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The Influence of Stages of Change on the Effectiveness of a Sleep Hygiene Education-Based Intervention

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ABSTRACT

Sleep-related problems detrimental to sleep quality have been identified in millions of people across the United States. Studies have found that the subsection of the population labeled as college students, due to either the setting or other connected environmental factors, exhibit one the highest prevalence's of these problems, roughly at 73% on college settings. Prior studies have utilized interventions focused around educational and behavior change components, the current study chose to also examine the role that motivation, specifically through motivational stages, may have on the outcomes of sleep hygiene and sleep quality variables following the conclusion of a sleep intervention program. Participants from a private university completed several self-report measures online at three distinct phases of testing throughout the timeframe of the study. A mixed factorial analysis did not yield significant differences across the variable of sleep hygiene, but did demonstrate a significant interaction effect with the variable of sleep quality. Overall, it was found that motivation may play a role in influencing specific variables' behavior change programs.

Keywords: sleep hygiene, sleep quality, sleep intervention, motivational stages

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CHAPTER I

INTRODUCTION

The Role of Sleep and the Effects of Sleep Deprivation on the Body

Sleep plays a pivotal role in an individual's overall health and wellbeing (NSF, 2014). Despite being so essential, each night millions of people across the United States struggle with the, now, all-to-common problem of falling asleep or staying asleep, leading to an overall lack of sleep on a grand scale (Sleep Education, 2014). Surveys conducted by the National Sleep Foundation, over a fifteen-year span, have further reinforced this notion due to the disturbingly high prevalence of reported sleep disturbances in the general population, with an estimated 50 to 70 million affected individuals (APA, n.d.). This immense statistic led to a push that has helped to increase recognition and surveillance of sleep hygiene-related consequences, resulting from either too little or too much sleep, in recent years (CDC, 2015). Follow-up studies, focused on the segmentation of the affected population, have marked college students as one of the most sleep deprived subsections of the population (University of Michigan, n.d.). Despite the breadth and depth currently portrayed by all available literature, it remains a topic of interest due to its extraordinary impact on all aspects of an individual's life, whether physiological or psychological.

A simplistic view of sleep and its processes, one that devalues the importance of sleep compared to other responsibilities, leads to unhealthy sleep patterns. Adherence to unhealthy sleep patterns has been a contributing factor towards the substantially high

prevalence of sleep-related problems (U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, & Blood Institute, 2005a). Sleep is best viewed as a highly organized, complex behavior that results from the disengagement of external stimuli and the production of variable, but specific, brain activity (Rosenthal, 2006). As such, sleep may be delayed, but due to its indispensable nature for our survival it may only be delayed temporarily. Like many other essential physiological processes, sleep is endogenously generated and homeostatically regulated (Rosenthal, 2006).

The synthesis between endogenous generation and homoeostatic regulation of sleep creates what has come to be known as the sleep-wake cycle (Lerner & Lerner, 2007). These two processes are described in the literature as Process C, the endogenous generation of adenosine and melatonin, and Process S, the homeostatic modulation of the sleep-wake cycle (Rosenthal, 2006). Since these are both considered to be open systems, they may be modified by changes in behavioral patterns, such as implementation of proper sleep hygiene (Asarnow, Soehner, & Harvey, 2014). Process C is modulated by two factors that are frequently addressed within the general population, the accumulation of a sleep debt and the influence that the day/night cycle has on preparing an individual's body for sleep (U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, & Blood Institute, 2005). Process S is modulated primarily by exogenous factors, such as the sleep environment, the timing of sleep, the use of caffeine or alcohol, illness or other conditions that have physiological effects on the body, and/or conditions/states that otherwise diminish the body's ability to reach a restorative level of sleep (U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, & Blood Institute, 2005).

Overall, recognition of these two processes helps an individual to develop a comprehensive view of sleep, allowing for adequate appreciation of its importance to general wellbeing and to identification of potential treatment targets to modulate sleep-wake cycles to restore and maintain positive sleep patterns. Positive sleep patterns promote the attainment of an adequate amount of sleep, specifically in terms of time slept, to promote health and well-being throughout the lifespan (PHO, 2015). While a healthy degree of sleep quality is dependent on an adequate amount of sleep, the specific amount is a separate variable, due to changing sleep needs across the life cycle (Rama, Cho, & Kushida, 2006). Sleep quantity plays an underlying, but important role, in the shaping of proper sleep quality. Despite variations in these two aspects of sleep, the suggested optimal amount needed, from late adolescence through late adulthood, is between 7 and 8 hours, albeit these amounts are subject to change due to variations between individuals (U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, & Blood Institute, 2005).

The importance of promoting healthy sleep-wake patterns is due to the prominent role that these patterns play in somatic anabolic processes, restorative molecular processes in the cerebrum, cleansing processes aimed at the removal of neurotoxins and other related threats, as well as the promotion of several higher-order cognitive functions (Frank, 2006). However, due to the nonstop nature of the world today, compared with that of the past decade, reaching what has been denoted as an optimal amount of sleep has become a challenge for millions (U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, & Blood Institute, 2005). Due to the detrimental impact that today's environment may have on sleep health, the consequences

of sleep deprivation and their effects on the human body have garnered more attention and recognition.

The inadequacy of sleep can present itself in three distinct ways: general sleep disruptions associated with increased awakenings and reduced sleep, self-imposed sleep restriction due to various factors, and total sleep deprivation of at least one night to prolong wake time (PHO, 2016). When chronic, these sleep patterns are contained under the category of sleep deprivation, a cumulative sleep debt accrued over time, instead of solely because of one or two nights of inadequate sleep (Lerner & Lerner, 2007). Recent estimates suggest the prevalence of such disturbances to be between 37-40% within the adult population (Rosa, 2006). Due in part to this data, but also in part to its strong association with injury, chronic diseases, and mortality, insufficient sleep has been increasingly recognized as a public health concern (Coughlin & Smith, 2014).

Sleep deprivation has wide reaching effects on both physiological aspects of behavior (Lerner & Lerner, 2007) and cognitive processes (Asarnow et al., 2014). Internally, sleep deprivation has considerable physiological effects on the human body. These include changes in cardiac physiology, respiratory physiology, cerebral blood flow, temperature regulation, endocrine function, and genital function. Specific changes within these systems include changes in cardiac rhythm variability, neuronal ventilation control, cerebral blood flow normal cyclic internal temperature, circadian hormone secretion, and sexual functioning in males (Rosenthal, 2006). Relatedly, sleep deprivation also predisposes individuals to certain illnesses and infections through a weakened immune system (U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, & Blood Institute, 2005b). In regard to innate cognitive

functionality, sleep deprivation can serve as a disrupting factor towards the encoding and retention of memories (Asarnow et al., 2014). When observed in adult populations, sleep deprivation may result in attentional deficits that negatively affect individual performance or, to a greater extent in young adult populations, an increase in risk-taking behaviors due to faulty decision making processes (Asarnow et al., 2014; Dorrian & Dinges, 2006; U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, & Blood Institute, 2005b). Due to the detrimental physiological and cognitive effects associated with sleep deprivation (U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, & Blood Institute, 2005b) and the estimated prevalence of such problems within the college setting (73% (Cloud, Knutson, Dautovich, Hirshkowitz, Hillyguys, & Gasior, 2014)), quantification of sleep disorders and quality of sleep carries a greater importance for this subset of the population. While quantity of sleep is a matter of great importance, it does not account for every sleep-related problem. Observation, education, and potential treatment of sleep-related problems focus on the incorporation of the sleep quality variable, sometime to an equal or greater extent than the focus on sleep quantity, as they affect and are affected by each other.

Sleep Quality, Effects on Wellbeing and College Populations

Sleep quality, the subjective evaluation of one's sleep patterns (Cloud et al., 2014), while varying slightly from sleep quantity, specifically that of reduced sleep, places a similar functional burden on modern society (Pensuksan, Lertmaharit, Lohsoonthorn, Rattananupong, Sonkprasert, Gelaye, & Williams, 2015). To a greater extent, sleep quality, not sleep quantity, is viewed as playing a more foundational role in

the development of an individual's cognitive, psychomotor, and emotional functioning (Valerio, Kim, & Sexton-Radek, 2016). Recent studies have also suggested that sleep quality, not quantity, is a better predictor of physical health and wellbeing (Benham, 2010; Bonuck, Schwartz, & Schechter, 2016).

The importance of sleep quality has been attributed not just to changes in sleep needs across the lifespan (U.S. Department of Health and Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute, 2005c), but also to differing individual sleep needs (Benham, 2010). Apart from its developmental functions (Valerio et al., 2016) and its importance to physical health and wellbeing (Benham, 2010), quality of sleep also exhibits an inverse relationship with psychological health (Vail-Smith, Felts, & Becker, 2009). Specifically, diminished sleep quality has been tied to increased levels of anxiety, depression, and generalized stress (Vail-Smith et al., 2009). These detrimental health effects are more prominent in collegiate settings, due to the environmental and social demands that may interfere with students' sleep hygiene (Bonuck, Schwartz, & Schechter, 2016). Specifically, the settings are correlated with increased sleep difficulties, unstable sleep patterns, and intrusive sleep environments (Bonuck et al., 2016).

College student populations are a focal point of study due to their increased vulnerability to sleep problems (Valerio et al., 2016). This vulnerability has been credited to poor social maturity levels, unique sleep-related challenges imposed by the campus culture (Vail-Smith et al., 2009), and irregular sleep patterns reinforced by false perceptions of what constitutes healthy sleep behaviors and patterns (Buboltz, Jenkins, Soper, Woller, Johnson, & Faes, 2009; Singleton & Wolfson, 2009). Of particular interest

is that these sleep-related challenges are not unique to one specific area or culture; instead they have been observed across diverse global settings and within a myriad of racial and ethnic group samples (Pensuksan et al., 2015; Valerio et al., 2016).

Despite alarming statistics (Buboltz, et al., 2009; Lund et al., 2010) and promising interventions, sleep-related problems are only increasing in the college student population (Valerio et al., 2016). A principle concern of poor sleep quality is its link to increased presentation of health risk behaviors (Carter, Chopak-Foss, & Punungwe, 2016), such as physical aggression (Pensuksan et al., 2015; Vail-Smith et al., 2009), alcohol use (Buboltz, et al., 2009; Lund et al., 2010; Singleton & Wolfson, 2009; Vail-Smith et al., 2009), tobacco use (Pensuksan et al., 2015, Vail-Smith, Felts, & Becker, 2009), use of prescription or over-the-counter medications to regulate sleep and wakefulness (Lund et al., 2010), recreational drug use, and suicidal ideation (Vail-Smith et al., 2009). These risky behaviors, in turn, have been associated with more severe presentations of anxiety or mood disorders (Pensuksan et al., 2015), chronic illnesses (Buboltz, et al., 2009), irregular sleep patterns (Carter et al., 2016), traffic accidents (Pensuksan et al., 2015), and diminished overall academic performance in student populations (Carter et al., 2016).

