

**Sleep health, resources, stress, and academic performance:
Comparing hospitality and non-hospitality undergraduate students**

by

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ABSTRACT

In recent decades, there have been an increasing number of sleep studies in both science and social science. One explanation could be that sleep researchers' focus has extended from sleep diseases to sleep health; this has expanded study populations beyond "unhealthy" patients to healthy people. In parallel, brain scientists have connected sleep with cognitive and emotional function, which intensified the discussion of sleep issues in daily life. Existing literature suggests a linkage between sleep and performance, but relative evidence is not solid. In particular, hospitality students' sleep health should be studied given the potential impact of program requirements and industry work characteristics; however, relative topics have not been widely studied in hospitality research.

The primary purpose of this study was to explore the relationship between sleep health and academic performance using the conservation of resource theory. The secondary purpose was to determine whether hospitality students differ from non-hospitality students with respect to sleep health and academic performance. This study consisted of two-phases. In Phase I, secondary data of 73,214 responses were received from a national higher education association and analyzed using correlations. In Phase II, primary data of 817 responses were collected from six U.S. universities using a self-report online questionnaire and analyzed using ANOVA and structural equation modeling.

In Phase I, findings confirmed that, over the past 10 years, stress and sleep difficulties were the top two health issues impacting academic performance from undergraduates' perspectives. In Phase II, results presented a positive but weak influence

of sleep health on academic performance. The results also indicated that poor sleep health was related to sleep aid usage, caffeinated beverage consumption, and long work hours. Finally, hospitality student employees' sleep health score was slightly lower than the average sleep health score of non-hospitality student employees.

In conclusion, sleep health seems not to be a direct predictor of academic performance, but it is associated with students' academic success and individual health. To assist hospitality students in balancing their sleep health, study, and work, it is important that both administrators and managers understand the importance of sleep and show willingness to cooperate with one other.

CHAPTER 1. INTRODUCTION

Background

Sleep has been linked to learning capabilities (e.g., memory, attention) (Curcio, Ferrara, & De Gennaro, 2006; Hershner & Chervin, 2014; Peigneux, Laureys, Delbeuck, & Maquet, 2001). Neuroscientists hypothesized that memory formation happens during sleep (Ambrosini & Giuditta, 2001; Giuditta et al., 1995; Plihal & Born, 1997; Smith, 2001). Recognizing and understanding the relationship between sleep and learning in neuroscience, psychology, and neurobiology highlights the importance of *sleep health* in education; learning and memory are two key elements for academic success. Sleep health consists of daytime alertness, sleep duration, sleep efficiency, sleep timing, and sleep satisfaction (Buysse, 2014). Poor sleep health may inhibit one's abilities to learn due to a lack of concentration, poor memory, and/or negative affect.

Evidence has shown that sleep health can be an issue among college students. Common sleep problems for college students include sleep loss, delayed sleep, irregular sleep schedule, and daytime sleepiness (Hershner & Chervin, 2014; Lack, 1986; Singleton & Wolfson, 2009). Bad habits and holding jobs that have late hours (e.g., shift work) can cause negative impacts on college students' sleep health. First, bad habits, such as consuming caffeinated beverages in the afternoon or evening, or using technology before bed, may increase time to fall asleep, decrease sleep hours, and increase daytime sleepiness (McKim, 2007; National Sleep Foundation [NSF], 2011). Another bad habit, drinking alcohol or taking sleep aids to fall asleep, may interfere with the normal sleep cycle, make sleep quality worse, increase frequency of nightmares, and decrease alertness during the day (Ebrahim, Shapiro, Williams, & Fenwick, 2013; Rosenzweig, Breedlove,

& Watson, 2005). Second, college students' sleep health can also be impacted by working an evening shift, night shift, rotating shift, split shift, or irregular schedule. Shift work can result in an irregular sleep schedule that leads to excessive daytime sleepiness, insomnia, reduced performance, increased risk of work accidents, difficulties with personal relationships, and negative affect (e.g., depression) (Caruso & Rosa, 2012; "Shift Work and Sleep," n.d.). According to 2014 data, the highest percentage of college-aged employees were hired in the leisure and hospitality industries (U.S. Department of Labor [USDOL], 2015); these industries often require shift work.

