ___ Somewhat Refreshed ___ Fatigued	_____ Hours	_____ _____ _____ _____ _____
Friday Feb. 21	_____ PM/AM	_____ AM/PM	_____ Times	___ Refreshed ___ Somewhat Refreshed ___ Fatigued	_____ Hours	_____ _____ _____ _____ _____
Saturday Feb. 22	_____ PM/AM	_____ AM/PM	_____ Times	___ Refreshed ___ Somewhat Refreshed ___ Fatigued	_____ Hours	_____ _____ _____ _____ _____
Sunday Feb. 23	_____ PM/AM	_____ AM/PM	_____ Times	___ Refreshed ___ Somewhat Refreshed ___ Fatigued	_____ Hours	_____ _____ _____ _____ _____
Monday Feb. 24	_____ PM/AM	_____ AM/PM	_____ Times	___ Refreshed ___ Somewhat Refreshed ___ Fatigued	_____ Hours	_____ _____ _____ _____ _____

Tuesday Feb. 25	_____ PM/AM	_____ AM/PM	_____ Times	___ Refreshed ___ Somewhat Refreshed ___ Fatigued	_____ Hours	_____ _____ _____ _____ _____
Wednesday Feb. 26	_____ PM/AM	_____ AM/PM	_____ Times	___ Refreshed ___ Somewhat Refreshed ___ Fatigued	_____ Hours	_____ _____ _____ _____

APPENDIX C

Task Log Sheet

Instructions: Please write a "To Do" list of the activities you wish to accomplish for each date below. At the end of the day, please place a check in the appropriate box to signify if the activity was completed or not completed.

THURSDAY, FEB. 20		
"To Do" Activities	Completed	Not Completed

FRIDAY, FEB. 21		
"To Do" Activities	Completed	Not Completed

SATURDAY, FEB. 22		
"To Do" Activities	Completed	Not Completed