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Elaborating on the differences between good and poor sleepers

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ELABORATING ON THE DIFFERENCES BETWEEN GOOD AND POOR
SLEEPERS

A Thesis

Presented to

The Faculty of the Department of Psychology
San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

by

Jon G. Vranesh

May 1999

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ABSTRACT
ELABORATING ON THE DIFFERENCES BETWEEN GOOD AND POOR
SLEEPERS

by Jon G. Vranesh

The purpose of this study is to identify differences between good and poor sleepers on several sleep related factors which had not been adequately considered in the previous literature. First, sample of 601 undergraduate university students participated in answering questionnaires. From this initial sample, 372 participants were selected on the basis of their scores on the Coren Insomnia Scale (1988) i.e., 186 good and poor sleepers. The sleep related dimensions that were compared between these groups were chronic arousability, propensity to sleep during the day, the ability to stay awake during various daytime activities, enthusiasm, smoking, and caffeine and alcohol consumption. Significant results were computed between good and poor sleepers for each of these dimensions. That is, poor sleepers were more chronically aroused, more likely to fall asleep during the day, experienced more trouble remaining awake during different daytime activities, and experienced more problems sustaining enthusiasm in completing goals than good sleepers. Additionally, poor sleepers tended to smoke more cigarettes per day and drink more caffeinated beverages and alcohol than good sleepers. Implications of the differences between good and poor sleepers are discussed as well as recommendations for future research regarding these two sleeper groups.

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TABLE OF CONTENTS

SECTION	PAGE
INTRODUCTION	3
METHOD	12
Participants.....	12
Variables	13
Procedure	16
RESULTS AND DISCUSSION	16
REFERENCES	22
APPENDICES	24
Appendix A. Sample Questionnaire	24
Appendix B. Means and Standard Deviations for Females and Males and t Statistics computed Between Females and Males for Related Variables	30

LIST OF TABLES

TABLE	PAGE
1. Means and Standard Deviations for Good and Poor Sleepers and t Statistics Computed Between Good and Poor Sleep Groups for Sleep Related Variables.....	17
2. Means and Standard Deviations for Females and Males and t Statistics Computed Between Females and Males for Related Variables (Appendix B)	30

Elaborating on the Differences Between Good and Poor Sleepers

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Running head: ELABORATING ON THE DIFFERENCES

Abstract

The purpose of this study is to identify differences between good and poor sleepers on several sleep related factors which had not been adequately considered in the previous literature. First, sample of 601 undergraduate university students participated in answering questionnaires. From this initial sample, 372 participants were selected on the basis of their scores on the Coren Insomnia Scale (1988) i.e., 186 good and poor sleepers. The sleep related dimensions that were compared between these groups were chronic arousability, propensity to sleep during the day, the ability to stay awake during various daytime activities, enthusiasm, smoking, and caffeine and alcohol consumption. Significant results were computed between good and poor sleepers for each of these dimensions. That is, poor sleepers were more chronically aroused, more likely to fall asleep during the day, experienced more trouble remaining awake during different daytime activities, and experienced more problems sustaining enthusiasm in completing goals than good sleepers. Additionally, poor sleepers tended to smoke more cigarettes per day and drink more caffeinated beverages and alcohol than good sleepers. Implications of the differences between good and poor sleepers are discussed as well as recommendations for future research regarding these two sleeper groups.

Elaborating on the Differences Between Good and Poor Sleepers

While sleep deprivation and insomnia are topics that have generated a substantial number of studies, the literature derived from studies of individuals classified as either good or poor sleepers is relatively sparse. Monroe (1967) was the first to document the basic differences between good and poor sleepers in regard to sleep behaviors, psychophysiological functioning and personality attributes. In this study, Monroe first defined good sleepers as those individuals who fell asleep in less than 10 minutes and never more than 15 minutes, did not wake up during the night, and had no subjective difficulty in falling or remaining asleep; poor sleepers were first defined as those who always took more than 30 minutes and usually taking more than 60 minutes to fall asleep, woke up at least once during the night, and had subjective difficulty in falling asleep. Monroe reported that relative to good sleepers, the poor sleepers experienced more Stage Two Sleep, less Stage REM with shorter REM periods, and more frequent awakenings. Monroe also noted that his poor sleepers exhibited more body movements as well as significantly higher mean values for measures of rectal temperature, phasic vasoconstriction, and basal skin resistance. Finally, when scored on personality measures of the Minnesota Multiphasic Personality Inventory, Monroe concluded that overall the scores of good sleepers represented greater psychological well being than that of poor sleepers.

Physiological Variables

Since Monroe's initial study, sleep research has assessed various physiological and psychological differences between good and poor sleepers, for example, Hyypä, Kronholm, and Mattlar (1991) defined good and poor sleepers according to their responses on a sleep questionnaire. Good sleepers were those who reported their sleep to be sufficiently deep, long, serene, and uninterrupted. Poor sleepers reported one or more of

the following symptoms: sleep latency of 50 minutes or more, habitual insomnia, greater than two awakenings per night, excessive daytime sleepiness, morning irritability, and snoring. In this study, it was reported that good sleepers experienced significantly better quality sleep and were less tired during the day than poor sleepers. Further, the mean sleep times for these groups were 7 hours 24 minutes for good sleepers and 6 hours and 57 minutes for poor sleepers. Additionally, good sleepers reported having fewer parasomnias, which interrupted sleep, and thus may have impacted the quality of sleep reported by these groups. These data suggest that poor sleepers may experience more fatigue throughout the day than good sleepers. Further, these results invite the speculation that poor sleepers may be more likely to doze off during the day. Thus, for the purposes of this study, we predicted that poor sleepers have a higher propensity to sleep during the day than good sleepers.