Prior studies have observed that a knowledge deficit, primarily related to good sleep habits, serves as a predictor of poor sleep quality as well as the increased presentation of health risk behaviors (Buboltz, et al., 2009). There is scant evidence that an instructional program alone can be effective when dealing with sleep-related problems. However, preliminary findings have shown that programs that also aim to emphasize consistent and positive sleep hygiene behaviors should be associated with

better outcomes than either a program only emphasizing sleep hygiene behavior change or that of a strictly educational program about sleep (Pensuksan et al., 2015).

Sleep Health Knowledge, Sleep Hygiene, and Sleep-Education Focused Interventions

Sleep education, while able to take many forms, tends to always be the backbone of any sleep health related intervention. Despite the emphasis on other interventions, due to the commonly held belief that educational programs would result in little behavioral change (Buboltz, Brown, & Soper, 2001), knowledge-based approaches referencing sleep hygiene and related practices have shown the most direct link to influencing overall sleep quality (Suen, Hon, & Tam, 2010). Confronting this lack of awareness is more effective than the substitution of self-medication practices through over-the-counter or pharmacological interventions for treatment of sleep-related problems in the long term (Buboltz et al., 2001). However, knowledge about sleep health appears to be limited (Bonuck, Schwartz, & Schechter, 2016), especially in university settings where students suffer from suboptimal levels of overall sleep quality and 68% show deficits in various sleep hygiene-related behaviors (Suen et al., 2010). Due to the successes of education based programs (Gruber, Somerville, Bergmame, Fontil, & Paquin, 2016; Jaffe & Engelke, 2015; Schub & Engelke, 2016), this study focused on the pairing of important sleep health knowledge with the positive sleep hygiene behaviors.

Proper sleep hygiene, while varied, is best recognized as a series of sleep promoting habits that are both goal-directed and knowledge structured (Kor & Mullan, 2011). The term sleep hygiene, while seemingly simple, incorporates a wide collection of behaviors that individuals can undertake to promote healthy and refreshing sleep (Kor &

Mullan, 2011; Suen et al., 2010). Sleep hygiene has been targeted due to the observed relationship between poor sleep hygiene practices and nearly all known sleep problems (Bonuck et al., 2016). Poor sleep hygiene has been documented as leading to multiple deleterious effects on an individual's personal and professional life, as well as leading to the increased occurrence of both minor and fatal accidents (Jaffe & Engelke, 2015). Poor sleep hygiene behaviors can include the excessive consumption of caffeine, nicotine, and alcohol (Suen et al., 2010) and may be due to growing academic demands, increased social opportunities, easy access to computers and mobile devices, and the irregularity of student sleep schedules (Kor & Mullan, 2011). Good sleep hygiene has the opposite effect, as it increases sleep duration; reduces and may even prevent behavioral sleep problems; and minimizes the use and/or abuse of substances (Bonuck et al., 2016; Jaffe & Engelke, 2015; Suen, Hon, & Tam, 2010;). Good sleep hygiene behaviors can include: (a) forming, and adhering to, a consistent sleep schedule; (b) exercising more, but not at times too close to normal bedtime; (c) avoiding or limiting the consumption of caffeine and nicotine, before bedtime and throughout the day, respectively; (d) avoiding alcohol use, before bed and as a tool to fall asleep; (e) and maintaining a healthy sleep environment, free of distractions such as lights, noises, electronic devices (Bonuck et al., 2016; Jaffe & Engelke, 2015).

While sleep hygiene-based education programs and interventions have proven to be more effective than other treatments (Gruber et al., 2016; Schub & Engelke, 2016, Jaffe & Engelke, 2015), such as pharmacological or harmful self-medicating treatments (Buboltz et al., 2001; NSF, 2014), their overall effectiveness is still limited. While much research has been dedicated to the treatment of sleep-related disturbances through a

myriad of interventions and programs (Cox & Olatunji, 2016), few sleep-related studies have focused on the factor of motivation, a key factor analyzed by several addiction and health related treatment interventions (Mander, et al., 2014). Since motivation is intrinsic to sleep hygiene (Buboltz et al., 2001; Kor & Mullan, 2011), this study focused on the aspect of motivation as it relates to treatment outcomes, when paired with a sleep hygiene-based educational intervention.

Change Theory

Behavior change, sleep related or otherwise, benefits from the facilitation of specific changes to the habits and/or behaviors that may contribute to the problem in question (Manchaiah, Rönnberg, Andersson, & Lunner, 2015). In recent years, various methods have been proposed to provide a theoretical understanding for health behavior change (Guess et al., 2016; Nieuwenhuijsen, Zemper, Miner, & Epstein, 2006). Of these frameworks, stage theories have been the most promising (Richert, Schüz, & Schüz, 2013; Rothmore et al., 2015).

Of all stage-related theories, the most frequently applied model has been the Transtheoretical Model, also referred to as the stages of change model (Guess et al., 2016; Manchaiah et al., 2015; Rothmore et al., 2015). The Transtheoretical Model has been used to describe the process of change. Specifically, it focuses on categorizing an individual's readiness to change into five separate stages (Prochaska & Velicer, 1997). The five stages include: Precontemplation, when individuals have no intention to change; Contemplation, when individuals become aware of problematic behavior and have an intent to change; Preparation, where individuals are committed to change, this stage is often left out of the model interpretations and instead combined with the stage before or

after it (Manchaiah et al., 2015; Soberay, Grimsley, Faragher, Barbash, & Berger, 2014); Action, when individuals are taking active steps to change their behaviors; Maintenance, when changes have been made and the focus shifts towards relapse prevention (Mander, et al., 2014; Manchaiah et al., 2015).

Identification of individuals' stages of change can play an important role in treatment of problematic behaviors by adapting programs and interventions on the basis of an individual's current level of readiness for change (Soberay et al., 2014). Overall, this model suggests that individuals who present in later stages of change are more apt to seek initial help, start an appropriate intervention or program, adhere to the intervention or program, and achieve successful outcomes (Prochaska, 2008). While the concepts and the processes by which behavioral changes occur are described very generally in the Transtheoretical Model (TTM) (Hutchison, Breckon, & Johnston, 2008), this model has been used in varying practical applications alongside specific interventions with positive outcomes (Prochaska, et al., 2004).

Stages of Change and Health Behaviors

Health promotion research focuses on changing targeted behavior by changing the affected individuals' knowledge and beliefs about the problematic behavior(s) (Lee-Lin, Nguyen, Pedhiwala, Dieckmann, & Menon, 2015). The TTM approaches this change from a stance that seeks the address the faults and deficits noted in previous, non-stage-related, health promotion programs (Prochaska, 2008). By viewing health behavior change as a continuum of nonlinear (Freyer-Adam, et al., 2014) stages (Lee-Lin et al., 2015), the TTM pushes for the modification of programs to better suit individuals' needs in change-dependent processes (Guess, et al., 2016; Richert et al., 2013). This model has

been used in a range health-related interventions, such as those focused on promoting preventative care programs (Genberg, Lee, Rogers, Willey, & Wilson, 2013; Lee-Lin et al., 2015), those focused on promoting positive lifestyle behaviors (Genberg et al., 2013; Guess, et al., 2016; Nunes & Silva, 2016; Rothmore et al., 2015), and those focused on addiction-related interventions (Freyer-Adam, et al., 2014; Gantiva, et al., 2014; Soberay et al., 2014). Findings from all three of the TTM modified intervention types have yielded results congruent with the prediction set forth by the principles of the TTM (Prochaska & Velicer, 1997; Wu, Hsieh, & West, 2009). These findings further reinforce the role that stages of change, specifically readiness/motivation to change, play within clinical presentations of reported problems (Richert et al., 2013; Soberay et al., 2014;).

Although it may not be feasible to assess and modify all variables related to stages of change (Richert et al., 2013), it is still important to assess for stages of change at pretreatment to better inform clinical judgment in any type of intervention-related study (Soberay et al., 2014). Although motivation is intrinsic to the process of developing and maintaining positive behavioral patterns in a wide range of circumstances (Guess, et al., 2016; Prochaska & Norcross, 2014; Robinson & Vail, 2012), it has not been emphasized in the literature relating to sleep-health behaviors. In this study, stages of change were assessed at pretreatment and then used as a factor to analyze effectiveness of and adherence to the sleep hygiene education program.

Present Study: Effects of Motivational Stage on Sleep Intervention Outcomes

The present study sought to support the findings of previous studies on health behavior change (Guess, et al., 2016; Prochaska & Norcross, 2014; Robinson & Vail, 2012), by extending the theoretical framework proposed by the TTM to that of sleep

hygiene-related behavior change (Prochaska & Velicer, 1997). Previous findings suggest that stages identified in pretreatment are predictive of specific outcomes at follow-up (Soberay et al., 2014). This study sought to further reinforce this observed relationship in a different set of health behaviors, specifically those related to sleep. Prior findings influenced the initial prediction that participants identified at the contemplation stage, or higher, will have better treatment outcomes than participants identified at precontemplation.

Secondly, while other studies have utilized time frames of two months or longer for the dissemination of their programs (Douglas & Hill, 2013; Hall, et al., 2015; Hu, et al., 2010; Mindell, Kuhn, Lewin, Meltzer, & Sadeh, 2006), the present study utilized a one month time period, from pretest to posttest, to conduct its analyses. It was predicted that the present study, through its sleep education and sleep behavior change components, would show significant differences at posttest in reported sleep hygiene and sleep quality scores.

Lastly, although not a primary goal, the present study sought to observe the previously found high prevalence of sleep-related problems through a college student sample (Cloud et al, 2014; University of Michigan, n.d.). It was predicted that, through the use of sleep quality global scores at pretest, the results of the present study would align with the increased prevalence of sleep-related problems in college settings. Since previous sleep interventions have focused primarily on the intervention itself (Cox & Olatunji, 2016) and not on the motivational factors that promote the change, this study aimed to find a relationship between readiness to change and actual change of problematic sleep hygiene-related behaviors.

CHAPTER II

METHODS

Participants and Procedures

Participants were 244 students recruited from a general psychology class at a small, private Christian university. Students received extra credit for participating in each of the three stages of the study. The mean age of participants was 19.01 (SD = 1.77). Thirty-four percent of the sample was male. Sixty-six percent of the sample was female.

At pretest, participants were asked to complete a demographic question subset and a change assessment scale, as well as indices to assess both sleep hygiene and sleep quality. The educational intervention was presented one week after the pretest assessments became available to allow for maximum participation from the students. The intervention stage consisted of a sleep hygiene focused educational program. The program took about 20 minutes to complete and included four sections of material related to sleep, sleep hygiene, and how to practically alter sleep behaviors. Two weeks after the intervention, participants were asked to complete both the Pittsburgh Sleep Quality Index and the Sleep Hygiene Index again. This allowed for students to report and update their perceived level of sleep quality and the presence and frequency of sleep hygiene-related behaviors for further analysis between stages of this program.

Measures

Stages of Change

Stages of Change was assessed using the University of Rhode Island Change Assessment Scale (McConnaughy, Prochaska, & Velicer, 1983). The URICA is a 32-item questionnaire, which assesses stages of change in participants at the present moment in regard to behaviors of interest in the study. The URICA is a self-report measure that is comprised of 32 questions answered by 5-point Likert scale, ranging from strongly agree to strongly disagree. Each component subscale: precontemplation, contemplation, action, and maintenance; is comprised of eight items. The URICA is a continuous measure where subjects can attain scores on more than one of the four stages, with higher total scores being indicative of a greater level of readiness to change. Cronbach's alpha for the URICA ranges from 0.77 to 0.79. A full-form version of the URICA 32-item scale is included in Appendix C.

