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Healthy Habits to Reduce Sleep Deprivation in College Students

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Sleep is imperative for a substantial number of vital regulative functions in the body, especially those concerning growth, recovery, and cognitive functioning (Alhola & Polo-Kantola, 2007). Despite the importance of sleep, 27% of college students are in danger of developing a sleeping disorder, and over 70% of college students have reported regular difficulties regarding sleep (Buboltz et al., 2006; Gaultney, 2010). College provides numerous opportunities for students, but it presents unique challenges, as well. In most cases, the college experience represents the first time that students are away from home and have full control over their lifestyle and time management. In this more autonomous role, students are bombarded with new responsibilities and stressors while trying to balance school, work, and social activities. Due to their numerous obligations, students must choose how to allocate their time and often decide to sacrifice sleep. As students undermine sleep, unhealthy habits can form. In turn, as students practice poor habits, they may not receive the proper amount or quality of sleep that their bodies need to function at maximum capacity. Although students may be aware that their sleep schedules are not ideal, they might not realize the full extent of the long-term effects on their health and academic performance.

Researchers have found numerous adverse effects of sleep deprivation. Loss of sleep can negatively impact the immune system, metabolism, blood pressure, tissue recovery, temperature regulation, general growth and healing, and even cancer progression (Alhola & Polo-Kantola, 2007; Luyster, Stollo, Zee, & Walsh, 2012). Sometimes these effects can be reversed, but if unhealthy sleep habits prevail for extended periods of time, they often have long-term consequences (Pejovic et al., 2013). Sleep also plays an important role in cognitive functions such as memory processes, performance speed, accuracy, decision making, and emotion

regulation (Alhola & Polo-Kantola, 2007; Uddin, 2016). When considering the adverse effects of sleep loss, it is alarming that so few college students are getting adequate sleep. The health consequences are a concern for the general population, but the cognitive ramifications should be particularly alarming for college students, given the effects on academic performance.

Scientists have conducted extensive research on sleep, but findings have been somewhat ambiguous, especially concerning the amount of sleep needed. Some studies claim college-aged students should be getting approximately seven hours of sleep, while others claim students need as much as eight or nine hours (Alhola & Polo-Kantola, 2007; Wang, Y. Jiang, Zhang, Liu, & F. Jiang, 2016). It is difficult to determine a universal standard for sleep, because sleep quality involves many components and is influenced by both genetics and social factors (Luyster et al., 2012; Önder, Beşoluk, İskender, Masal, & Demirhan, 2014; Watson et al., 2017). Despite the countless studies that have been done on sleep, the general public does not seem to hold much regard for the findings. Thus, it is necessary to provide a synthesis of available information so that students can make informed decisions concerning their sleep habits.

Today's society has reduced sleep to an afterthought rather than making it a priority. In the last 100 years, the average amount of sleep adults obtain has dropped about two hours per night while their responsibilities have remained constant, if not increased (Watson et al., 2017). Maladaptive sleep habits can begin at any stage of life but commonly start in college. Once routines are set, poor habits are frequently sustained beyond college, as graduates enter the workforce. As substandard patterns are perpetuated, lack of sleep may start to affect performance in professional settings, as well. Academic performance in college can be a significant predictor of future success, because it can project a student's chance of obtaining an internship and may also impact annual earning potential after graduation (Taylor, Vatthauer, Bramoweth, Ruggero,

& Roane, 2013). Due to its extensive ramifications, sleep deprivation should be remedied immediately. Although sleep deprivation in college students can be largely attributed to personal choices, which impact both quantity and quality of sleep, collegiate institutions should promote healthier sleep habits, because lack of sleep in college students negatively impacts long-term health, cognitive functioning, and academic performance.