In another relevant study, Adam, Tomeny, and Oswald (1986) selected good and poor sleepers based on self-report measures regarding sleep practices. This study reported that poor sleepers awake more often in the early hours of sleep and attain about 30 minutes less sleep than those who were classified as good sleepers. Thus, these data are consistent with those reported by Hyyppa et al. and support the conclusion that poor sleepers achieve less quality sleep than good sleepers. However, research has also shown that poor sleepers' estimation in reporting the amount of time they sleep is somewhat inaccurate. That is, in sleep times recorded in the lab, it has been shown that poor sleepers may overestimate the time they spend falling asleep and may underestimate their total time spent sleeping (Adam et al. 1986; Pace-Schott, Kaji, Stickgold, & Hobson, 1994). Adam and his colleagues also concluded that poor sleepers possess higher body temperatures during the day and night as well as being more anxious and having higher urinary cortisol and adrenaline excretion.

Physiological and psychological differences have been reported for older samples of good and poor sleepers. Shaver, Giblin, and Paulsen (1991) defined good and poor sleepers according to a self-report sleep quality and sleep efficiency index. Within these measures, sleepers were compared on somnographic sleep variables as well as psychological variables. As a result of these observations, Shaver, and his colleagues noted that poor sleepers were shown to have longer sleep latencies to stages 1 and 2, a higher percentage remained awake, possessed longer latencies to REM sleep, and achieved less REM sleep than good sleepers in this age group. In this regard, Bliwise (1992) reported that older, self-identified poor sleepers described longer sleep latencies, less total sleep time, more non-restorative sleep, and more daytime fatigue than did older, self-identified good sleepers. In this study, sleep recordings performed to verify self-reports did indicate that older, poor sleeper groups did have shorter total sleep times, longer sleep latencies, and more awakenings than an older group who classified themselves as good sleepers.

Personality Variables

In identifying different personality characteristics, insomniacs (i.e. severe poor sleepers) tend to be more neurotic than good sleepers (Levin, Bertelson, & Lacks, 1984; Monroe & Marks, 1977). When taking the Minnesota Multiphasic Personality Inventory (MMPI), self-reported poor sleepers scored higher on Hypochondriasis, Depression, Hysteria, Psychasthenia, and Psychopathic Deviate than self-reported good sleepers. From these results, Levin et al. assumed that poor sleepers seem to be more anxious, depressed, obsessed with body image, possess feelings of inadequacy and low self-confidence. Scores on the Cesarec-Marke Personality Scheme found that poor sleepers rate higher on impulsivity, aggression, defense of status, and guilt feelings (Hyypa et al. 1991). Thus, good sleepers tend to possess a more positive self-esteem and a more balanced mental well-being than poor sleepers.

Marks and Monroe (1976) evaluated certain personality traits of emotionally disturbed adolescent good and poor sleepers to reveal differences in personality traits. In this study, Marks and Monroe distinguished poor sleepers from good sleepers on the basis of their psychotherapist's rating of the individual's difficulty with sleeping. In addition, each subject's psychotherapist then rated him/her on 680 personality variables. As a result of this effort, Marks and Monroe reported that the personality characteristics that significantly distinguished good and poor emotionally disturbed adolescent sleepers were anxiety, tension, obsession, depression, sensitivity, somatic concerns, and multiple neurotic manifestations. Higher levels of anxiety and tension noted for these poor sleepers suggest that poor sleepers may exhibit higher chronic levels of arousal than good sleepers. If this is the case, then perhaps differing levels of chronic arousability might aid in explaining differences in personality characteristics as well as other qualities that distinguish good from poor adolescent sleepers. Thus, we predict that relative to good sleepers, poor sleepers possess higher levels of chronic arousal.

Additional research involving emotionally disturbed adolescents was performed by Bertelson and Monroe (1979). They defined good and poor sleepers based on similar ratings used by psychotherapists in the study performed by Marks and Monroe (1976). From this research, personality characteristics describing the emotionally disturbed adolescent poor sleeper were depression, fearfulness, inhibition, anxiety, and rumination. Further results in this study state that emotionally disturbed adolescent good sleepers vary from emotionally disturbed adolescent poor sleepers by exhibiting healthy personality characteristics such as being critical, using good rationalization, being extroverted, and good use of projection, etc. (Bertelson & Monroe, 1979). Bertelson and Monroe conclude that adolescent poor sleepers display similar neurotic personality patterns to those of adult poor sleepers and insomniacs as found in previous research performed by Monroe and Marks (1977).