It is important to study hospitality students' sleep health, given the likelihood of shift work and alcohol consumption. Hospitality students commonly need industry experiences to achieve program requirement and to be prepared for their future careers. Internship/industry experience is required by most hospitality undergraduate programs (Kay & DeVeau, 2003) and it is also ranked as the most important curriculum component from the perspective of industry professionals (Min, Swanger, & Gursoy, 2016). In addition, researchers have found that hospitality students had a higher level and more frequent alcohol consumption than non-hospitality students (Borchgrevink, Sciarini, & Borchgrevink, 2010). Therefore, given the importance of sleep and overall sleep health, there is a need to study sleep health in hospitality students.

Statement of the Problem

Sleep health is important to learning. Recognizing the balance between college students' sleep health, work, and study can be challenging. There may be a need to develop support for college students to better manage sleep challenges. Prior to providing supports for students, it is important to confirm the significance and relevancy of sleep

health and academic performance. However, it is uncertain whether college students perceive sleep health as the most influential health issue having an impact on their academic performance, as compared to other health factors (e.g., common cold, depression, and relationship difficulties).

Encouraging college students to have good sleep behaviors is needed. However, asking students to make sleep health a priority can be challenging. The relationship between sleep health and academic performance has been studied but previous findings were mixed. For example, Gomes, Tavares, and de Azevedo (2011) found that college students who had very good sleep quality reported higher grades than those who had poor sleep quality. In another study, Howell, Jahrig, and Powell (2004) reported that sleep quality was not significantly correlated with student grade point average and course grade. Consistent findings are needed to convince college students that sleep health is important to their academic performance. Without strong evidence, communicating the importance of sleep health to college students can be challenging.

Recognizing that hospitality students' sleep health in particular may be affected by their mandatory program requirement, sleep health should be given more consideration in hospitality education and industry. Although the importance of sleep is on the forefront of many research agendas (e.g., Buysse, 2014; Curcio et al., 2006; Hershner & Chervin, 2014), only a few hospitality studies have focused on sleep health (Brand, Hermann, Muheim, Beck, & Holsboer-Trachsler, 2008; Chiang, Arendt, Zheng, & Hanisch, 2014). Due to a lack of understanding about sleep health for hospitality students (e.g., the similarity and differences between hospitality and non-hospitality

students) and solid evidence, requesting that hospitality administrators and practitioners give priority to this issue is presently unwarranted.

Purpose and Objectives of the Study

First, the purpose of this study is to understand the underlying mechanisms of the effects of sleep health on academic performance using the conservation of resources (COR) theory. The secondary purpose is to determine whether hospitality students differ from non-hospitality students with respect to sleep health and academic performance.

The specific objectives of this study are to:

1. explore the impact of health issues on academic performance from undergraduate students' perspectives.
2. examine the relationship between sleep health, resources, stress, and academic performance of undergraduates.
3. determine if individual and/or institutional characteristics moderate the relationship between sleep health, resources, stress, and academic performance among undergraduates.
4. determine whether differences in individual and/or institutional characteristics exist between hospitality and non-hospitality undergraduates.
5. determine whether differences in the relationship between sleep health, resources, stress, and academic performance exist between hospitality and non-hospitality undergraduates.

Definition of Terms

Academic performance: grades on exams/important projects, grades in courses, and/or course completion (National College Health Assessment, 2011).

Conservation of resources (COR) theory: a theory about stress and motivators of stress; the theory was developed by (Hobfoll, 1989). When people predict or experience stressful challenges resulting in the threat of or actual loss of resources, they are motivated to protect or gain resources (Halbesleben, Neveu, Paustian-Underdahl, & Westman, 2014; Hobfoll, 1989).

Daytime sleepiness: one's tendency to fall asleep during the day (Shen, Barbera, & Shapiro, 2006).

Delayed sleep: a behavior whereby a person goes to bed later on weekends than weekdays (Singleton & Wolfson, 2009).

External resources: three of the four categories of resources which are objects, conditions, and energies.

Health: "a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity" (World Health Organization, n.d.).

Internal resources: one of the four categories of resources which is personal characteristics.

Resources: anything owned by a person; examples of resources include time, money, energy, and personality traits (Hobfoll, 1989).

Shift workers: people who work an evening shift, night shift, rotating shift, split shift, or employer-arranged irregular schedule (USDL, 2005).