Effects of Sleep Deprivation

Students and collegiate institutions should work to remedy the growing epidemic of sleep deprivation. Studies have made connections between sleep and many different health issues (Alhola & Polo-Kantola, 2007; Pejovic et al., 2013). Proper sleep is imperative for both mental and physical aspects of long-term health (Helvig, Wade, & Hunter-Eades, 2016). Sleep loss can affect a surprising number of bodily functions. Thus, it is important to address both the physiological and psychological effects, specifically pertaining to college students. The impairment of regular functions can affect mental health and academic performance (Khalsa et al., 2016). Universities should recognize the importance of academic performance and general well-being in their students and provide proper education on the detrimental effects of sleep deprivation. Perhaps, if students gain a clearer understanding of how sleep loss affects the body, they will be more inclined to make healthier choices.

Physiological Health

Sleep deprivation affects a vast number of physiological factors, including energy conservation, tissue recovery, fatigue, plasma in the blood, and hormone levels (Alhola & Polo-Kantola, 2007; Pejovic et al., 2013). Hormones are important for regulating the body's response to various situations and stimuli (Garcia-Garcia, Juárez-Aguilar, Santiago-Garcia, & Cardinali,

2014; Jarcho, Slavich, Tylova-Stein, Wolkowitz, & Burke, 2013; Jaremka et al., 2014). Cortisol, leptin, and ghrelin are a few of the major hormones that can be affected by sleep (Jarcho et al., 2013; Ozsoy, Besirli, Unal, Abdulrezzak, & Orhan, 2015). These hormones regulate functions related to stress, emotion, hunger, and satiety (Garcia-Garcia et al., 2014; Jarcho et al., 2013; Jaremka et al., 2014). Extended periods of unbalanced hormones can lead to other major health issues such as depression and eating disorders (Beiter et al., 2015; Jarcho et al., 2013; Ozsoy et al., 2015). Cortisol, leptin, and ghrelin are only a few of the hormones that can be affected by sleep loss. Given the crucial role of hormones in the body, it is imperative that students get the proper sleep amount and quality needed to maintain proper hormone regulation and other physiological functions.

Cortisol levels. Sleep reduction can disrupt the regulation of cortisol, inflating the typical levels which often produces adverse effects in the body (Engert, Smallwood, & Singer, 2014; Jarcho et al., 2013; Luyster et al., 2012; Romero-Martinez & Moya-Albiol, 2016). When presented with a stressor, the body's hypothalamic pituitary adrenal (HPA) axis works to produce a hormone called cortisol (Jarcho et al., 2013). This hormone helps the body respond to various kinds of stress. Under regular conditions, a large amount of cortisol is released upon waking and steadily declines throughout the day. Research has shown that cortisol plays a key role in mood regulation; individuals with high levels of cortisol often report increased negative mood states and display greater levels of anger (Engert et al., 2014; Romero-Martinez & Moya-Albiol, 2016). Deviations from natural cortisol levels can also lead to breast cancer, cardiovascular disease, Post-Traumatic Stress Disorder (PTSD), depression, and eating disorders (Jarcho et al., 2013). Elevated cortisol levels are directly correlated with both depression and suicidal tendencies (Gerber et al., 2013; D. O'Connor, Ferguson, Green, O'Carroll, & R.

O'Connor, 2016). Approximately twenty percent of all individuals will have depression at some point in their life (Jarcho et al., 2013). This number increases significantly in college students (Gress-Smith, Roubinov, Andreotti, & Luecken, 2015). For example, at a large southwestern university in the United States, almost 40% of students reported depressive symptoms (Gress-Smith et al., 2015). Research indicates that depression is a growing issue among college students. As students get proper sleep, they will have less risk of elevated cortisol levels, which may decrease their chances of having depression.