Daytime Functioning Variables

Differences in quality of sleep between good and poor sleepers has led some researchers to investigate whether or not this would affect how these individuals act, feel, and perceive their surroundings. Marchini, Coates, Magistad, and Waldum (1983) defined poor sleepers as those who reported insomnia for at least four days per week for the previous two years and who averaged less than 80% sleep efficiency based on sleep recordings at home. Good sleepers were those who had no complaints of poor sleep and showed 88% sleep efficiency. Their study found that during the day, good sleepers spend a significantly greater amount of time talking to people, working, and studying than poor sleepers. Good sleepers also differed significantly in their waking thoughts. They spent more time thinking about interpersonal relationships as well as family. On the other hand, poor sleepers thought more about the environment surrounding them, various ways in which they could relax, items in the news, and about the process of getting ready to go to bed. Essentially, poor sleepers were more preoccupied with themselves. Poor sleepers have also reported their surroundings to be quieter, more gloomy, and physically uncomfortable. In general, poor sleepers were found to suffer more from depression and indifference, take less enjoyment in activities, physically less active, more relaxed, more likely to be ill, mentally less active and concerned, and more accepting of self than good sleepers. With this daily outlook, it would seem that poor sleepers as a group are less enthusiastic about surrounding activities in their daily lives. If so, this lack of enthusiasm could result in poor sleepers being less efficient in their jobs, activities, and daily responsibilities. Consistent with this line of reasoning, we predict that poor sleepers experienced more difficulty in sustaining enthusiasm in order to complete tasks in their daily life.

Performance Variables

Performance differences of daily responsibilities between good and poor sleepers has also been the subject of some investigation. Naval students (Johnson & Spinweber, 1983) were examined to reveal any relationship between quality of sleep to performance of their tasks in the Navy. Good and poor sleepers were distinguished by their responses to a sleep questionnaire. Upon enlisting, there were no differences between groups on items used in attempting to predict career effectiveness (i.e. age, education and scores on various military tests). However, poor sleepers' performances were significantly inferior to that of good sleepers. Poor sleepers received fewer promotions, were less frequently recommended for enlistment, more likely to be hospitalized during tour of duty, and they experienced a higher drop out rate when compared to good sleepers. Results from this study suggest that poorer performance could result from this group's greater chronic sleep debt and poorer sleep quality (Johnson & Spinweber, 1983). Thus, poor sleepers may be more likely to fall asleep or find it difficult to remain awake during their duties in the Navy, thereby affecting their performance. This raises the issue that poor sleepers find it more difficult to stay awake during daily activities as a result of poorer quality sleep. From this speculation, we predicted that poor sleepers experience more trouble staying awake during daily activities and in their interactions with others than good sleepers.

Sleep Hygiene Variables

There are many behavioral patterns that may prevent individuals from achieving quality sleep. Sleep hygiene is one area that has received limited study in regard to measuring salient differences between good and poor sleepers. For example, Libman, Creti, Brender, Amsel, and Fichten (1997) defined sleeper groups based on self-report responses of sleep experiences. Poor sleepers were those sleepers who reported experiencing 30 minutes of undesired awake time three times or more for the past six months. Additionally, their responses indicated high difficulty in achieving quality sleep.

Good sleepers were defined as those who did not report experiencing problems with delayed sleep onset and experiencing few problems in achieving quality sleep. Libman and his colleagues reported that good older sleepers engage less frequently in wakeful behaviors during the night than poor older sleepers. They are more likely to lie in bed quietly and rest or relax during times of nocturnal wakefulness. Poor older sleepers are more likely to go to the toilet or toss and turn in bed. The major difference between these groups is that poor older sleepers often experience a more complete awakening than their counterparts. Further, they observed that poor sleepers are less likely to relax upon nocturnal awakenings. This may be associated with the anxiety and tension that is characteristic of their personalities. More complete awakenings and less likelihood of relaxing upon being awakened invite speculation that poor sleepers may possess a higher chronic level of arousal than good sleepers.

Another sleep hygiene dimension that has been studied between good and poor sleepers is their caffeine intake. In this regard, mixed results have been reported in previously published studies. In two studies that focused on older adults (Bliwise, 1992; Libman et al., 1997), no significant differences between self-identified poor and good sleepers for caffeine consumption were found. Further, for samples of middle-aged adults, Bliwise (1992) reported that current medication, caffeine, and alcohol consumption were equivalent between self-identified poor and good sleepers. In a related study, Kirmil-Gray, Eagleston, Gibson, and Thoresen (1984) classified adolescents (aged 13 to 17 years) as good and chronic poor sleepers based on their responses to a questionnaire regarding sleep quality, sleep habits, and beliefs about sleep and daytime mood and functioning. In contrast to the results reported by Bliwise (1992) and Libman et al. (1997), they observed that self-reported occasional and chronic poor sleepers ingest a significantly greater amount of caffeine per day than self-reported good sleepers. While research involving the consumption of caffeine and alcohol on good and poor sleep is relatively sparse, it is well

documented that these substances have a negative impact on sleep. Caffeine has been shown to negatively affect sleep and wakefulness in participants in that its use is associated with delayed sleep onset when administered before bedtime and a reduction in total sleep time. (Karacan, Thornby, Anch, Booth, & Williams, 1976). Additionally, caffeine increases the total number of awakenings once sleep is achieved, and because of caffeine's suspected negative impact on sleep, especially among adolescents, we predicted that good and poor sleeping university students might differ in their caffeine consumption. Specifically, this study hypothesizes that poor sleepers consume larger amounts of caffeine than good sleepers.