Sleep disturbance: something that interrupts someone when he/she is sleeping (Longman Dictionary of Contemporary English, 2003).

Sleep duration: sleep time length.

Sleep health: “A multidimensional pattern of sleep-wakefulness, adapted to individual, social, and environmental demands that promotes physical and mental well-being. Good sleep health is characterized by subjective satisfaction, appropriate timing, adequate duration, high efficiency, and sustained alertness during waking hours” (Buysse, 2014, p. 12).

Sleep latency: the length of time it takes someone to fall asleep (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989).

Sleep quality: quantitative and subjective aspects of sleep. Examples of quantitative aspects of sleep are sleep duration, sleep latency, and numbers of arousals. Examples of subjective aspects of sleep are depth or restfulness of sleep (Buysse et al., 1989).

Stress: “an event or events that are interpreted as threatening to an individual and which elicit physiological and behavioral responses” (McEwen, 2000, p.173).

Organization of the Dissertation

The dissertation consists of six chapters and appendices. Chapter One introduces the study background, problem, purpose and objectives, and provides the definition of terms. Chapter Two reviews the relevant literature and presents a theoretical framework. Chapter Three describes the research methods divided into two phases. Chapter Four is a journal article summarizing part of this dissertation, prepared for submission to the *Journal of Hospitality, Leisure, Sport, & Tourism Education*; the format of this chapter follows journal requirements. Chapter Five is another journal article summarizing part of this dissertation, prepared for submission to the *Journal of Hospitality & Tourism Research*; the format of this chapter follows journal requirements. I was responsible for taking leadership in development of the research concept, data collection, data analysis, and

manuscript writing. Dr. Arendt served as mentor and was involved in all phases of the research and writing. Dr. Sapp provided expert advice on data analysis and interpretation. The last chapter concludes the dissertation by summarizing the results, implications, limitations, and recommendations for future research. References are illustrated at the end of each chapter. Appendices are provided after Chapter Six including permissions, instruments, and additional tables.

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CHAPTER 2. REVIEW OF LITERATURE

Introduction

This literature review is divided into seven sections, beginning with a brief overview of the evolution of sleep research in the last few decades. A definition of health and the relationships between sleep health and other health factors are provided in the second section. The third section examines shift workers' sleep health in light of service industry needs. The fourth section reviews literature related to the role of sleep health in hospitality employment. The fifth section addresses the relationship between sleep health and academic performance among college students, including student employees and hospitality undergraduates. The theoretical underpinning for this study is the theory of conservation of resources (COR), therefore the sixth section focuses on this theory and its application and measurement. Finally, the seventh section explains the theoretical framework of this proposed study along with hypotheses and a proposed model.

Evolution of Sleep Research

The study of sleep is advancing rapidly as illustrated by the following three identified shifts in focus. First, the research purpose has shifted from focusing on the treatment of sleep disorders to their prevention (Buysse, 2014), suggesting a change of focus from treating ill patients to promoting health of individuals. For example, while the Pittsburgh Sleep Quality Index (PSQI), developed in 1989, has been widely used in hospitals and clinics to diagnose patients that had sleep problems (Backhaus, Junghanns, Brooks, Riemann, & Hohagen, 2002), the PSQI is now also used for healthy individuals in understanding sleep duration, sleep disturbances, daytime function, and sleep quality (e.g., Chiang, Arendt, Zheng, & Hanisch, 2014; Howell, Jahrig, & Powell, 2004). In line

with this change in research purpose, Buysse (2014) indicated that previous sleep studies focused on the negative role of sleep problems rather than the positive role of sleep in overall health. One study found that people who believe their sleep quality is good, even though it may actually not be good, might have better cognitive performance (e.g., attention) (Draganich & Erdal, 2014).

Second, to develop sleep research settings that mimic real life, the location of where sleep research participants are studied has changed from laboratories to real life-settings (e.g., home) (Buysse, 2014). For example, Darwent, Dawson, and Roach (2012) investigated the application of a sleep-wake model in the workplace using data collected in the natural work environment rather than an experimental environment. Consequently, the instruments used have changed as well. Traditionally, polysomnography (PSG) was used to diagnose sleep disorders. PSG testing uses advanced laboratory equipment and researchers are able to study brain activity and sleep cycle stages; however it is expensive and inconvenient and therefore not used in social science studies (Parsai, 2011; Rosenzweig, Breedlove, & Watson, 2005). An alternative type of objective instrument, actigraphy, employs a sleep tracker to measure an individual's sleep hours and active/resting cycles in daily life at a much lower cost than PSG; actigraphy has been identified as a reliable and valid instrument measuring sleep (de Souza et al., 2003; Kushida et al., 2001).