Sleep Hygiene

Sleep hygiene was assessed using the Sleep Hygiene Index (Mastin, Bryson, & Corwyn, 2006). The SHI is a 13-item self-report questionnaire, which assesses the practice of sleep hygiene behaviors. Each item is rated on a 5-point scale, ranging from 0 (never) to 4 (always). Total scores can range between 0 and 52, with a higher score being indicative of poorer sleep hygiene. Cronbach's alpha for SHI is 0.66. Full-form SHI is included in Appendix D.

Sleep Quality

Sleep quality was assessed using the Pittsburgh Sleep Quality Index (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The PSQI is a 19-item questionnaire, which

assesses sleep quality and disturbances of an individual over the past 30 days. The PSQI consists of 19 self-rated questions and five questions rated by the participant's partner. The five partner-rated questions were omitted in this assessment due to not counting towards the scoring of the PSQI. The 19 items were grouped into seven component scores, each weighted equally on a 0-3 scale. Component scores are combined to yield a global PSQI score, that may range between 0-21; with higher scores being indicative of poorer sleep quality. Cronbach's alpha for the PSQI is 0.83 for all of its seven components. Full-form PSQI is included in Appendix E.

Sleep Education

Sleep education was provided in PowerPoint slide format. The topics covered in this program included: background information about sleep, the importance of sleep, sleep deprivation, the potential causes of poor sleep, the consequences of poor sleep, and proper sleep hygiene practices (Chiang, 2013; Kryger, Dement, & Roth, 2012; Lowry, Dean, & Manders, 2010; Orzeł-Gryglewska, 2010; Williams & Carey, 2003). To ensure that participants completed the program, they were presented with 12 questions intermittently throughout the program and then all 12 were presented together at the end of the program. The sleep education program and program questionnaire can be located in Appendix F, and G, respectively.

CHAPTER III

RESULTS

Descriptive Statistics for Sleep Hygiene Behaviors and Sleep Quality

The purpose of this chapter is to present the analysis of the effect that motivational stages of change play on improved behavioral change after an educational intervention aimed at improving sleep quality. This analysis was conducted by measuring the variables of sleep hygiene and sleep quality, through discriminate measures, at both the outset and conclusion of the study. Sample means and standard deviations, prior to grouping by motivational stages, will be presented first. Descriptive statistics and ANOVA results for the intervention after grouping by motivational stages will be presented afterwards. Sleep hygiene analyses will be presented prior to the sleep quality analyses in the following sections.

Initially, a baseline was formed by analyzing the dataset for the general trend of sleep hygiene and sleep quality scores, prior to grouping the participants scores by the between-subjects' variable of motivational stages. It was predicted that a broad overview of the dataset would not reveal any significant differences from pretest to posttest, in either of the target variables. Descriptive statistics for the sample were obtained through a series of univariate analyses of both dependent variables. Results from the univariate analysis of sleep hygiene scores can be found in Table 1. The analysis did not yield any significant differences from pretest to posttest phases of testing. This was expected due to the varying motivational stages within the sample. A second univariate analysis was run

for the variable of sleep quality; the results of this analysis are shown in Table 2. Although the findings of this study did not reach statistical significance, the differences were mostly as expected with only minimal observed differences between the two phases of testing. However, instead of the expected decline in scores, a slight increase was observed.

Table 1

Average Sleep Hygiene Index scores by phase of testing

Phase of Testing:	*N*	*M*	*SD*
Pretest	244	24.63	6.03
Posttest	244	24.24	6.22

Table 2

Average Pittsburgh Sleep Quality Index scores by phase of testing

Phase of Testing:	*N*	*M*	*SD*
Pretest	244	7.73	3.03
Posttest	244	7.79	2.89

Descriptive Statistics and ANOVA Results for Sleep Hygiene Behaviors

After descriptive sample characteristics were gathered through univariate analysis the focus was switched to analyze the dependent variables using a 2 (Pretest vs. Posttest) x 2 (Precontemplation vs. Contemplation) mixed factorial ANOVA. Sleep hygiene was the first variable to be analyzed using this statistical test. The goal of this analysis was to examine the effect motivational stage had on case sleep hygiene. It was predicted that students identified at the precontemplation stage would not show any significant level of

improvement in sleep hygiene at posttest. Alternatively, it was predicted that students identified at the contemplation stage would demonstrate improvement in their sleep hygiene. The results of this analysis can be found in Table 3 and the differences between means can be seen in Figure 1. The results from the precontemplation group aligned with initial expectations (M_{pre} = 23.88, SD_{pre} = 6.29, M_{post} = 23.99, SD_{post} = 6.19) due to the stagnation in scores observed across the phases of testing. However, the results from the contemplation group did not match initial expectations. While there was minimal improvement across phases of testing (M_{pre} = 25.46, SD_{pre} = 5.63, M_{post} = 24.51, SD_{post} = 6.26) the changes were not statistically significant. Overall, the ANOVA results did not indicate any statistically significant main effects or interaction effect.

Table 3

ANOVA Results for sleep hygiene scores by motivational stage

Measure	*dF*	*F*	*P Value*
Phase	1	1.31	0.25
Stage of Change	1	2.28	0.13
Phase*Stage of Change	1	2.08	0.15

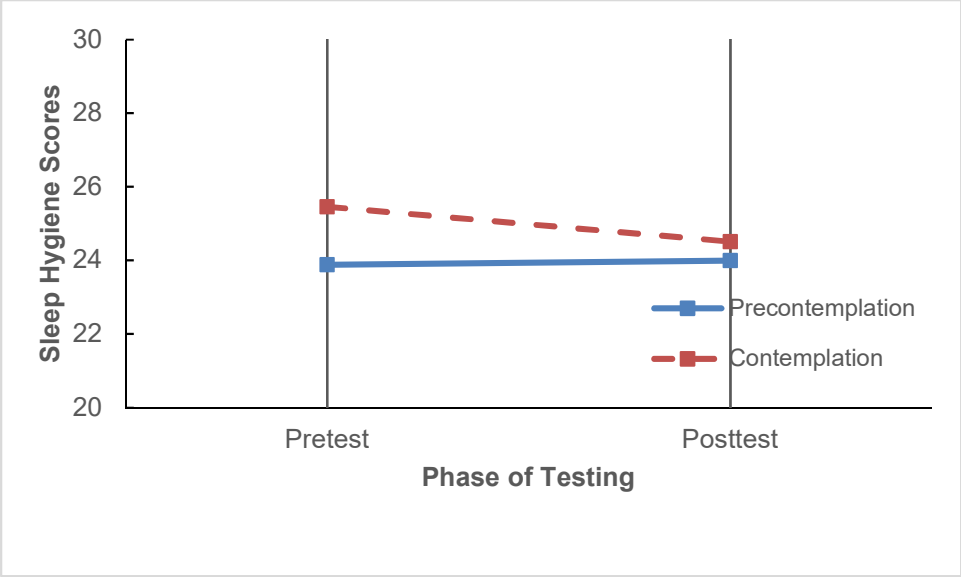

Figure 1. Average sleep hygiene scores by motivational stage

Descriptive Statistics and ANOVA Results for Sleep Quality

The final analysis involved a second 2 (Pretest vs. Posttest) x 2 (Precontemplation vs. Contemplation) mixed factorial ANOVA with sleep quality as the dependent variable. The predictions remained the same, with the precontemplation group expected to show little to no improvement and the contemplation group expected to show significant improvement across the phases of testing. The results of this analysis can be found in Table 4 and the differences between means can be seen in Figure 2. As can be seen in Table 4, there were no significant main effects for phase of testing or stage of change. There was, however, a significant Phase x Stages of Change interaction, $F(1, 37) = 4.57$, $p = .034$. The sleep quality scores of the precontemplation group were higher from pretest to posttest ($M_{pre} = 7.34$, $SD_{pre} = 2.97$, $M_{post} = 7.92$, $SD_{post} = 2.86$) and the scores from the contemplation group were lower from pretest to posttest ($M_{pre} = 8.16$, $SD_{pre} = 3.05$, $M_{post} = 7.64$, $SD_{post} = 2.92$). With higher scores being indicative of poorer quality of sleep and

lower scores being indicative of better quality of sleep, this meant an observed decline for the precontemplation group and an observed improvement for the contemplation group.

Table 4

ANOVA Results for sleep quality scores by motivational stage

Measure	*dF*	*F*	*P Value*
Phase	1	0.02	0.89
Stage of Change	1	0.94	0.33
Phase*Stage of Change	1	4.57	0.03

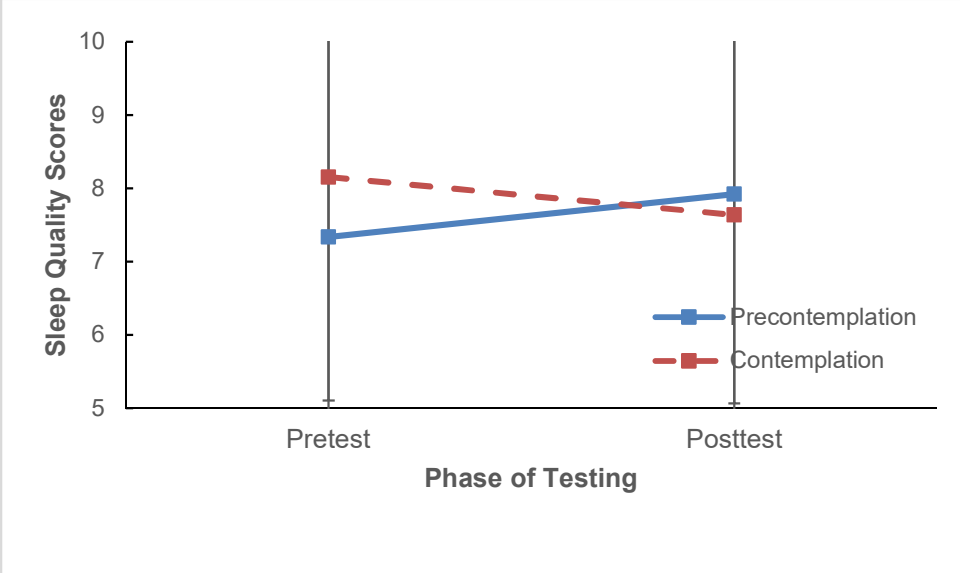

Figure 2. Average sleep quality scores by motivational stage

CHAPTER IV

DISCUSSION

Summary and Overview of Findings

Sleep-related problems continue to be of growing concern in today's society due to the vital role that sleep plays in promoting mental health, physical health, quality of life, and safety (NHLBI & NIH, 2012; NSF, 2001). These sleep-related problems have been attributed to a broad range of factors including physiological health problems, psychological health concerns, and societal factors like the constant access to technology and varying work schedules across the population (APA, n.d.; CDC, 2015). Recent studies have estimated that between 50 to 70 million Americans chronically suffer from sleep and wakefulness disorders (Colten & Altevogt, 2006). The alarming number of affected individuals has led to the increased recognition and surveillance of such problems through the examination of all aspects of sleep (CDC, 2015).