In addition to caffeine, alcohol use has also been shown to affect the quality of an individual's sleep. Research has demonstrated that alcohol usage can reduce REM sleep in participants and disrupt normal sleep patterns (Williams & Salamy, 1972). Tolerance for this substance can also result in an individual experiencing insomnia (Kales & Kales, 1984). Thus, individuals who report difficulty in achieving quality sleep may use alcohol more frequently than those who report good sleep. In this regard, it is predicted that poor sleepers would report consuming more alcoholic beverages than good sleepers.

Another sleep hygiene related factor that may also be able to differentiate between good and poor sleepers is cigarette smoking. Like caffeine and alcohol, smoking has been found to have negative impacts on sleep. Past research has indicated that smokers report more difficulty with achieving quality sleep than nonsmokers (MacGregor & Balding, 1988). Therefore, it is predicted that more individuals who are classified as poor sleepers will report smoking than is the case for individuals classified as good sleepers.

Stress Related Variables

Studies examining the role of stress and its effects on sleep have been conducted. Upon examining mid-life and older samples of good and poor sleepers, older poor sleepers in these groups suffer from a greater level of psychological stress and inferior sleep

efficiencies than good sleepers in these age groups. Shaver et al. (1991) found that mid-life women who declared themselves as poor sleepers scored higher on psychological distress than self-declared good sleepers in the same age group. Research investigating the question as to whether irritants and positive experiences of the previous day have an effect on sleeping behavior has also been conducted. Weller and Avinir (1993) conducted a study regarding hassles (irritants), uplifts (positive experiences), and quality of sleep for poor and good sleepers. Good and poor sleepers were categorized according to their score being above (good sleepers) or below (poor sleepers) the median on a sleep index scale. Findings revealed significant differences between good and poor sleepers in regard to hassles and when considering hassles and uplifts together. Although not significant, poor sleepers reported a greater number of stressful and positive events than good sleepers. Results from this study suggest that increased psychological arousal resulting from any change, whether it be hassles or uplifts, may hinder the quality of sleep that an individual experiences (Weller & Avinir, 1993).

Attempts have been made to identify differences in nocturnal and daytime activity for poor and good sleepers in older age groups. One such study examined the differences between good older sleepers, poor older sleepers experiencing high distress, and poor older sleepers experiencing low distress (Fichten, et al. 1995). In this particular study, poor sleepers met certain criteria for experiencing insomnia (30 minutes of undesired awake time at least three times per week lasting for six months) and possessing responses to a sleep questionnaire describing a high level of difficulty in achieving quality sleep. Good sleepers failed to meet the insomnia criteria and their sleep questionnaire responses described little difficulty in achieving good quality sleep. Results found that the high distress poor older sleepers reported greater sleepiness and fatigue during daytime activity than the other two groups. Likewise, high distress poor older sleepers' scores on personality measures reflected an anxious, worrying, and negative affective set. It has

been suggested that daytime activity may be closely associated with depression, while poor nocturnal activity is not only tied to sleep and wake times, but to anxiety. Thus, problems associated with sleeping may be linked less to what older individuals do at night or during periods of wakefulness, and more to what they are thinking, feeling, and their arousal level during daytime activity and nocturnal wakefulness (Fichten, et al. 1995).

The Current Experiment

Although prior research has explored some variables that seem to differentiate good and poor sleepers, as noted, research in this area is not exhaustive and aspects of it are in conflict. Thus, the present study has as its focus the identification of additional dimensions of good and poor sleepers, which may help to promote a better understanding of the variables which are important in differentiating these two groups. In particular, this study proposed the following hypotheses regarding good and poor sleepers: (1) relative to good sleepers, poor sleepers possess higher levels of chronic arousal, (2) poor sleepers have a higher propensity to sleep during the day than good sleepers, (3) poor sleepers experience more trouble staying awake during daily activities and during their interactions with others, (4) poor sleepers experience more difficulty in sustaining enthusiasm in order to complete tasks in their daily life, (5) poor sleepers consume more caffeinated beverages per day than good sleepers, (6) poor sleepers partake in more frequent use of alcohol than good sleepers, (7) relative to good sleepers, poor sleepers are more likely to smoke cigarettes.

Method

Participants

The participants in this study consisted of 601 undergraduate students (mean age = 19.7 ± 3.5 yr.) from San Jose State University. Participants drawn from the university's psychology subject pool filled out a questionnaire (as seen in Appendix A) regarding questions centered on sleep hygiene. From this sample, 372 participants who scored low (bottom 33.3% of scores) and high (top 33.3% of scores) on insomnia related items for the

Coren Insomnia Scale (1988) were selected. Of these, there were 186 students (101 female, 85 male) who experienced little difficulty in falling asleep (i.e. Coren Insomnia Scale score ≤ 26) and 186 students (101 female, 85 male) who experienced a large degree of difficulty in falling asleep (i.e. Coren Insomnia Scale score ≥ 32).