Leptin and ghrelin levels. Leptin and ghrelin are other hormones that can be strongly linked to depression (Ozsoy et al., 2015). Studies show that sleep loss leads to an imbalance of both hormones (Broussard et al., 2016; Jaremka et al., 2014). When an individual does not receive the necessary amount of sleep, their leptin levels drop and their ghrelin levels rise (Broussard et al., 2016; Jaremka et al., 2014). These hormones work in conjunction with one another to regulate both hunger and satiety (Garcia-Garcia et al., 2014; Jaremka et al., 2014). Thus, skewed levels of leptin and ghrelin are strongly connected with weight gain and obesity (Jaremka et al., 2014). Increased weight gain can lead to emotional discontent, often causing body distortion and eating disorders (Beiter et al., 2015). Body image is a significant stressor in college students, especially females (Beiter et al., 2015). Between 13% and 22% of female college students suffer from some form of disordered eating (Eisenberg, Nicklett Roeder, & Kirz, 2011; Gan, Mohd Nasir, Zalilah, & Hazizi, 2011). Eating disorders also display a significant correlation with depression (Beiter et al., 2015). It should be the aim of all collegiate institutions to provide proper sleep education as a preventative measure for their students. As students learn and take the initiative to change their habits, their risk for eating disorders and depression should decrease.

Cognitive Functioning

In addition to the numerous physiological effects, sleep deprivation also affects many psychological aspects. The less sleep that an individual obtains, the more cognitive functioning and performance is impaired, which can in turn affect academic performance (Khalsa et al., 2016). Particularly concerning for college students, sleep loss can increase fatigue and hinder memory processes (Alhola & Polo-Kantola, 2007; Doerr et al., 2015). Because reduced sleep can negatively affect cognitive functioning and academic performance, it is important that students implement healthy habits to prevent sleep deprivation.

Fatigue. College schedules can include a variety of activities and obligations, including class, work, clubs, service opportunities, and social activities. Most college students are aware of the amount of energy necessary to keep up with their often-busy schedules. But, in order to maintain the energy levels they require, students need to obtain the proper amount of sleep (Doerr et al., 2015; Lund, Reider, Whiting, & Prichard, 2010). Poor sleep quality can lead to depression and fatigue which can, in turn, negatively impact an individual's response to stress (Doerr et al., 2015; Valpiani, Brown, Thorsteinsson, & Hine, 2011). High levels of stress then have an adverse effect on sleep, which simply perpetuates the negative cycle (Lund et al., 2010). Increased fatigue can also lead to reduced motivation, which negatively impacts the ability to process information and to achieve goals (Stover, de la Iglesia, Boubeta, & Liporace, 2012). Valpiani et al. (2011) determined that better sleep has been shown to reduce fatigue in depressed students. More research is necessary to make a clear connection, but it can be theorized that improved sleep may also reduce fatigue in sleep-deprived students who are not depressed.

Memory. A large concern for college students should be the effect that sleep deprivation has on memory. Extensive research shows a direct correlation between sleep deprivation and

memory impairment (Alhola & Polo-Kantola, 2007). Memory impairment has been shown to impact performance on memory tasks and, subsequently, academic performance. Reduced sleep can affect both working and long-term memory (Alhola & Polo-Kantola, 2007). Memory is important for college students, because they are often expected to recall large amounts of information for exams throughout the semester. Generally, professors will administer cumulative finals at the end of the semester, so students must be able to remember information for an extended period of time. The negative effects of sleep loss on memory should motivate students to make the necessary changes to prevent sleep deprivation.

Working memory. Sleep is especially important for working memory (Alhola & Polo-Kantola, 2007; Frenda & Fenn, 2016). Reduced sleep affects the frontal and parietal cortices of the brain, which are vital for working memory (Frenda & Fenn, 2016). Working, or short-term, memory is characterized by its four systems (Alhola & Polo-Kantola, 2007). These systems are the phonological loop, visuospatial sketchpad, episodic buffer, and central executive. Each system has a vital role in the memory process. The phonological loop stores audio information, the visuospatial sketchpad stores visual and spatial information, the episodic buffer integrates information, and the central executive controls them all. Short-term memory is closely related to attention, so when one is affected, the other is, as well. Studies have shown that when sleep deprivation affects working memory, participants display both reduced speed and accuracy when completing memory tasks (Alhola & Polo-Kantola, 2007). College students are frequently required to recount information during timed tests. If their speed and accuracy are impaired, it is reasonable to suggest that they may not perform as well on timed exams. Thus, students should be aware of healthy habits and implement them immediately to improve test performance.