Sleep-related studies have examined the prevalence, role, and consequences of sleep-related problems across a wide range of population subsections (Colten & Altevogt, 2006). Of the many population subsections, college student subsections have been identified as increasingly at risk due to an estimated prevalence of such problems being as high as 73% in college settings (Cloud et al., 2014; University of Michigan, n.d.). Intervention-based studies in sleep have previously focused on the promotion of healthy sleep-wake patterns, the acquisition of a sufficient amount of sleep, and improving overall sleep quality (Buboltz, Brown, & Soper, 2001; Bonuck, Schwartz, & Schechter, 2016; Kor & Mullan, 2011; Suen, Hon, & Tam, 2010). However, other intervention-based studies targeting various health behaviors, such as drug abuse/dependence and

preventative care, also include motivation to change as an important variable towards predicting treatment efficacy (Genberg et al., 2013; Guess, et al., 2016; Lee-Lin et al, 2016; Nunes & Silva, 2016; Rothmore et al., 2015).

The present study sought to examine the effectiveness of a sleep program with the incorporation of motivational stages. While the principles of the trans-theoretical model have been frequently applied to many health behavior change interventions (Guess et al., 2016; Manchaiah et al., 2015; Rothmore et al., 2015), they have not been as common in the sleep literature. The identification of participants' motivational stages in previous studies allowed researchers to more reliably predict program or intervention success by stage (Prochaska, 2008), but it was also used in other studies to adapt their programs or interventions on the basis of their participant's current level of readiness to change (Soberay et al., 2014). The present study focused on the greater predictive ability garnered by the identification of motivational stages, it however did not focus on its intervention modification potential. The TTM was utilized in this study to attempt to make more reliable predictions in association with specific stages, such as believing that participants who were identified in the precontemplation stage would have worse outcomes than those identified as being in the contemplation stage. This was primarily due to the positive outcomes previous studies achieved through the pairing (Prochaska, et al., 2004).

The present study also sought to examine the effectiveness of a hybrid approach to a sleep program. This required the inclusion of an educational and behavior change component to be present within the framework of the study in order promote the outcome of improved sleep quality. Prior studies had found positive outcomes using either of the

components alone (Armstrong & Dregan, 2014; Stranges, Tigbe, Gómez-Olivé, Thorogood, & Kandala, 2012).

Lastly, the present study sought to observe previously found prevalence rates of sleep-related problems reported by individuals in college settings. To assess the prevalence of these reported problems in this college student sample the present study utilized the average global scores from the Pittsburgh Sleep Quality Index at pretest. Global scores on PSQI can range from 0 to 21, with higher scores being indicative of worse sleep quality. It was predicted that this study would also find evidence of increased sleep-related problems in this subsection of the population.

Overall, the results of this study only partially supported the initial prediction about the effects that motivational stage has on participant outcomes. As predicted, individuals identified at the precontemplation stage showed no improvement in sleep hygiene or sleep quality after going through the sleep education. In addition, the contemplation group showed no improvement in the sleep hygiene variable after going through the sleep education. However, a significant crossover interaction was observed for sleep quality. Specifically, the sleep quality of the participants in the contemplation stage improved significantly at posttest relative to the precontemplation participants at pretest. The presence of this interaction offers some insight into the potential effect that motivation can have on sleep interventions.

However, support for the second hypothesis was not observed in the results. Specifically, it appears that the length of an intervention may play a significant role, not solely, in the dissemination of the information, but also in the changes that can be observed due the time it may take for the changes to be implemented or take effect. The

findings in the present study revealed slight improvements across the phases of testing, however they did not reach statistical or observable significance.

The final hypothesis sought to examine the increased prevalence of sleep-related problems in this sample due to both their association with the college setting and previous findings labeling this subsection at an increased risk for those problems. In the present study, this was assessed through the average PSQI global scores at pretest. Although the average scores from the sample where not in the upper echelons of severity, an average PSQI global score of 7.73 is still considered indicative of poorer quality of sleep. These findings, at least partially, support what has been found previously in college settings. That is, college students or those associated with the college setting may be at increased risk of experiencing sleep-related problems.

Limitations and Future Directions

In the present study, there were several limitations faced by the investigator in the process of recruiting the necessary number of participants, disseminating the educational program, and collecting all necessary data. First, the respondents were recruited from an undergraduate psychology class at a Christian university. This may have resulted in skewed findings due to the population available for study. Future studies could build upon this by recruiting participants from different areas of study on campus or even from different campuses.

Second, the respondents were asked to complete the self-report measures via online survey administration. The use of self-report measures could have resulted in random responding or motivated misresponding among the participants. Specifically, respondents could have magnified or exaggerated their answers, but they also could have

underreported answers, affecting the reliability of what was reported. Online administration of the survey and the educational program could have limited access to potential participants. Future studies could build on this by allowing the option for an in-person format as well as its online counterpart. Future studies could also aim to use different measuring instruments to remove the variables associated with the use of self-report measures.

Furthermore, the study collected data at three different points in time and participants could have dropped out at any phase of testing. This could have affected consistency of respondents making it harder to draw conclusions from the sample. Future studies could attempt to incorporate safeguards to prevent participant dropout from affecting the continuity of their results. Future studies could also see their investigators become more involved and available for contact from study participants in an attempt to reduce the amount of experimental attrition that may occur otherwise, for various reasons.

Another potential limitation for the present study could have been the time frame in which the study was conducted. It appears that the one-month time period utilized by the present study may not have provided enough time for significant findings to become measurable. Also, aspects of behavior change might require a longer time to become observable. Future studies could aim to lengthen the timeframe allotted to the study to test the belief that significant results could be observed over a longer time frame. Also, future studies could aim to incorporate more checks throughout the course of the study to further reinforce the principles presented by the sleep education programs. Future studies could also move away from a single concurrent assessment of these variables through an

intervention and instead move towards a cross sectional observation with the appropriate groups or to a longitudinal study which could better assess the differences per individual.

Lastly, there were many possible confounding variables that could not be addressed by the design of the study. With this being a student population, an example would include individual class workload and amount of extracurricular involvement. Future studies could aim to either have more control over the settings in which their participants are tested or they could be designed to accept results from a naturalistic-like observational study.

Clinical and Research Implications

The present study examined the relationship that motivation and stages of change have with either predicting or influencing positive treatment outcomes. The present findings suggest that there was a statistically significant interaction between motivational stage and phase of testing regarding the variable of sleep quality. However, descriptive statistics from the study did not show a statistically significant difference from pretest to posttest. Consequently, research in this area could switch the focus from analyzing differences between pretest and posttest due to motivation and instead look for interaction effects that may be associated with motivational stage of participants. This switch in focus could help future investigators focus on which effects may be more strongly influenced by motivation when behavior change is the goal. Secondly, the premise of the present study could be used to build upon the body of literature regarding sleep interventions and the variable of motivation, due to the lack of studies looking at these in conjunction. The present study found that poor sleep quality and poor sleep hygiene were commonly reported from the sample of participants. This opens the way for further

research on what makes this subsection of the population vulnerable to sleep-related problems more so than the general population.

The present study also suggests that an educational component may be a vital component of any behavior change program. An educational component may aid in increasing participants understanding of the behavior change process leading to better outcomes. This opens opportunities for future studies in sleep behavior change to include an educational component as a base to achieve better results.

Within clinical settings, the present study suggests that focusing on the motivation to change should be a priority when confronting similar situations. Specifically, for therapists and counselors, the present study suggests that while the history of reported problems is an important focal point, that it should not be the only focus to avoid missing potentially valuable information. Also, due to the way that motivational stages are used in other types of interventions, the incorporation and focus on motivational stages may help clinicians guide patients through an effective treatment plan by being able to adapt it to what they may be ready to work on instead of utilizing a standardized treatment plan.

Lastly, an important implication of this study, is the need for the effected individuals to become more knowledgeable about their current situation to improve it. This information could prove to be invaluable for clinicians in creating individualized treatment plans. However, when the same information is presented to individuals seeking treatment it may allow them to take more control over their situation and better understand how the implementation of specific changes can improve their current situation.

Conclusion

Summarizing the results of the present study, motivational stages appeared to play a role in influencing, at least marginally, the outcomes of the interventions. Specifically, the findings suggested that individuals identified at the precontemplation stage saw no improvement in their reported sleep hygiene behavior or their sleep quality. However, the findings also portrayed a trend towards improvement for the group of individuals identified at the contemplation stage. Given these findings, future research in this area might benefit from a longer time frame being allotted for the study. Finally, by analyzing the scores of the participants, it was clear that sleep-related problems were extremely common among the tested demographic. Although the specific reason behind this was not the focus of the study, it opens the way for future research to examine what predisposes this subsection of the population to an increased prevalence of sleep-related problems. The prevalence of such problems could establish an urgently needed conversation with colleges and universities in order to promote the health and well-being of the student body starting with sleep and their sleep habits.

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APPENDIX A

IRB Approval Letter

ABILENE CHRISTIAN UNIVERSITY
Educating Students for Christian Service and Leadership Throughout the World

Office of Research and Sponsored Programs
320 Hardin Administration Building, ACU Box 29103, Abilene, Texas 79699-9103
325 674-2885

11/10/2016

Pablo Soto
Department of Psychology
ACU Box 28011
Abilene Christian University

Dear **Mr. Soto**

On behalf of the Institutional Review Board, I am pleased to inform you that your project titled

was approved by expedited review (46.110(b)(1) category **7**) on **11/10/2016** for a period of **one year** (IRB # **16-080**). The expiration date for this study is **11/10/2017** . If you intend to continue the study beyond this date, please submit the Continuing Review Form at least 30 days, but no more than 45 days, prior to the expiration date. Upon completion of this study, please submit the Inactivation Request Form within 30 days of study completion.

If you wish to make **any** changes to this study, including but not limited to changes in study personnel, number of participants recruited, changes to the consent form or process, and/or changes in overall methodology, please complete the Study Amendment Request Form.

If any problems develop with the study, including any unanticipated events that may change the risk profile of your study or if there were any unapproved changes in your protocol, please inform the Office of Research and Sponsored Programs and the IRB promptly using the Unanticipated Events/Noncompliance Form.

I wish you well with your work.