Variables

In order to differentiate good from poor sleepers, insomnia related questions taken from the Coren Insomnia Scale (1988) were used for 11 items within the questionnaire (e.g. I awake during the night). Participants responded by circling an initial of the response alternatives bounded by “Never” and “Always”. Each alternative response received a numerical score (1, 2, 3, 4, or 5) depending on which alternative was circled. There were three items (e.g., I feel rested in the morning) which used reversed scoring (5, 4, 3, 2, or 1) to test for reliability of the participant’s markings. A single insomnia total score was calculated for each participant by summing up individual insomnia item scores. The minimum and maximum scores for this scale are 11 and 55 points, respectively. A higher score on this scale indicates the potential for greater difficulty in falling asleep.

Items used to measure chronic levels of arousability (hypothesis 1) were those that make up the Arousal Predisposition Scale by Coren (1988). For this scale, participants responded to the 12 items (e.g., I get flustered if I have to do several things at once) using a format that is identical to the one used in the Coren Insomnia Scale. For each participant, a single Arousal Predisposition Scale total score was calculated by summing the number assigned to each item. The minimum and maximum scores for this scale are 12 to 60 points, respectively. A higher score on this scale indicates a higher level of chronic arousal.

A participant’s propensity to sleep during the day (hypothesis 2) was measured by eight questions from the Epworth Sleepiness Scale (Johns, 1991). Questions from this scale asked the participant to score different situations as to how likely they were to fall

asleep or just feel tired. Sample situations from this scale include “Sitting and reading,” “Lying down to rest in the afternoon when circumstances permit,” and “As a passenger in a car for an hour without a break.” Response categories for these situations ranged from “would never doze” to “high chance of dozing.” Each response category received a numerical score (0, 1, 2, or 3,) ranked in ascending order. For each participant, a single propensity to sleep during the day score was calculated by summing the numbers assigned to each item. The minimum and maximum scores for this scale ranged from 0 to 24 points, respectively. A higher score on this scale indicates a greater likelihood for an individual to fall asleep during the day than an individual with a lower score.

In order to test hypothesis 3, one question asked the participant how often he/she had trouble staying awake while performing various activities (i.e., During the past month how often have you had trouble staying awake while driving, eating meals, engaging in social activities?). Response choices for this item ranged from “Not during the past month” to “Three or more times a week” and received an ascending numerical score (1, 2, 3, 4) depending on which response was chosen. The minimum and maximum scores for this question ranged from 1 to 4 points, respectively. A higher score on this question indicates that an individual experiences more difficulty staying awake among various daytime activities than an individual with a lower score.

For testing hypothesis 4, a question measuring an individual’s enthusiasm (i.e. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?) was included in the questionnaire. The participants were asked to select a response for this item from four alternatives bounded by “No problem at all” and “A very big problem.” These responses were scored numerically on an ascending 4-point scale similar to scoring sequences seen in the preceding questions. The minimum and maximum scores for this question ranged from 1 to 4 points, respectively. A higher score

on this question indicates that an individual experiences more difficulty staying motivated in accomplishing tasks during the past month than an individual with a lower score.

A number of questions within the questionnaire measured aspects of an individual's sleep hygiene practices. In order to estimate the amount of caffeinated beverages consumed by participants (hypothesis 5), the question "How much coffee, tea, or caffeinated soda do you drink per day?" was asked. Response categories for this question ranged from the lowest frequency rating of "None" to the highest frequency rating of "more than 5 cups/sodas." For these items, 1 was assigned to the lowest frequency item and ascending numerically to the highest frequency item which was assigned a value of 5. The minimum and maximum scores for this question ranged from 1 to 5 points, respectively. A higher score on this question indicates that an individual drinks more caffeinated beverages per day than an individual with a lower score. Alcohol consumption (hypothesis 6) was measured by the question, "Indicate the number of days or nights in an average week you: Drink more than 3 ounces of alcohol (e.g., 3 mixed drinks, 3 beers, or 3 glasses of wine)." Possible responses for this question ranged from 0 to 7 days. The minimum and maximum scores for this question ranged from 0 to 7 points, respectively. A higher score on this question indicates that an individual drinks more alcohol per week than an individual with a lower score. A question regarding smoking (hypothesis 7) asked, "How much do you smoke each day?" Participants responded by circling alternatives bounded by "None" and "More than 2 packs," which were numerically scored (1, 2, 3, 4, 5) in ascending order. The minimum and maximum scores for this question ranged from 1 to 5 points, respectively. A higher score on this question indicates that an individual smokes more packs of cigarettes per day than an individual with a lower score.

Procedure

These scales and questions were compiled into a single packet and students completed the questionnaire during a regularly scheduled class period. The experimenter described to the participants the objectives of the study. Participants were then instructed to read each question carefully, answer them to the best of their ability, and were instructed to hand the questionnaire to the researcher upon its completion. The Coren Insomnia Scale was scored for the entire sample and students who possessed low (good sleepers - bottom 33.3% of scores) and high scores (poor sleepers - top 33.3% scores) for experiencing difficulty in falling asleep were selected. The remaining questions used in this study provided the data that was used for the analysis.