Third, sleep studies have expanded beyond medical science to social science disciplines (e.g., psychology and sociology) (Buysse, 2014). Social scientists have begun paying attention to sleep-related issues, such as the effect of sleep on performance (e.g., Chiang et al., 2014; Snyder, 2003). Self-report data are commonly collected in social

science research using instruments such as sleep logs, sleep diaries, and sleep questionnaires. Snyder (2003), for example, used sleep logs to understand the effect of sleep on individual productivity; participants listed activities that they wanted to accomplish and reported whether they completed those activities. In another study, Chiang et al. (2014) adapted items from the PSQI to estimate the effects of sleep quantity and quality on undergraduate students' grade point averages (GPA).

One interesting and novel approach to sleep research that has recently been undertaken involves the use of placebos to study sleep quality. Draganich and Erdal (2014) explored placebo effect on cognitive performance via two experimental studies. The first study had 50 participants (19 men and 31 women) and the second had 114 participants (43 men and 71 women). All participants were undergraduate students enrolled at the same college but in different programs (fields included natural science, humanities, and social science). In Study 1, sleep quality was measured in two ways: a self-report questionnaire and a laboratory technique. The researchers generated fake sleep reports (the placebo) and presented them to participants. Cognitive performance was measured using instruments developed for testing individual attention, processing speed, and memory. Participants were first informed that people whose sleep quality was above average seemed to perform better on learning and memory tests, whereas those whose sleep quality was below average seemed to perform worse. Participants were then randomly assigned into one of two groups—above average sleep quality or below average sleep quality—based on their fake sleep reports. Study 2 aimed to reduce experimenter bias as well as to confirm and expand the findings of Study 1. Participants were given 50 attention test questions and awarded one point for each correct answer.

Mean scores on attention test questions were found to differ between above average and below average sleep quality groups ($M = 34.81$ and 22.13 respectively in Study 1; $M = 32.24$ and 26.19 respectively in Study 2). No significant correlation was found between self-reported sleep quality and scores on cognitive functioning tests. This study showed a weak relationship between self-reported sleep quality and cognitive performance. The researchers suggested that attention, a cognitive function, might be influenced by the placebo effect (i.e., an individual's belief about his/her sleep quality) besides actual sleep quality.

Responding to the evolving sleep research, a new concept, sleep health, was put forth in an article published in the journal *Sleep* (Buysse, 2014). Sleep health is defined as “a multidimensional pattern of sleep-wakefulness, adapted to individual, social, and environmental demands, that promotes physical and mental well-being” (Buysse, 2014, p. 12). Buysse (2014) continued to suggest that “good sleep health is characterized by subjective satisfaction, appropriate timing, adequate duration, high efficiency, and sustained alertness during waking hours” (p.12). Notably, the definition and characteristics of sleep health encompass healthy individuals instead of patients with sleep disorders therefore distinguishing sleep health studies from sleep studies.

Sleep Health and Other Health Factors

Definition of health

Human health is a broad concept that has been studied extensively. Studies included, but are not limited to, physical, mental, behavioral, sexual, and environmental health (e.g., Buhi, Marhefka, & Hoban, 2010; Horton & Snyder, 2009). Previous literature on the topic was reviewed to provide a specific definition for the proposed

study. The World Health Organization (WHO, n.d.) defines health as “a state of complete physical, mental and social well-being and not merely the absence of disease and infirmity”, a definition that has maintained since 1948. However, literature using the term “wellness” was also considered because of the overlap between health and wellness. From a historical perspective, Dunn (1959) claimed that health was a passive condition which differed from wellness, a dynamic concept, which is “a condition of change in which the individual moves forward, climbing toward a higher potential of functioning” (p. 447). Nevertheless, Dunn’s definition of wellness was similar to the WHO’s definition of health. Nowadays, the definitions of *health* and *wellness* are more similar, so although the WHO’s definition of health was adopted for the proposed study, literature using both terms will be reviewed and discussed.