Long-term memory. Sleep deprivation also affects long-term memory processes. These can be divided into two categories: declarative and non-declarative memory (Alhola & Polo-Kantola, 2007). Declarative memory utilizes accrued knowledge of the world as well as information concerning one's own life. This information can be stored in audio or visual form and recalled at will. Reduced sleep negatively impacts the ability to recall information but does not seem to affect recognition. Non-declarative memory handles the knowledge required to perform everyday tasks. These may include functions such as motor and perceptual skills. Sleep deprivation can impair normal behaviors dependent on non-declarative memory, including language and other functions that are performed without explicit awareness (Alhola & Polo-Kantola, 2007). In a collegiate setting, it is important that students can perform at peak capacity and retain course information at will. Thus, it is important that the processes involving memory are functioning correctly. If students create healthier habits, their academics and quality of life are likely to improve.

Healthy Sleep Habits

It is important that students are made aware of proper sleep habits, especially considering the rigorous schedule that college life requires. Additionally, students should be informed of the warning signs and risks associated with intrinsic sleeping disorders. This will enable them to be aware of any risk factors so that they can contact a professional with their concerns. Due to the numerous physiological and psychological effects discussed previously, it is imperative that students implement healthy habits to prevent sleep deprivation and sleeping disorders. One of the greatest predictors of sleep health is sleep quality. There are many aspects of sleep health that ultimately contribute to sleep quality. These factors include consistency, sleep/wake times, and sleep length (Alhola & Polo-Kantola, 2007; D. Kay, personal communication, February 21,

2017; Önder et al., 2014; Watson, 2017). In addition to healthy habits, many tools are used to measure and evaluate sleep. For students to create better habits, they must know what healthy habits to implement. Once students are aware of the recommendations and begin to follow them, it is proposed that their school performance and overall quality of life will improve.

Identifying Sleep Disorders

The associated features of a sleep disorder can vary greatly, but students should be informed of factors associated with intrinsic sleeping disorders such as insomnia, narcolepsy, hypersomnia, sleep apnea, and restless leg syndrome, because 27% of college students may be at risk for at least one sleeping disorder (Gaultney, 2010; American Academy of Sleep Medicine, 2001). These can sometimes be prevented through proper sleep hygiene, but students and university faculty members should be aware of the symptoms of serious disorders (Centers for Disease Control and Prevention, 2016). The third edition of the International Classification of Sleep Disorders (ICSD) provides detailed information on various sleep disorders and the process of diagnosis (American Academy of Sleep Medicine, 2001). The diagnostic criteria in the ICSD includes a principal complaint, a pathophysiological abnormality, an associated feature, objective documentation, the presence of medical or mental disorders, and the presence of another sleep disorder (American Academy of Sleep Medicine, 2001). Warning signs may include frequently taking more than 30 minutes to fall asleep; long naps during the day; falling asleep at inappropriate moments (usually while sitting still); constant fatigue; negative mood states; interrupted sleep; a tingling sensation in the legs at bedtime; loud snoring, breathing, or gasping while sleeping; or difficulty focusing throughout the day (American Academy of Sleep Medicine, 2001; Watson, 2017). If a student displays any of these symptoms three or more nights per week for more than a month, it is recommended that they keep a daily sleep journal for

approximately two weeks and consult a professional for help (D. Kay, personal communication, February 21, 2017). Sleep disorders can negatively affect academic performance. Grimes (2013) determined that students with sleeping disorders are 1.28 times more likely to receive a lower GPA than other students. Thus, it is important that sleep disorders are addressed as soon as possible to improve academic performance and overall quality of life.