Results and Discussion

Differences between good and poor sleepers were observed for all of the variables included in this study. The means and standard deviations for each sleeper group for these seven variables are summarized in the Table 1. In addition, Table 1 includes the t ratios and effect sizes that were computed to analyze the differences between good and poor sleepers on each variable. If one compares the means listed in Table 1 between each sleeper group, poor sleepers scored significantly higher on each variable. That is, poor sleepers rated themselves higher on chronic arousability, propensity to sleep during the day, experiencing trouble staying awake during various activities, experiencing trouble maintaining enthusiasm, amount of caffeine and alcohol consumed, and the amount smoked.

Preliminary analysis of the data examined if there were significant gender differences for the seven dimensions analyzed in our study. Females reported to be significantly more chronically aroused ($M = 35.96$) than males ($M = 33.42$) ($t = 3.46$, $p < .001$). With the exception of chronic arousal, no consistent differences were found between gender and the rest of the good and poor sleeper dimensions (see Appendix B).

Table 1
Means and Standard Deviations for Good and Poor Sleepers and t Statistics computed
Between Good and Poor Sleep Groups for Sleep Related Variables

<u>Variables</u>	<u>Good Sleepers</u> (N= 186)	<u>Poor Sleepers</u> (N = 186)	<u>t</u>	<u>p</u>	<u>est. w²</u>
	<u>M</u>	<u>M</u>			
Chronic Arousal	32.15	37.45	6.53	< .001	.14
Propensity to sleep	8.81	11.24	4.27	< .001	.07
Ability to stay awake during activity	1.42	1.95	1.03	< .001	.08
Enthusiasm	1.86	2.63	.89	< .001	.17
Smoke	1.05	1.13	.37	< .05	.01
Caffeine	2.14	2.44	1.03	< .01	.02
Alcohol	.26	.42	.81	< .05	.01

Hypothesis 1 of this study was supported by the fact that poor sleepers were significantly more likely to report higher levels of chronic arousal than good sleepers. This supports previous studies (Marks & Monroe, 1976; Fichten et al., 1995; Weller & Avinir, 1993) that suggested feelings of anxiety and higher levels of arousal are associated with those who experience poor sleep. In these previous studies, arousal was measured by scores from psychotherapists and self-report measures from the participants. Self-report measures from the Arousal Predisposition scale (Coren, 1988) offer a slightly different interpretation of arousal between good and poor sleepers. Differentiation is based not on just feelings of anxiety and tension, but consistent, long-term levels of arousal. This marked distinction of chronic arousal provides new criteria from which poor and good sleepers can be differentiated.

Hypothesis 2 was supported by the finding that poor sleepers were significantly higher in their propensity to sleep during the daytime than good sleepers. This result compliments previous self-report research (Hyypä et al. 1991) which found that poor sleepers experience less quality sleep, experience more parasomnias that disturb sleep, and feel more tired during the day than good sleepers. Possessing a higher propensity to fall asleep during the day suggests that poor sleepers may indeed suffer from the poor quality sleep which affects their daytime functioning. Thus, the Epworth Sleepiness Scale, which measures an individual's propensity to sleep during the daytime, provides important differentiation between good and poor sleepers.

As previously mentioned, Johnson and Spinweber (1983) found poor sleepers to perform their duties less effectively than that of good sleepers in the Navy. This research suggested that greater chronic sleep debt as well as poorer sleep quality might be the cause of these differences between sleeper groups. Hypothesis 3 was supported by the finding that relative to good sleepers, poor sleepers were found to experience more trouble staying awake during daily activities and in their interactions with others. That is, the results of

this study offer a direct explanation for why performance may be lower for poor sleepers. Poorer quality of sleep directly affects the functioning of poor sleepers in their activities as well as their social interactions. Poor sleepers find it more difficult to stay awake during activities and duties and therefore in accord with Johnson and Spinweber (1983) perform less effectively than that of good sleepers.

Marchini, et al. (1983) found poor sleepers to differ significantly in their waking thoughts from good sleepers. They reported that poor sleepers thought about various ways they could relax, about the process of getting ready to go to bed, and reported their surroundings to be gloomy. Because poor sleepers report a more negative outlook on their life, it is speculated that this difference in thinking between good and poor sleepers may be attributed to differences in levels of enthusiasm. Therefore, it is believed that their enthusiasm may affect their outlook. Hypothesis 4, that poor sleepers experience more difficulty in sustaining enthusiasm in order to complete tasks in their daily lives, was confirmed with significant results. Thus, differences in enthusiasm, may offer a better understanding of why these two groups differ significantly in their waking thoughts.

With regard to sleep hygiene practices, poor sleepers were found to be statistically different from good sleepers on a number of measures. Hypothesis 5, 6 and 7, were supported by significant but modest relationships which revealed poor sleepers using 1.14 times more caffeine, 1.62 times more alcohol, and smoked 1.08 times more than their good sleeper counterparts. Allowing for differences in age, results for caffeine use lend further support to research conducted by Kirmil-Gray et al. (1984) that poor sleepers consume more caffeine than good sleepers. The presence of statistically significant results regarding smoking and alcohol use suggest that the use of similar stimulants or depressants may also affect the quality of sleep that an individual attains. Put differently, it appears that poor sleepers are more likely to practice poor sleep hygiene habits than their good-sleeping peers.