Sincerely,

Megan Roth

Megan Roth, Ph.D.
Director of Research and Sponsored Programs

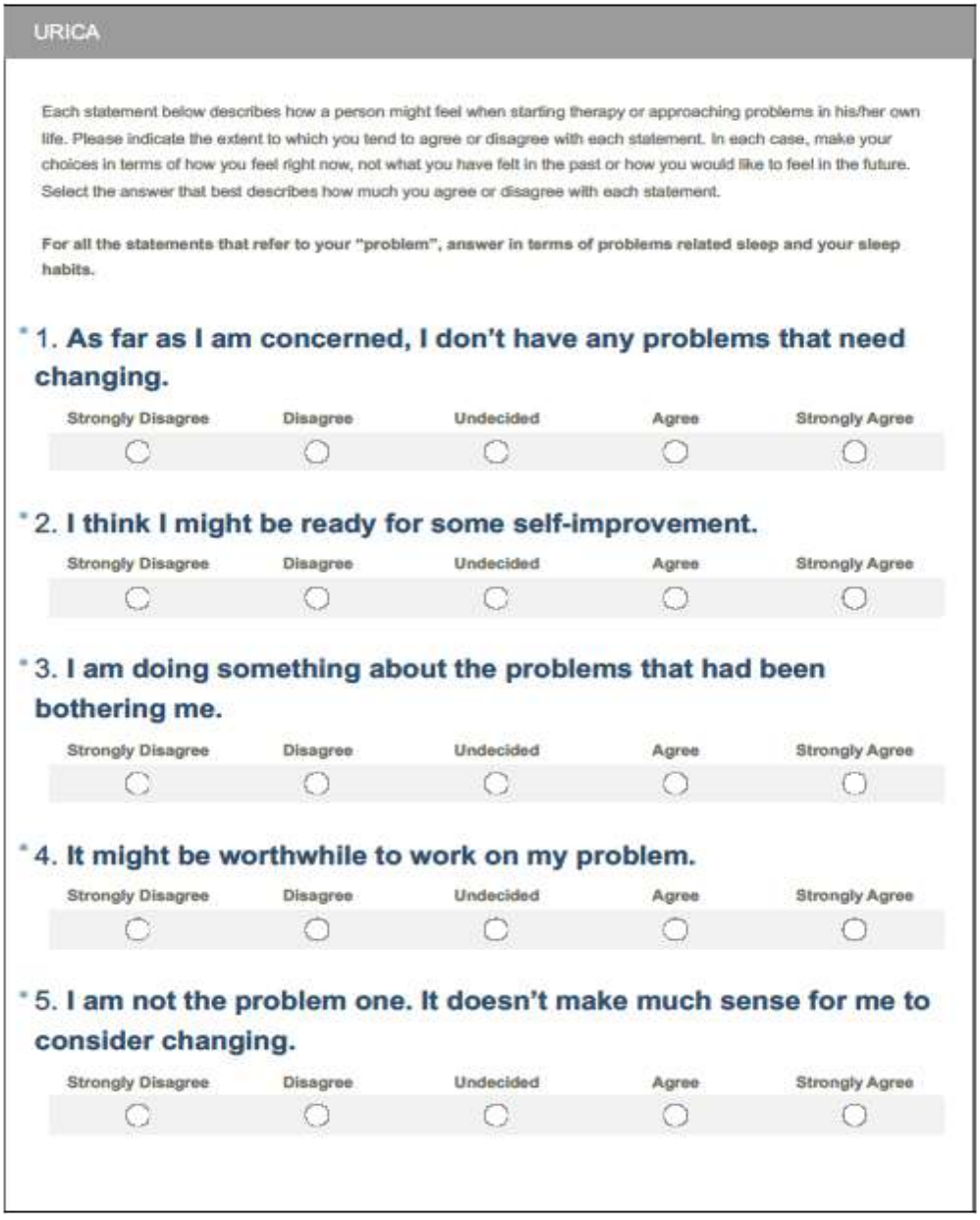
APPENDIX B

Demographic Questionaire

1. Are you male or female?
    - Male
    - Female
2. What is your age
    - ☐
3. What is your classification?
    - Freshman
    - Sophomore
    - Junior
    - Senior
4. Which of the following best describes your current occupation?
    - Full-time student, employed
    - Full-time student, not employed
    - Part-time student, employed
    - Part-time student, not employed

APPENDIX C

University of Rhode Island Change Assessment Scale



URICA

Each statement below describes how a person might feel when starting therapy or approaching problems in his/her own life. Please indicate the extent to which you tend to agree or disagree with each statement. In each case, make your choices in terms of how you feel right now, not what you have felt in the past or how you would like to feel in the future. Select the answer that best describes how much you agree or disagree with each statement.

For all the statements that refer to your "problem", answer in terms of problems related sleep and your sleep habits.

* 1. **As far as I am concerned, I don't have any problems that need changing.**

Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree

* 2. **I think I might be ready for some self-improvement.**

Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree

* 3. **I am doing something about the problems that had been bothering me.**

Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree

* 4. **It might be worthwhile to work on my problem.**

Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree

* 5. **I am not the problem one. It doesn't make much sense for me to consider changing.**

Strongly Disagree | Disagree | Undecided | Agree | Strongly Agree

* 6. **It worries me that I might slip back on a problem I have already changed, so I am here to seek help.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 7. **I am finally doing some work on my problem.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 8. **I have been thinking that I might want to change something about myself.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 9. **I have been successful in working on my problem, but I'm not sure I can keep up the effort on my own.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 10. **At times my problem is difficult, but I am working on it.**

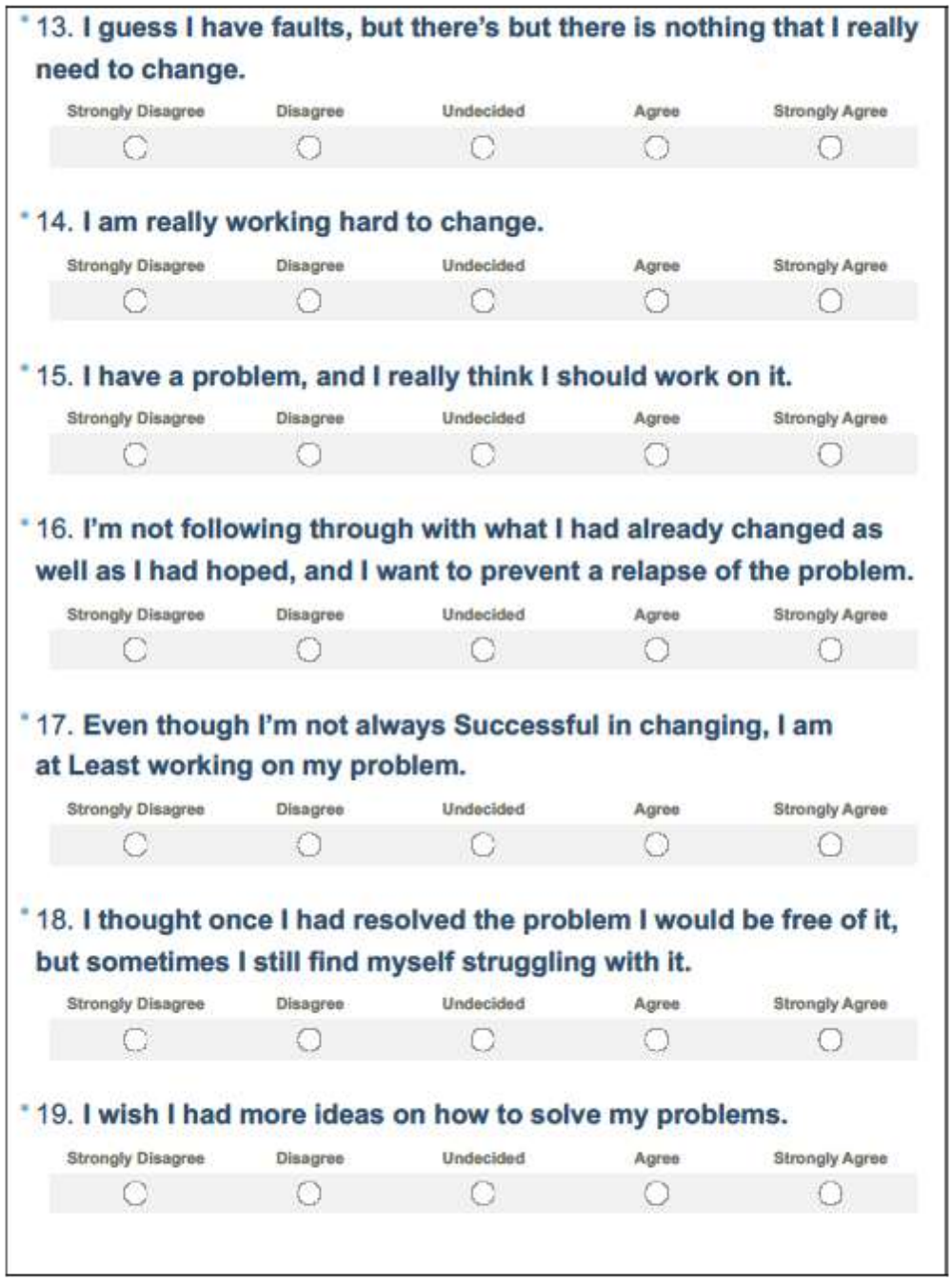
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 11. **Trying to change is pretty much a Waste of time for me because the problem doesn't have to do with me**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 12. **I'm hoping that I will be able to understand myself better.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○



* 13. **I guess I have faults, but there's but there is nothing that I really need to change.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 14. **I am really working hard to change.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 15. **I have a problem, and I really think I should work on it.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 16. **I'm not following through with what I had already changed as well as I had hoped, and I want to prevent a relapse of the problem.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 17. **Even though I'm not always Successful in changing, I am at Least working on my problem.**

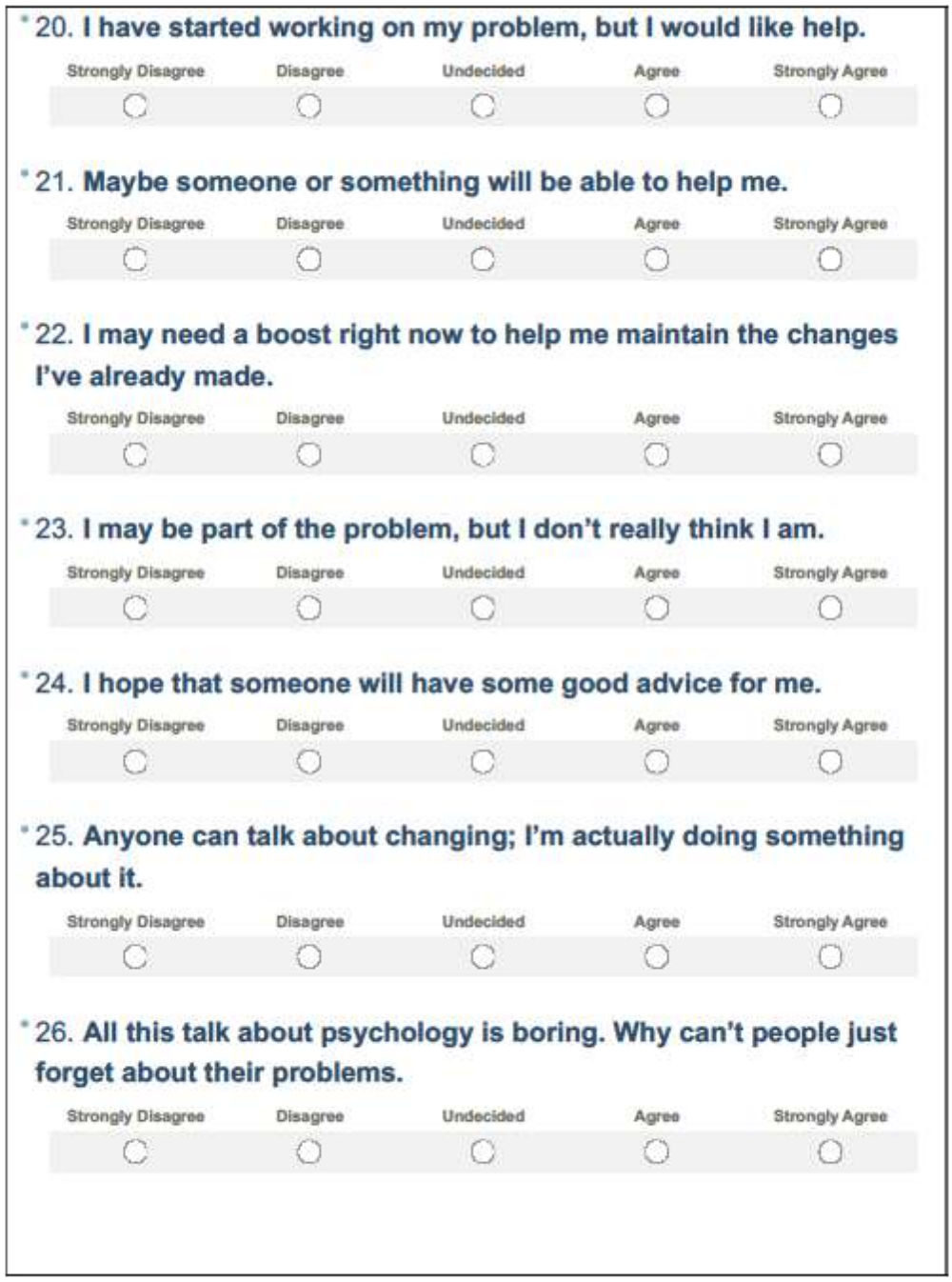
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 18. **I thought once I had resolved the problem I would be free of it, but sometimes I still find myself struggling with it.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 19. **I wish I had more ideas on how to solve my problems.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○