Sleep Quality

Sleep quality is arguably the ultimate indicator of sleep health. Despite its importance, only 11% of college students typically meet the criteria for good sleep quality (Gilbert & Weaver, 2010). This is a major concern, because students with poor sleep quality often report an elevated number of issues with both physical and psychological health, which can subsequently affect academic performance (Lund et al., 2010). Many aspects of sleep quality must be addressed. Sleep quality can be affected by consistency, sleep and wake times, and sleep length (Alhola & Polo-Kantola, 2007; D. Kay, Personal Communication, February 21, 2017; Önder et al., 2014; Watson, 2017). Each of these elements affects sleep in a different way. Students should implement healthy habits to improve each factor of sleep quality. Due to the great significance of sleep quality, numerous measurement tools have been developed. Students should be aware of the common tools and understand how they are used. As students gain more knowledge concerning sleep, they will be enabled to take responsibility for their personal choices and to make the necessary changes to prevent sleep deprivation.

Factors and healthy habits. The many different aspects of sleep are important on an individual level, but together they contribute to overall sleep quality, as well. The goal should be to achieve what Dr. Kay, a sleep researcher and professor at Brigham Young University (BYU), calls the “sweet spot” for sleep. This sweet spot is where “an individual does not have to think

about sleep; they must neither chase it nor is it chasing them" (D. Kay, personal communication, February 21, 2017). To progress toward this state, an individual should correct poor habits in each area that affects sleep quality (D. Kay, personal communication, February 21, 2017). The main contributing factors include consistency, sleep and wake times, and sleep length. Due to the individual effects of each aspect, each of these has specific habit recommendations, as well.

Consistency. The principal recommendation from Dr. Kay (personal communication, February 21, 2017) is to be consistent when it comes to sleep schedules. Each morning, the body's circadian clock is reset, and when an individual's sleep schedule is not consistent, the natural phase is disrupted (D. Kay, personal communication, February 21, 2017). It is common practice for college students to stay up late and wake up early on weekdays and then to sleep in on the weekends to "make up" for lost sleep, but this does not satisfy the sleep debt accrued throughout the week (D. Kay, personal communication, February 21, 2017). Instead, students should try to develop a consistent pattern of going to sleep and waking up at the same time every day (Are you getting enough sleep; D. Kay, personal communication, February 21, 2017). Although this may be one of the most difficult adjustments for college students, it could also be one of the most beneficial changes.

Sleep/wake times. When setting a consistent schedule, students should determine what will work best for them. Some studies have shown that earlier wake times lead to improved performance, but no definitive guidelines currently exist, which is likely due to the genetic factors involved (Önder et al., 2014). Current society operates on a morning-based schedule, wherein work and classes often begin early in the morning, and individuals are encouraged to rise early. Despite the prevalence of morning responsibilities and deadlines, some individuals with nighttime preferences may perform better when on a later schedule (D. Kay, personal

communication, February 21, 2017). Unfortunately, the research regarding sleep/wake times regarding morning/nighttime preferences is somewhat lacking. Thus, it should be up to the discretion of the individual to set and to maintain a schedule that will be most beneficial.

Sleep length. The number of hours of sleep adults need to function at peak capacity is largely up for debate in the scientific community. The literature available is not always consistent, although recommendations do tend to fall within a range of 7-8.5 hours per night (Alhola & Polo-Kantola, 2007; Luyster et al., 2012; Wang et al., 2016). Discrepancies in the findings could be attributed to the fact that both social and genetic factors affect how much sleep individuals need (Önder et al., 2014; Watson et al., 2017). Due to the genetic and social factors affecting sleep, a student may find their personal sleep needs to be different from the recommended amount. Individual needs can be determined by keeping a detailed sleep journal averaging the amount of time spent in bed and napping and including added factors such as nighttime sleep quality and daytime sleepiness (D. Kay, personal communication, February 21, 2017). It is imperative that students strive to obtain the optimal amount of sleep, because restricted sleep, both short-term and long-term, has been linked with negative mood states and mental health problems (Bei, Manber, Allen, Trinder, & Wiley, 2017). Chronic reduction of sleep also affects the immune and inflammatory systems, which can increase susceptibility to the common cold and other illnesses (Watson et al., 2017). Despite these correlations and numerous other negative health effects of sleep restriction, approximately one-third of adults only sleep for six hours or less each night (Watson et al., 2017). Although there are no definitive guidelines, students should try to get an average of seven or eight hours of sleep per night. If this does not seem adequate, it may be helpful to start a sleep diary to determine personal sleep needs.