The results of this study suggest some interesting and new criteria for distinguishing poor from good sleepers. First, poor sleepers seem to be those individuals that are more anxious and easily excited, represented by their higher level of chronic arousal. Thus, perhaps how an individual is capable of handling stress according to one's chronic arousal level and not necessarily the particular type of stress is what determines whether one will achieve good or poor quality of sleep. In any case, Coren's Arousal Predisposition Scale (1988) proves to be a valuable measure in differentiating good and poor sleepers. Likewise, the Epworth Sleepiness Scale (Johns, 1991) proves useful in differentiating between good and poor sleepers' propensity to sleep during the daytime. It seems logical to deduce that these individuals who have a greater natural inclination to fall asleep are those lacking sufficient quality sleep on a daily basis as is the case with poor sleepers. Significant differences between good and poor sleepers in their ability to stay awake during various activities such as driving, eating meals and engaging in social activities raise some interesting implications. For instance, it may be that individuals suffering from poorer quality of sleep are perhaps more likely to have accidents while driving and during other activities in which they participate. If so, this would seem definitely worthwhile to investigate. Future research should examine these possibilities. Relative to good sleepers, lower levels of enthusiasm in poor sleepers may result in lower performance levels and lower productivity in their personal life as well as in their professional careers. If this is so, future research could examine whether poor sleepers who rate low on enthusiasm are also those who are less efficient in their life settings than good sleepers. Next, as seen in this study, sleep hygiene habits do seem to differentiate good from poor sleepers. Poor sleep hygiene habits, such as smoking, and caffeine and alcohol consumption, all seem to negatively impact an individual's sleep quality. Use of stimulants, such as caffeinated drinks and smoking cigarettes, may be the poor sleeper's attempt to offset one's sluggishness or fatigue resulting from poor sleep quality. Likewise,

heavier use of alcohol may result from trying to mitigate depressed or anxious feelings that poor sleepers are known to experience. Additionally, poor sleepers may rely more on using alcohol as a means of promoting sleep. These results lead one to believe that perhaps other hygiene habits may prove to also differentiate good and poor sleepers. For instance, perhaps how soon an individual eats before sleeping may impact his quality of sleep. Additionally, how much an individual exercises on a regular basis may also affect sleep quality and differentiate these two groups. These possibilities should also be examined.

Overall, this study has revealed additional differences between good and poor sleepers than that of previous research. Results from this study also suggest that further differences separating these two groups are likely. Information found in this study could be used to counsel poor sleepers. For example, those poor sleepers who consume large amounts of caffeinated beverages, alcohol, and smoke could be informed that decreasing their consumption of these variables could help them in achieving better quality sleep. Likewise, those who suffer from high levels of chronic arousal may find methods or therapy in which to lower these levels and thereby attain better quality sleep. Finally, recommendations for further research in this study should be considered in order to more accurately differentiate between these two sleeper groups.

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Appendix A

Coren Insomnia Scale

Instructions: This questionnaire deals with a number of common behaviors and self-perceptions. For each question select the response which best describes you and your behaviors. Select from among the following response alternatives:

Never (or almost never) Seldom Occasionally Frequently Always (or almost always)

Circle the first letter which corresponds to your choice.

1. I experience delayed sleep onset.	N S O F A ____
2. I awake during the night.	N S O F A ____
3. I awake early in the morning.	N S O F A ____
4. I have nightmares.	N S O F A ____
5. I experience restlessness.	N S O F A ____
6. I awake tired.	N S O F A ____
7. I get all the sleep that I need.	N S O F A ____
8. I am satisfied with my sleep.	N S O F A ____
9. I feel rested in the morning.	N S O F A ____
10. When I awake during the night I have difficulty falling asleep again.	N S O F A ____
11. I snore during my sleep.	N S O F A ____

Scoring:

Each alternative response received a numerical score (1, 2, 3, 4, or 5) depending on which alternative circled. There were three items (e.g., I feel rested in the morning) which used reversed scoring (5, 4, 3, 2, or 1) to test for reliability of the participant's markings. A single insomnia total score was calculated for each participant by summing up individual insomnia item scores. The minimum and maximum scores for this scale are 11 and 55 points, respectively. A higher score on this scale indicates the potential for greater difficulty in falling asleep.

Appendix A (continued)

Arousal Predisposition Scale

Instructions: This questionnaire deals with a number of common behaviors and self-perceptions. For each question select the response which best describes you and your behaviors. Select from among the following response alternatives:

Never (or almost never) Seldom Occasionally Frequently Always (or almost always)

Circle the first letter which corresponds to your choice.

8. I am a calm person.	N S O F A ____
9. I get flustered if I have several things to do at once.	N S O F A ____
10. Sudden changes of any kind produce an immediate emotional effect on me.	N S O F A ____
11. Strong emotions carry over for one or two hours after I leave the situation.	N S O F A ____
5. I am restless and fidgety.	N S O F A ____
6. My mood is quickly influenced by entering new places.	N S O F A ____
7. I get excited easily.	N S O F A ____
8. I find my heart keeps beating fast for a while after I have been "stirred up."	N S O F A ____
9. I can be emotionally moved by what other people consider to be simple things.	N S O F A ____
10. I startle easily.	N S O F A ____
11. I am easily frustrated.	N S O F A ____
12. I tend to remain excited or moved for long periods of time.	N S O F A ____

Scoring:

For each participant, a single Arousal Predisposition Scale total score was calculated by summing the number assigned to each item. The minimum and maximum scores for this scale are 12 to 60 points, respectively. A higher score on this scale indicates a higher level of chronic arousal.