* 20. **I have started working on my problem, but I would like help.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 21. **Maybe someone or something will be able to help me.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 22. **I may need a boost right now to help me maintain the changes I've already made.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 23. **I may be part of the problem, but I don't really think I am.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 24. **I hope that someone will have some good advice for me.**

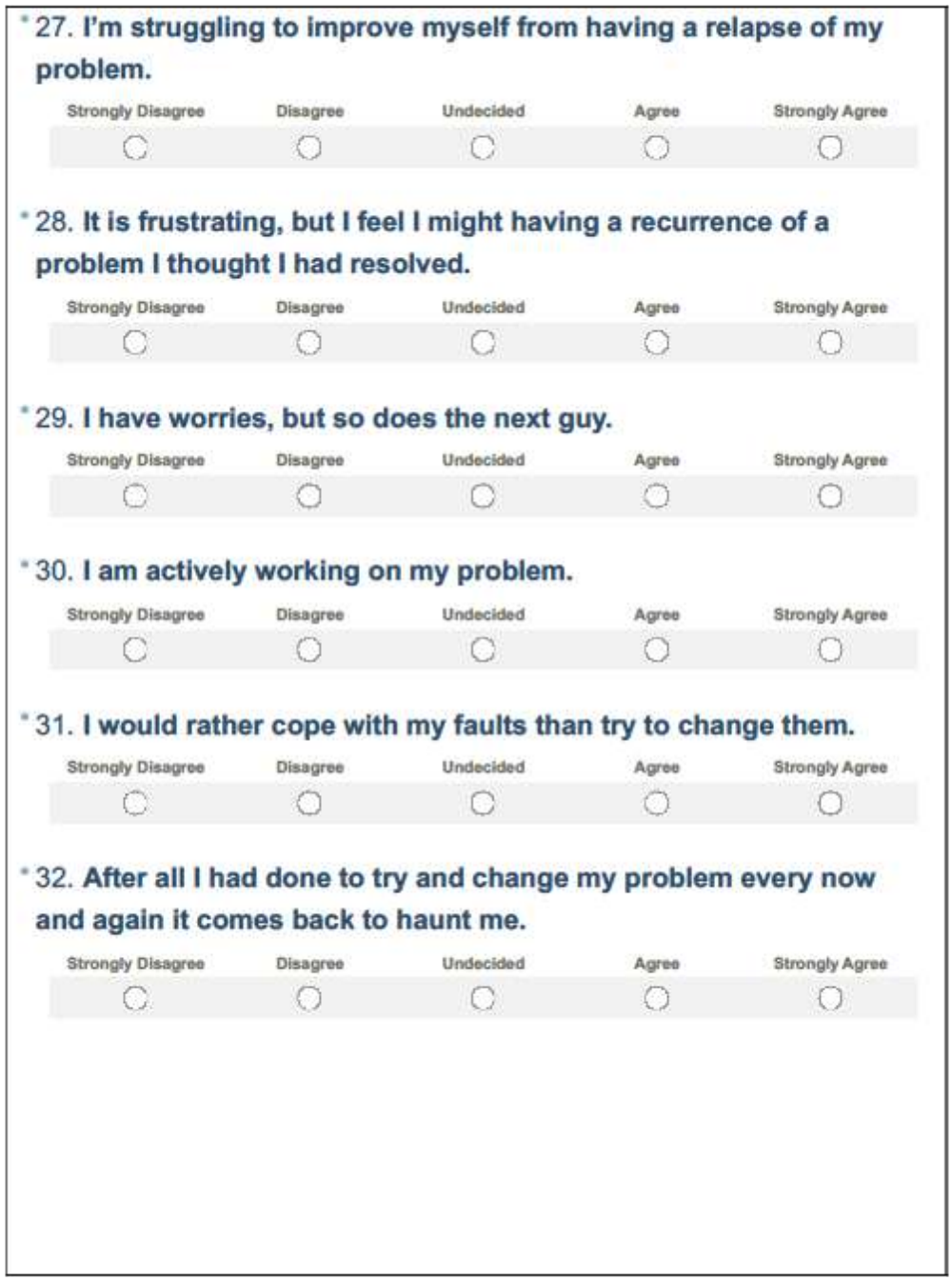
Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 25. **Anyone can talk about changing; I'm actually doing something about it.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 26. **All this talk about psychology is boring. Why can't people just forget about their problems.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○



* 27. **I'm struggling to improve myself from having a relapse of my problem.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 28. **It is frustrating, but I feel I might having a recurrence of a problem I thought I had resolved.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 29. **I have worries, but so does the next guy.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 30. **I am actively working on my problem.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 31. **I would rather cope with my faults than try to change them.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

* 32. **After all I had done to try and change my problem every now and again it comes back to haunt me.**

Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
○	○	○	○	○

APPENDIX D

Sleep Hygiene Index

SHI

Below you will find a list of statements. Please rate how true each statement is for you by selecting the response option that you identify with the most **(Consider only your current situation)**

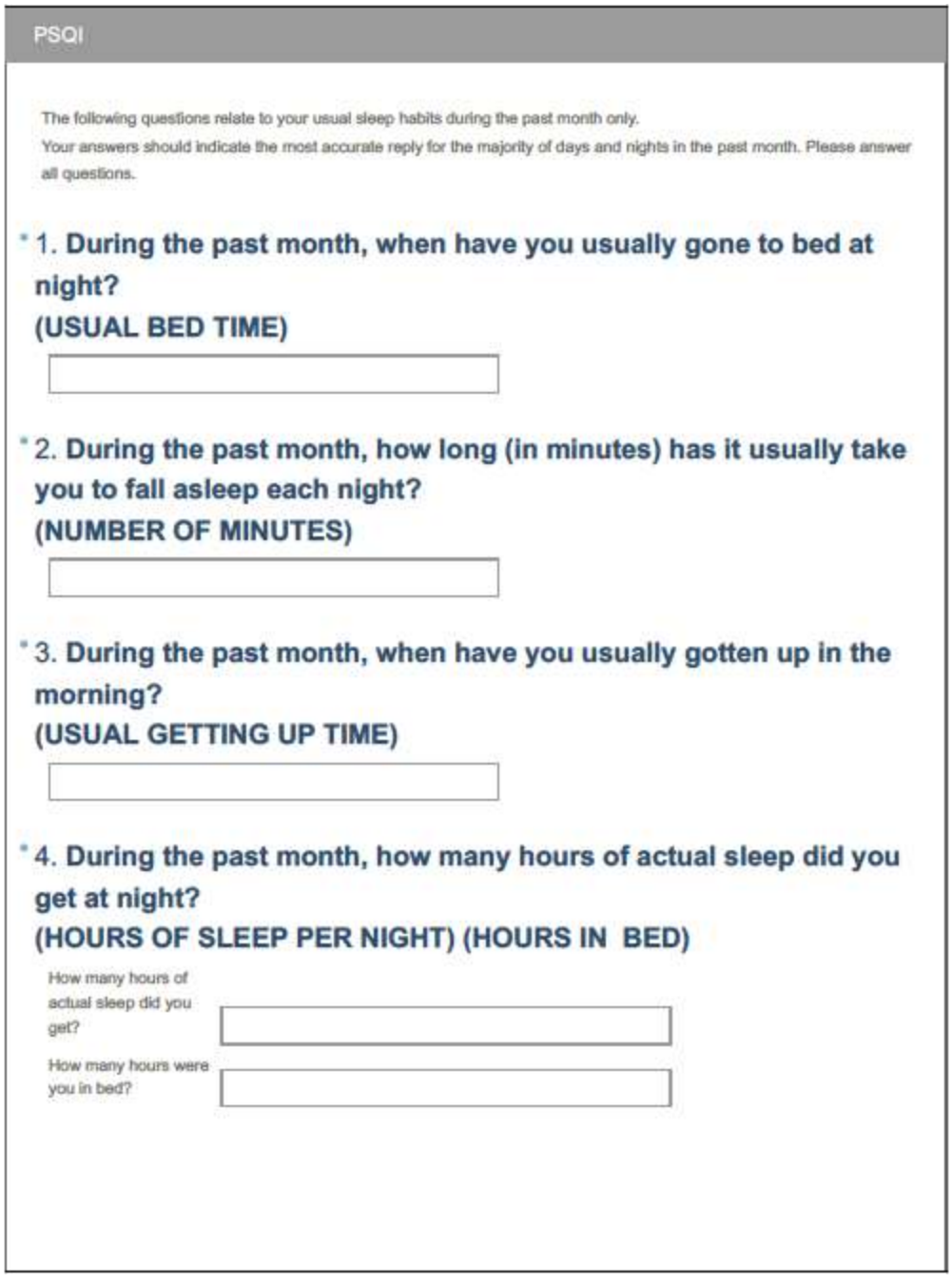
* 1. Sleep Habits

	Never	Rarely	Sometimes	Frequent	Always
I take daytime naps lasting two or more hours	○	○	○	○	○
I go to bed at different times from day to day	○	○	○	○	○
I get out of bed at different times from day to day	○	○	○	○	○
I exercise to the point of sweating within 1 hr of going to bed	○	○	○	○	○
I stay in bed longer than I should two or three times a week	○	○	○	○	○
I use alcohol, tobacco, or caffeine within 4 hours of going to bed or after going to bed	○	○	○	○	○
I do something that may wake me up before bedtime (for example: play video games, use the internet, or clean)	○	○	○	○	○
I go to bed feeling stressed, angry, upset, or nervous	○	○	○	○	○
I use my bed for things other than sleeping or sex (for example: watch television, read, eat, or study)	○	○	○	○	○

	Never	Rarely	Sometimes	Frequent	Always
I sleep on an uncomfortable bed (for example: poor mattress or pillow, too much or not enough blankets)	○	○	○	○	○
I sleep in an uncomfortable bedroom (for example: too bright, too stuffy, too hot, too cold, or too noisy)	○	○	○	○	○
I do important work before bedtime (for example: pay bills, schedule, or study)	○	○	○	○	○
I think, plan, or worry when I am in bed	○	○	○	○	○

APPENDIX E

Pittsburgh Sleep Quality Index



PSQI

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

* 1. **During the past month, when have you usually gone to bed at night?**
(USUAL BED TIME)

* 2. **During the past month, how long (in minutes) has it usually take you to fall asleep each night?**
(NUMBER OF MINUTES)

* 3. **During the past month, when have you usually gotten up in the morning?**
(USUAL GETTING UP TIME)

* 4. **During the past month, how many hours of actual sleep did you get at night?**
(HOURS OF SLEEP PER NIGHT) (HOURS IN BED)

How many hours of actual sleep did you get?