Regardless, students should make it a priority to obtain enough sleep to prevent academic and health issues.

Measurement tools. Scientists have developed many different measurement tools to evaluate the various aspects of sleep and diagnose sleeping disorders. Two of these tools that appear frequently in sleep studies are the Pittsburgh Sleep Quality Index (PSQI) and the Epworth Sleepiness Scale (ESS) (Gilbert & Weaver, 2010; Khalsa et al., 2016). Both are self-reported questionnaires that allow professionals to assess sleep, but they cover different aspects (Gilbert & Weaver, 2010; Khalsa et al., 2016). While noting that official tests should be administered by a professional, it may be beneficial for students to become aware of these tests. If students understand how these measurement tools work, they may have a better idea of how to interpret warning signs they observe in themselves and their classmates. If students suspect a sleeping disorder, they should consult a professional as soon as possible to improve standards for academics and quality of life.

The Pittsburgh Sleep Quality Index. It may be advantageous for students to become familiar with this tool (see Figure1). The PSQI assesses sleep quality over the prior month (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The self-reported questionnaire contains 19 items that are combined to create seven component scores (Buysse et al., 1989). These scores include subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction (Buysse et al., 1989). When added together, these scores generate a global score (Buysse et al., 1989). This global score can be used to determine the difference between “good” and “poor” sleepers (Buysse et al., 1989). This can be an effective tool for professionals in the process of diagnosing sleep disorders, and it may be beneficial for students to be familiar with the content of the questionnaire and how scores

are calculated. Being familiar with the questionnaire would allow students to be more aware of warning signs and seek help sooner.

The Epworth Sleepiness Scale. It may also be valuable for students to be aware of the process for the ESS (see Figure 2). The ESS is used to evaluate daytime sleepiness as a predictor for certain sleeping disorders (Johns, 1991). The questionnaire asks the individual's likelihood of falling asleep in several everyday situations involving little movement. Asking the likelihood rather than the incidence of falling asleep in each situation is meant to control for the variance in an individual's daily schedule. The composite scores fall between 0 and 24 and denote overall sleepiness. A sleep score of 16 signifies a high level of daytime sleepiness and can be used in the process of diagnosing narcolepsy, hypersomnia, and severe sleep apnea. ESS scores alone are not strong enough to give a certain diagnosis, but they can be used as indicators (Johns, 1991). Due to the usefulness of the ESS in addressing daytime sleepiness, it may be helpful for students to understand and evaluate the situations that can be predictors for sleep disorders. This may encourage them to ask a professional to administer the questionnaire when they suspect any form of disordered sleep.

Promoting Healthy Habits

Proper sleep education could greatly improve both academic success and overall quality of life in college students (Thomas, 2015). It is the responsibility of the student to develop and maintain healthy habits but that can be difficult when they are not educated on the matter. Although the public's lack of knowledge or acknowledgment is a distressing issue, it presents the opportunity for collegiate institutions to fill the educational gap. Universities are not encouraged to make large-scale policy or curriculum changes that would affect class times or deadlines, as this may not be useful for every student (D. Kay, personal communication, February 21, 2017).

Alternatively, institutions should focus on enlightening students. Students should be made aware of the dangers of sleep deprivation and how to prevent it. Once students have been provided with the necessary information, it becomes their responsibility to implement changes on an individual level.