Sleep is generally treated as part of physical health; however, Buysse's (2014) definition linked sleep health to all three dimensions of the WHO’s (n.d.) definition of health (physical, mental, and social). Interactions between sleep health and each of the three WHO dimensions of health have been found in previous studies.

Physical health factors relating to sleep health

Sleep is a basic physiological need for everyone. When people sleep, their body temperatures are lower and muscle movements are decreased to save energy and recover from physical tiredness/fatigue (Berger & Phillips, 1995). Human beings follow a circadian rhythm which is regulated by a hormone, melatonin. People feel sleepy two to three hours after the brain releases melatonin (Kalat, 2008). After experiencing initial sleepiness, people feel alertness again regardless of whether or not they sleep (Kalat, 2008). This cycle accounts for why some people feel alert at certain times of the day even

without sleep the night before (Kalat, 2008). However, depriving sleep may produce fatigue (Minkel et al., 2012), cumulate sleep debt (Van Dongen, Rogers, & Dinges, 2003), and/or cause a series of inflammatory responses (Simpson & Dinges, 2007). A lack of and/or poor quality of sleep in the long-term may increase the risk of chronic illnesses such as obesity, diabetes, gastrointestinal disorders, hypertension, cardiovascular disease, Alzheimer's disease, and cancer (Buxton & Marcelli, 2010; Hasler et al., 2004; Slats, Claassen, Verbeek, & Overeem, 2013).

Mental health factors relating to sleep health

Continuous stress impacts individual sleep health. When under stress, the human body undergoes a series of reactions to help human beings produce and save energy (Kalat, 2008). When a person experiences stress, the body releases a hormone to enhance metabolism and brain activities, and to activate the immune system for self-protection (Abercrombie, Kalin, Thurow, Rosenkranz, & Davidson, 2003). The immune system will eventually become exhausted if a person is continually under stress (Cohen et al., 1998). Sleepiness is one of the symptoms of an exhausted immune system (Maier & Watkins, 1998); in other words, sleepiness might be a signal of experiencing prolonged stress.

Conversely, sleep health has an influence on certain aspects of mental health, such as individual emotion, mood, anxiety, depression, and stress (Baglioni et al., 2011; Minkel et al., 2012; Pilcher & Huffcutt, 1996). In a meta-analytic study, Baglioni et al., (2011) analyzed nine longitudinal epidemiological studies and reported that the incidence of depression was twice as high in participants with insomnia as in participants without any sleep difficulties. In an experimental study, Minkel et al. (2012) found that sleep-deprived participants (n = 29) reported a higher level of anger, anxiety, depression, and

perceived stress than non-sleep-deprived participants (n = 24). Minkel et al. (2012) suggested that the threshold for emotion may be reduced due to sleep loss. In sum, prolonged stress causing poor sleep health might impact the capability for emotional self-management, resulting in a vicious cycle.

Social health factors relating to sleep health

Social and environmental demands vary between individuals. Each individual has to adequately manage and adapt their sleep patterns to social and environmental demands (Buysse, 2014), suggesting that sleep health is potentially related to social health. While physical and mental health are terms that have generally been understood, social health is a vague term that needs to be clarified. Larson (1996) noted a possible definition of social health as follows: “individual’s social adjustment and the response to environment. It should exclude measures external to the individual, such as the size of one’s social network, social interaction, and social support except when those factors affect social adjustment” (p. 184). The WHO’s website indicates that “social determinants of health are the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life” (Social determinants of health, n.d.).

Recognizing that social determinants include conditions in which people live and work, influences on sleep health, such as jet lag disorders and social jetlag, have been reported. For example, jet lag disorders are common for air travelers whose circadian rhythm is disrupted due to changing time zones (Weingarten & Collop, 2013). Likewise, ‘social jetlag’, a term defined as the differences in sleep behaviors (e.g., sleep hours, sleep timing) between work days and days off, can also disrupt an individual’s circadian

rhythm. The level of social jetlag depends on whether the differences in sleep behaviors between work days and days off are large or small (Wittmann, Dinich, Mellow, & Roenneberg, 2006). People working rotating shifts might have a high level of social jetlag and experience daytime sleepiness (Juda, Vetter, & Roenneberg, 2013). Lau et al. (2013) studied social jetlag in 1,139 college students with regard to their sleep behaviors between weekdays and weekends, and found the effects of social jetlag on quality of life and mood.