How many hours were you in bed?

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

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
Cannot get to sleep within 30 minutes	○	○	○	○
Wake up in the middle of the night or early morning	○	○	○	○
Have to get up to use the bathroom	○	○	○	○
Cannot breathe comfortably	○	○	○	○
Cough or snore loudly	○	○	○	○
Feel too cold	○	○	○	○
Feel too hot	○	○	○	○
Have bad dreams	○	○	○	○
Have pain	○	○	○	○
Other reason (Describe below)	○	○	○	○

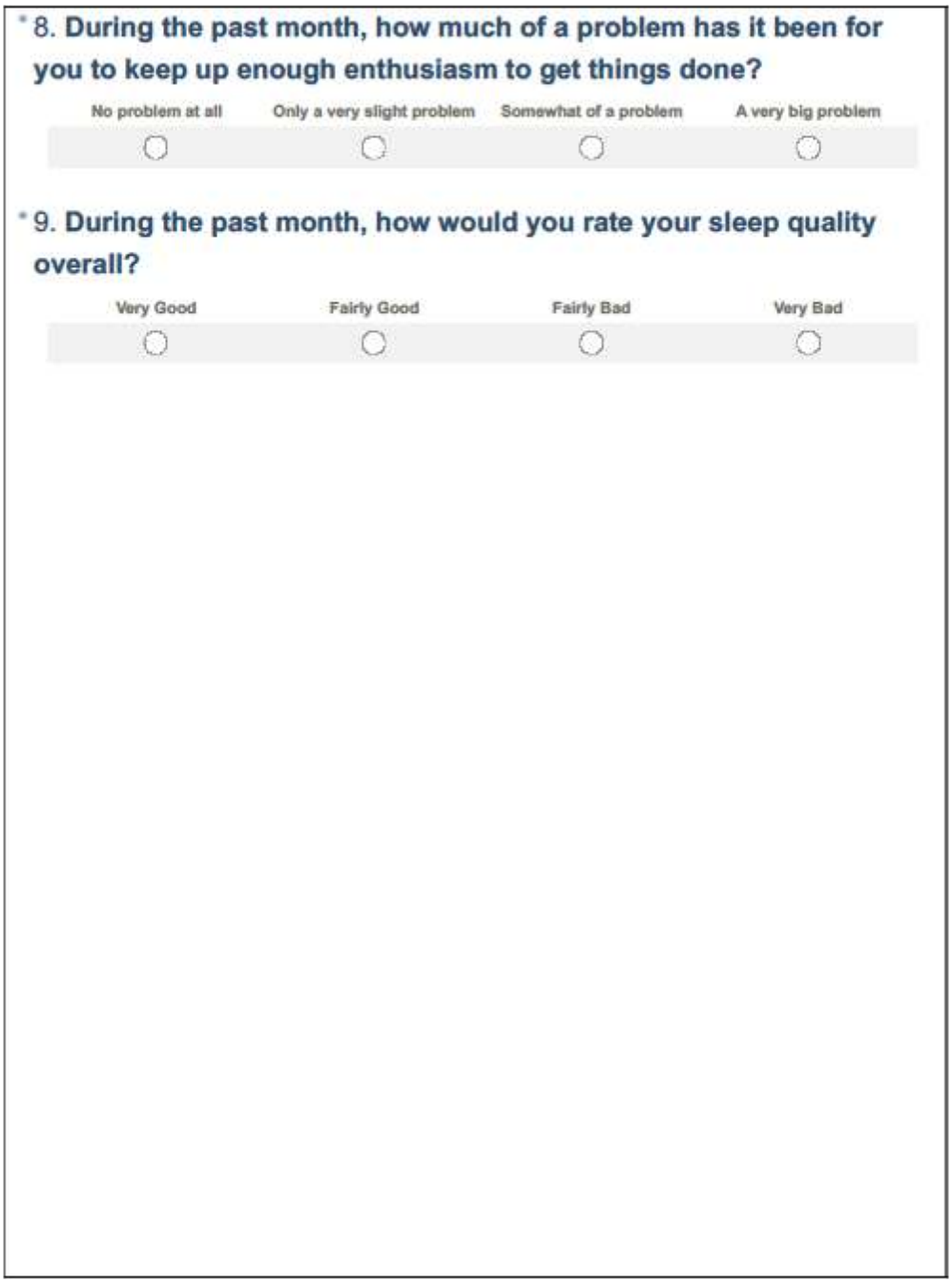
Other reason (s), please describe:

* 6. **During the past 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
○	○	○	○

* 7. **During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?**

Not during the past month	Less than a week	Once or twice a week	Three or more times a week
○	○	○	○



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

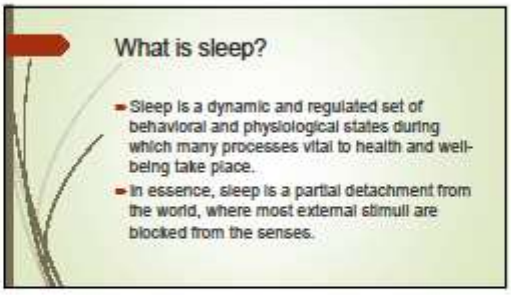
No problem at all	Only a very slight problem	Somewhat of a problem	A very big problem
○	○	○	○

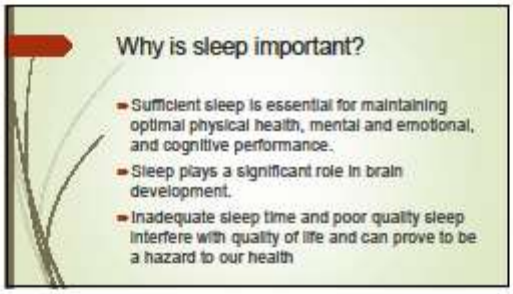
* 9. **During the past month, how would you rate your sleep quality overall?**

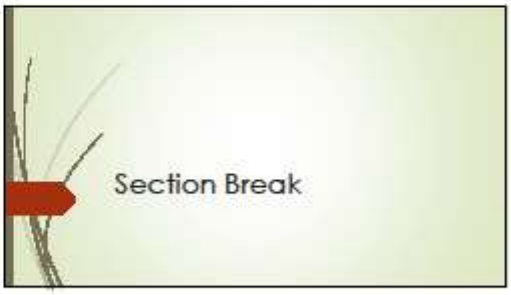
Very Good	Fairly Good	Fairly Bad	Very Bad
○	○	○	○

APPENDIX F

Sleep Education Program



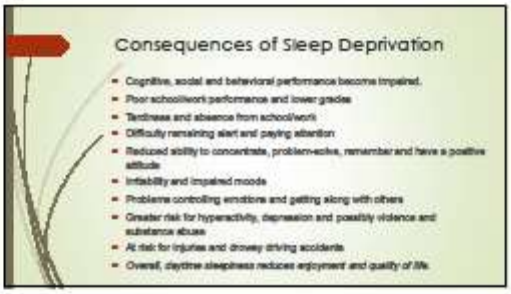


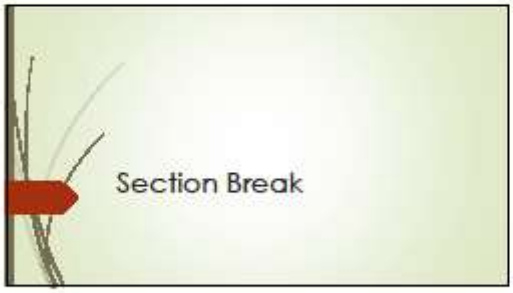


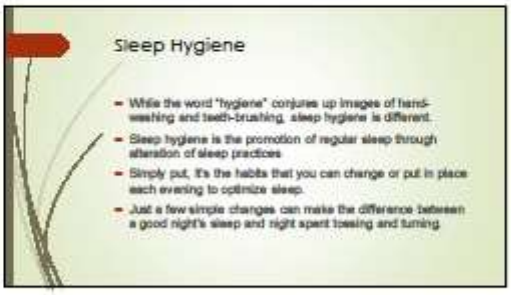

Sleep Deprivation/Sleep Deficiency
Sleep deprivation is a condition that occurs if you don't get enough sleep. Sleep deficiency is a broader concept. It occurs if you have one or more of the following:
You don't get enough sleep (sleep deprivation)
You sleep at the wrong time of day (that is, you're out of sync with your body's natural clock)
You don't sleep well or get all of the different types of sleep that your body needs
You have a sleep disorder that prevents you from getting enough sleep or causes poor quality sleep


Why are we sleep deprived? (General)
This can include a multitude of factors ranging from our habits to our social and academic lives, such as:
Academic workload
Social activities, extracurricular activities, and jobs
Computer/Internet/TV/Cell phone use
Excessive use of caffeine
Use of alcohol and/or recreational drugs


Why are we sleep deprived? (Medical)
Heart disease
Diabetes
Weight Problems
Heartburn
Kidney disease
Menopause
Psychological Disorders
Varying Sleep Disorders

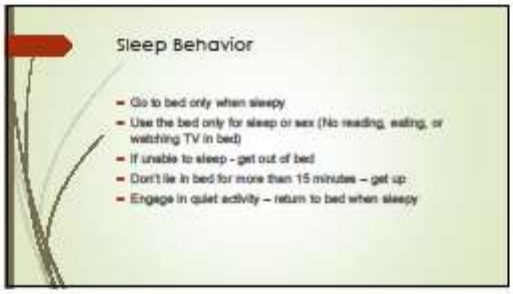

Consequences of Sleep Deprivation
Cognitive, social and behavioral performance become impaired.
Poor school/work performance and lower grades
Tardiness and absence from school/work
Difficulty remaining alert and paying attention
Reduced ability to concentrate, problem-solve, remember and have a positive attitude
Irritability and impaired moods
Problems controlling emotions and getting along with others
Greater risk for hyperactivity, depression and possibly violence and substance abuse
At risk for injuries and drowsy driving accidents
Overall, daytime sleepiness reduces enjoyment and quality of life.