Conclusion

Sleep deprivation is a growing epidemic that is plaguing society and yet lacking sufficient recognition. Sleep is imperative for many vital functions in the body. Reduced sleep negatively affects growth, recovery, and cognitive functioning (Alhola & Polo-Kantola, 2007). It can lead to serious physical and mental health issues, including breast cancer, cardiovascular disease, PTSD, depression, and eating disorders (Jarcho et al., 2013). Collegiate settings usually represent the first opportunity for students to have full control of their lifestyle. Simultaneously, students are faced with a barrage of new responsibilities. Given the current society, it is no surprise that college students often view sleep as unimportant. Society has effectively de-emphasized the important role of sleep; sleep is viewed as less important than work, school, or extracurricular activities. This view is counter-productive, because sleep loss impairs an individual's ability to perform at full capacity in any setting. Individuals who get the proper sleep quality and amount will tend to perform better in all endeavors.

Students and universities can combat the growing issue of sleep deprivation by working together to spread awareness of proper sleeping habits and then implementing them on an individual level. Institutions across the nation, and even worldwide, should not be encouraged to make changes in schedule or policy such as earlier/later class times or deadlines, because it would be difficult to make an adjustment that would be beneficial for all students (D. Kay, personal communication, February 21, 2017). Instead, universities should implement and

encourage proper education on healthy sleep habits. For example, BYU has numerous resources that can be utilized to educate students and to set an example for other institutions to follow. BYU has a wealth of knowledge contained in its library, online databases, and faculty. If students and faculty members at BYU make a collective effort, they could greatly impact the growing epidemic of sleep loss at BYU.

In addition, the Counseling and Psychological Services (CAPS) office at BYU houses a Student Outreach Council that works to promote the services offered and to provide training presentations on various issues that college students face such as depression, anxiety, eating disorders, and stress. BYU should utilize this council to spread proper education through smaller trainings or formal classes. The Outreach Committee on the council has compiled many presentations from visiting professors and university faculty that they can present to students. Many of the faculty members at BYU have a long history of research and could assist in creating a sleep presentation or training that could be distributed on a large scale by the outreach committee. It is worthwhile to educate students, as it could improve academic performance and quality of life. This could be the start of a necessary revolution in the way society views the importance of sleep.

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Appendix

Pittsburgh Sleep Quality Index (PSQI)

Name_____ ID # _____ Date _____ Age _____

Instructions:

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? (This may be different than the number of hours you spend in bed.)

   HOURS OF SLEEP PER NIGHT _____

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

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

   (a) Cannot get to sleep within 30 minutes

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

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

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

   (c) Have to get up to use the bathroom

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

   (d) Cannot breathe comfortably

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

(e) Cough or snore loudly

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

(f) Feel too cold

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

(g) Feel too hot

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

(h) Had bad dreams

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

(i) Have pain

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

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

_____

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

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

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

Very good _____

Fairly good _____

Fairly bad _____

Very bad _____

7. During the 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 ___

8. 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 once a week ___ Once or twice a week ___ Three or more times a week ___

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

No problem at all _____

Only a very slight problem _____

Somewhat of a problem _____

A very big problem _____

10. Do you have a bed partner or roommate?

No bed partner or roommate _____

Partner/roommate in other room _____

Partner in same room, but not same bed _____

Partner in same bed _____

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

(a) Loud snoring

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

(b) Long pauses between breaths while asleep

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

(c) Legs twitching or jerking while you sleep

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

(d) Episodes of disorientation or confusion during sleep

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

(e) Other restlessness while you sleep: please describe

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

Figure 1. This is the Pittsburgh Sleep Quality Index (PSQI) which can be used to evaluate overall sleep quality. This table was adapted from the questionnaire given in Buysse et al., 1989.

The Epworth Sleepiness Scale (ESS)

Name: _____

Date: _____ Age: _____ Sex: _____

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 these 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

Situation	Chance of dozing
Sitting and reading	
Watching TV	
Sitting inactive in a public place (e.g. a theater or a 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 the traffic	

Thank you for your cooperation

Figure 2. This is The Epworth Sleepiness Scale Questionnaire which can be used to evaluate daytime sleepiness. This table was adapted from the questionnaire given in Johns, 1991.