Individuals' sleep health can be impacted when they live and work in stressful conditions, such as having job stress, experiencing peer pressure, and living with family issues. Metabolism, brain activity, and the immune system are activated when people are stressed and this may lead to sleep difficulties (Abercrombie et al., 2003). Some people drink alcohol or take sleep aids to help them fall asleep, but these may actually make their sleep quality worse. Ebrahim, Shapiro, Williams, and Fenwick (2013) reviewed 20 studies and found that drinking alcohol before going to sleep changed the normal sleep cycle and made people still feel tired after waking up, although it did help people fall asleep quickly. Taking sleep aids may result in increased frequency of nightmares (Rosenzweig et al., 2005).

Sleepiness seems to make people get emotional easily and may lead to broken social relationships (e.g. with spouses, children, friends, peers, and/or coworkers). In a focus group study, interviewees with sleep loss mentioned that they had a low tolerance for their children and this made them feel guilty (Papp et al., 2004). When people are sleepy, they may consume caffeinated beverages—coffee, tea, chocolate, soft drinks, energy drinks—as a remedy (McKim, 2007; Mednick, Cai, Kanady, & Drummond,

2008). Likewise, some researchers have found that caffeine increases the time it takes to fall asleep and reduces sleep hours, although the effects varied by when, how much, and how often an individual consumed caffeinated beverages (McKim, 2007). Some people take stimulants other than caffeine such as amphetamines. These also have been found to have negative effects on sleep (e.g., insomnia) (McKim, 2007).

In conclusion, feeling sleepy is a potential warning sign of poor physical, mental, and/or social health. People try to fall asleep at night and try to keep awake during the day to meet the demands of work and daily life. However, individuals' overall health problems can be exacerbated due to inadequate sleep coping strategies. Ultimately, good sleep health is important in coping with sleepiness and promoting individual health.

Sleep Health and Shift Workers

The National Sleep Foundation (NSF) defines a shift worker as “anyone who follows a work schedule that is outside of the typical ‘9 to 5’ business day” (“Shift Work and Sleep,” n.d.). Shift workers are people who work evening shifts, night shifts, rotating shifts, split shifts, or employer-arranged irregular schedules (U.S. Department of Labor [USDOL], 2005). Shift workers' irregular work schedules may lead to poor sleep health. According to the NSF, the most common sleep symptoms among shift workers are: excessive sleepiness followed by insomnia; disrupted sleep schedule; reduced performance, which can lead to increased risk of work accidents; difficulties with personal relationships; and irritability/depression (Caruso & Rosa, 2012; “Shift Work and Sleep,” n.d.).

Shift workers and needs of the service industry

Shift work has existed for decades and meets the demands of 24-hour service businesses (“Shift Work and Sleep,” n.d.). Many fast-growing businesses employ shift workers to improve organizational productivity and effectiveness, especially in highly competitive globalized environments. Unfortunately, employers may be dissatisfied with overall employee productivity if they ignore the influence of shift work on sleep health and the consequent effects on job performance. In a poll by the NSF (2008), 12% of the 1,000 interviewed adults had been late to work in the past month because of sleepiness or sleep problems. A total of 7% of the 1,000 respondents were classified as shift workers (i.e., starting a work shift between 6 p.m. and 6 a.m.). Of those that were shift workers, more than half (58%) reported that they slept less than six hours on work days, a much higher percentage than non-shift workers (13%) (NSF, 2008). Lack of sleep may affect the human immune system, which in turn is linked to behavioral and physiological functions including sleepiness, fatigue, attention lapses, and inflammation (Simpson & Dinges, 2007). Mulgrew et al. (2007) in their study of 428 patients with suspected sleep-disordered breathing found that sleepiness was related to various causes of negative job performance (e.g., bad memory, inattention, unsafe behaviors). In an evaluation of the financial cost to organizations of poor sleep, Rosekind et al. (2010) concluded that poor sleep decreased individual productivity by an annual average of \$1,967 per person. In addition to financial impacts, the effect of shift work on shift workers’ sleep health in the service and healthcare industries have been documented in previous studies; flight crews (Gander et al., 2015); nurses (Karhula et al., 2013), resident physicians (Papp et al., 2004); and train drivers (Darwent et al., 2012) have all been studied.