Section Break


Sleep Hygiene
While the word "hygiene" conjures up images of hand-washing and teeth-brushing, sleep hygiene is different.
Sleep hygiene is the promotion of regular sleep through alteration of sleep practices.
Simply put, it's the habits that you can change or put in place each evening to optimize sleep.
Just a few simple changes can make the difference between a good night's sleep and night spent tossing and turning.


What changes can be done to improve our sleep hygiene?
Timing
Sleep behavior
Thermal Tips
Bedroom Environment Tips
Ingestion
Mental Control


Timing
Go to bed at the same time each day
Set the alarm and get up at the same time everyday (regardless of how much you slept)
Do not nap during the day. Eventually you will reestablish a deep pattern


Sleep Behavior
Go to bed only when sleepy
Use the bed only for sleep or sex (No reading, eating, or watching TV in bed)
If unable to sleep - get out of bed
Don't lie in bed for more than 15 minutes – get up
Engage in quiet activity – return to bed when sleepy


Sleep behavior (Cont.)
Repeat the aforementioned strategy for as many times as is necessary
You must teach your body to associate the bed with sleep, not frustration
Restrict the amount of time you spend in bed to your usual amount of sleep (ex. 7 hours) even if you did not get to sleep as well as you would have liked


Thermal Tips
You can raise body temperature by exercising 3 to 4 hours before bed
You can raise body temperature by taking a warm bath 20 minutes before bed
Sleeping is associated with a decline in core body temperature from a state of relative warmth


Bedroom Environment Tips
Maintain a steady temperature in the room throughout the night
Fluctuations in room temperature disrupt the Dream State
Illuminated wall clocks have been associated with awakening
Keep the room dark

Ingestion

- Caffeine (a stimulant) should be discontinued 4 to 6 hours before bedtime
- Nicotine (a stimulant) should be avoided near bedtime and upon night waking
- Alcohol (a depressant) causes awakenings later in the night (though initially may promote falling asleep)
- A light snack may be sleep inducing; a heavy meal too close to bedtime is an interference

Mental Control

- Making an "effort" to fall asleep will not produce sleep
- Sleep should not be effortful
- Avoid mentally stimulating activity just before bed (ex. Action movies, stimulating conversation)
- Mentally quiescent tasks such as listening to music, calming thoughts etc. can help
- Relaxation techniques such as visual imagery and the tense-relax skill (progressive muscle relaxation) can help

Section Break

Sleep Hygiene in Practice

- Purpose: to improve quality and quantity of sleep
- Goals:
  - 1. Monitor sleep habits to recognize sleep problems
  - 2. Try sleep hygiene strategies to improve sleep
- Steps:
  - 1. Sleep Tracking
  - 2. Sleep Hygiene

Sleep Tracking

- In order to better understand how you sleep, it is helpful to keep a log of your sleep patterns. Known as a sleep diary (an example will be provided for personal use but is not required as part of the study)
- The things monitored by a Sleep Diary
  - Napping: any and all naps should be recorded
  - Bedtime: The time you went to bed and turned off the lights
  - Sleep-onset latency: The amount of time you believe it took you to fall asleep
  - Number of awakenings and the duration of these awakenings
  - Morning awakening: The time you actually woke up before starting your day
  - Out-of-bed time: The actual time you got out of bed

Sleep Tracking (Example)

Sleep Hygiene

- After monitoring your sleep, notice what kinds of sleep difficulties you are having (e.g., Difficulty falling asleep, difficulty staying asleep)
- Then, choose the sleep hygiene strategies you would like to try to help you improve those areas
- Choose at least one new strategy to try
- (If using the sleep diary, which is optional) place a check next to the strategy that you tried
  - (Example of this will follow)

Sleep Hygiene Strategies Tracking (Example)

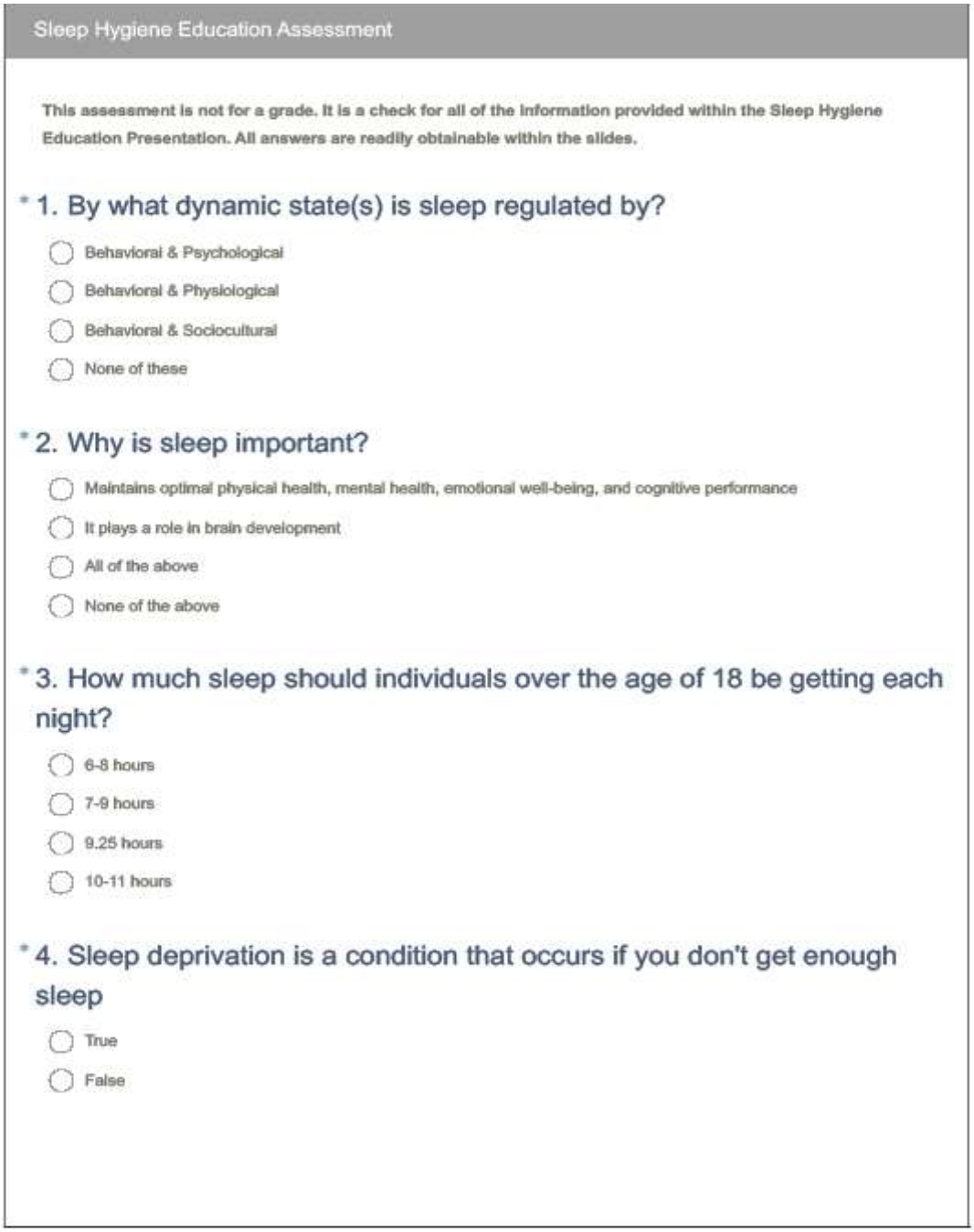
Full Sleep Diary (Example)

Summary

- The take away point from all of this is that good sleep is ultimately necessary for our overall well-being
- Sleep plays a major role in our development, including physiological and psychological aspects
- When faced with recurring sleep difficulties, the most effective treatment is the attention of negative sleep habits to positive ones which promote our sleep quality.
- Medications, both prescription and over-the-counter, were never considered as long term treatment for sleep difficulties and after prolonged use they can result in a form of dependence, either behaviorally through reinforcement or a dependency due to the use habit-forming drugsaddictive.

APPENDIX G

Sleep Education Program Assessment



Sleep Hygiene Education Assessment

This assessment is not for a grade. It is a check for all of the information provided within the Sleep Hygiene Education Presentation. All answers are readily obtainable within the slides.

* 1. By what dynamic state(s) is sleep regulated by?

- ◯ Behavioral & Psychological
- ◯ Behavioral & Physiological
- ◯ Behavioral & Sociocultural
- ◯ None of these

* 2. Why is sleep important?

- ◯ Maintains optimal physical health, mental health, emotional well-being, and cognitive performance
- ◯ It plays a role in brain development
- ◯ All of the above
- ◯ None of the above

* 3. How much sleep should individuals over the age of 18 be getting each night?

- ◯ 6-8 hours
- ◯ 7-9 hours
- ◯ 9.25 hours
- ◯ 10-11 hours

* 4. Sleep deprivation is a condition that occurs if you don't get enough sleep

- ◯ True
- ◯ False

* 5. Which of the following is a general reason for sleep deprivation?

- ◯ A dark, calm, and quiet sleep environment
- ◯ Adequate amount of time asleep each night
- ◯ Excessive use of stimulants, either OTC such as caffeine or Stimulant prescription medications
- ◯ Optimal physical health

* 6. Which is not a consequence of sleep deprivation?

- ◯ Cognitive impairment in daily activities
- ◯ Poor school performance
- ◯ Irritability and impaired moods
- ◯ Optimal performance/alertness in daytime activites

* 7. What is sleep hygiene?

- ◯ Distinctive stages of sleep, best demonstrated by PSG recordings the electrocephalgram, electrooculogram, and electromyogram.
- ◯ The promotion of regular sleep through alteration of sleep practices
- ◯ One's satisfaction of the sleep experience, integrating aspects of sleep initiation, sleep maintenance, sleep quantity, and refreshment upon awakening
- ◯ Does not have a clear definition

* 8. It is often too rigorous to make changes to our sleep hygiene?

- ◯ True
- ◯ False

* 9. Which of the following is a positive behavior associated with improved sleep quality?

- ◯ Taking as many naps as possible
- ◯ Staying in bed even if you are unable to go sleep
- ◯ Using the bed only for sleep and sex
- ◯ Reinforcing the association of frustration with your bed/sleeping environment

* 10. Which of the following, if ingested, could disrupt healthy sleep patterns?

- ◯ Caffeine
- ◯ Nicotine
- ◯ Alcohol
- ◯ All of the above

* 11. Making an "effort" to fall asleep will increase ones chances of falling asleep

- ◯ True
- ◯ False

* 12. Which of the following sleep hygiene tip(s) given, in regards to mental
control over sleep, is accurate?

- ◯ Avoid mentally stimulating activities before bedtime
- ◯ Tasks that help to calm our thoughts, such as listening to calming music can help
- ◯ Practicing a variety of relaxation techniques can help
- ◯ All of the above are accurate
- ◯ None of the above are accruate