Appendix A (continued)

The Epworth Sleepiness Scale

How likely are you to doze off or fall asleep in the following situations, in contrast to feeling just tired? This refers to your usual way of life in recent times. Even if you have not done some of the things recently, try to work out how they would have affected you. Use the following scale to choose the most appropriate number for each situation.

0 = would never doze

1 = slight chance of dozing

2 = moderate chance of dozing

3 = high chance of dozing

<u>Situation</u>	<u>Chance of dozing</u>
Sitting and reading	_____
Watching TV	_____
Sitting inactive in a public place (e.g. a theater or meeting)	_____
As a passenger in a car for an hour without a break	_____
Lying down to rest in the afternoon when circumstances permit	_____
Sitting and talking to someone	_____
Sitting quietly after a lunch without alcohol	_____
In a car, while stopped for a few minutes in traffic	_____

Scoring:

Each response category received a numerical score (0, 1, 2, or 3,) ranked in ascending order. For each participant, a single propensity to sleep during the day score was calculated by summing the numbers assigned to each item. The minimum and maximum scores for this scale ranged from 0 to 24 points, respectively. A higher score on this scale indicates a greater likelihood for an individual to fall asleep during the day than an individual with a lower score.

Appendix A (continued)

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

10. 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 ____
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Scoring:

Response choices for this item ranged from “Not during the past month” to “Three or more times a week” and received an ascending numerical score (1, 2, 3, 4) depending on which response was chosen. The minimum and maximum scores for this question ranged from 1 to 4 points, respectively. A higher score on this question indicates that an individual experiences more difficulty staying awake among various daytime activities than an individual with a lower score.

11. During the past month, how much of a problem has it been for you to keep up enthusiasm to get things done?

Not during the past month ____	Less than once a week ____	Once or twice a week ____	Three or more times a week ____
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Scoring:

These responses were scored numerically on an ascending 4-point scale similar to scoring sequences seen in the preceding question. The minimum and maximum scores for this question ranged from 1 to 4 points, respectively. A higher score on this question indicates that an individual experiences more difficulty staying motivated in accomplishing tasks during the past month than an individual with a lower score.

Appendix A (continued)

For the next set of questions:

- Please read each question very carefully before answering.
- Answer all questions.
- Answer all questions in numerical order.
- Each question should be answered independently of the others. DO NOT go back and check your answers.
- All questions have a selection of answers.

1. How much coffee, tea, or caffeinated, soda do you drink per day?"

- a) None b) 1 cup or soda c) 2 or 3 cups/sodas d) 3 to 5 cups/sodas e) more than 5 cups/sodas

Scoring:

Response categories for this question ranged from the lowest frequency rating of "None" to the highest frequency rating of "more than 5 cups/sodas." For these items, 1 was assigned to the lowest frequency item and ascending numerically to the highest frequency item which was assigned a value of 5. The minimum and maximum scores for this question ranged from 1 to 5 points, respectively. A higher score on this question indicates that an individual drinks more caffeinated beverages per day than an individual with a lower score.

2. How much do you smoke each day?

- a) None b) less than 1 pack c) 1 pack d) 2 packs e) More than 2 packs

Scoring:

Participants responded by circling alternatives bounded by "None" and "More than 2 packs," which were numerically scored (1, 2, 3, 4, 5) in ascending order. The minimum and maximum scores for this question ranged from 1 to 5 points, respectively. A higher score on this question indicates that an individual smokes more packs of cigarettes per day than an individual with a lower score.

Appendix A (continued)

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

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

1. Drink more than 3 ounces of alcohol
(e.g. 3 mixed drinks, 3 beers, or 3 glasses of wine) _____

Scoring:

Possible responses for this question ranged from 0 to 7 days. The minimum and maximum scores for this question ranged from 0 to 7 points, respectively. A higher score on this question indicates that an individual drinks more alcohol per week than an individual with a lower score.

Appendix B

Means and Standard Deviations for Females and Males and t Statistics Computed
Between Females and Males for Related Variables

<u>Variables</u>	<u>Females</u> (N= 202)		<u>Males</u> (N = 170)		<u>t</u>	<u>p</u>
	<u>M</u>	<u>SD</u>	<u>M</u>	<u>SD</u>		
Chronic Arousal	35.96	6.94	33.42	6.87	3.46	< .001
Propensity to sleep	10.27	4.26	9.74	4.76	1.11	.268
Ability to stay awake during activity	1.63	.87	1.74	.96	-1.10	.271
Enthusiasm	2.32	.93	2.16	.92	1.60	.110
Smoke	1.08	.27	1.09	.35	-.58	.564
Caffeine	2.21	.83	2.40	1.07	-1.70	.091
Alcohol	.31	.70	.37	.80	-.78	.436

IMAGE EVALUATION TEST TARGET (QA-3)

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