Gander et al. (2015) examined the effect of in-flight sleep patterns on pilots' sleepiness, fatigue, and response times when they were on the long-range trips; a total of 237 pilots were studied. Secondary data were used and collected from four different airlines. Participating pilots took one or two in-flight breaks to allow for in-flight sleep, (flight durations ranged 9.8-18.3 hours). One hour before landing, participants were asked to report their perceived sleepiness and fatigue, and take a response time test. Results showed that the average participants' in-flight total sleep time was 3.68 hours. If participants slept more in flight, they experienced less sleepiness and fatigue. If participants' flights arrived to the destination early in the morning, they reported feeling more sleepy and fatigued, and demonstrated slower response times compared to participants whose flights arrived later. These findings might suggest that appropriate breaks are necessary for safe performance of workers in high-stress jobs, like pilots.

Karhula et al. (2013) examined the effect of job strain on sleepiness and recovery from work among nurses and nurses' assistants who worked in a three-shift system in Southern Finland. The participants were recruited from "The Finnish Public Sector Study," a nationwide study conducted in 2008. Job strain was used to categorize the participants into groups and measured by a total of 12 items including job demand and job control. A total of 95 female participants were divided into two groups, high job strain (HJS; n = 42, 44%) and low job strain (LJS; n = 53, 56%). Severe sleepiness was defined by a sum score ≥ 7 using the Karolinska Sleepiness Scale (KSS) (Åkerstedt & Gillberg, 1990). Five work shifts were defined: morning shift (between 7am and 3pm); evening shift (between 2pm and 10pm); overnight shift (between 9pm and 7am); extended shift (more than 12 hours in a daytime shift); and quick return (evening-to-

morning shift). Data were collected for each work shift using an on-line questionnaire and sleep diary. In both the HJS and LJS groups, more than half of the participants reported severe sleepiness (KSS scores ≥ 7) during the morning (51% and 50%, respectively) and overnight shifts (69% and 76%, respectively). The results showed that a higher percentage of nurses appeared to suffer severe sleepiness during the morning and overnight shifts than evening shifts. Nurses who were classified as having high job strain exhibited poor recovery from previous work shifts. Karhula et al. (2013) suggested that improved work schedules and a decrease in the number of quick return shifts might help shift workers recover from previous work, cope with sleepiness, and reduce work strain.

Papp et al. (2004) conducted a mixed method study to explore the effects of sleep loss and fatigue on resident-physicians. A total of 149 participants (60 interns and 89 residents) in 22 focus groups were interviewed. A questionnaire was used to collect data regarding perceived sleepiness, fatigue, and impacts of sleep loss and fatigue. A sleepiness score (anchors: 0 = would never doze to 3 = high chance of dozing) was used. Results showed that on average, participants had sleepiness scores at the moderate level (between 11 and 15), suggesting that a clinical intervention was needed for coping with sleepiness (Johns & Hocking, 1997). The researchers used their findings to develop a diagram regarding the effects of sleep loss and fatigue on the following three facets: a) learning and cognition, b) job performance, and c) personal life. With respect to learning and cognition, participants stated that sleep loss and fatigue had impacts on their thinking ability and learning motivation. Regarding job performance, participants indicated that they had poor performance when they were sleepy and tired, such as losing empathy for patients and making medical errors. With respect to personal life, participants perceived

that sleep loss and fatigue impacted their physical and mental health, as well as social relationships.

Darwent et al. (2012) examined the application of a bio-mathematical modeling of fatigue to predict fatigue levels according to sleep-wake time and duration of workers. The participants in this study were 225 Australian train drivers (221 males and 4 females). Sleep-wake time and duration were collected for two weeks using a wrist activity monitor and a sleep diary. During the same time period, work shifts were recorded using a work diary. Collected data were used to create a predictive model and the validity of the model was evaluated by comparing the predicted data to observed data. The results showed that 85% of predicted sleep-wake time and duration were consistent with observed sleep-wake time and duration. The researchers concluded, however, that the generalizability of their findings were limited because many factors were not controlled (e.g., individual differences and environmental factors). The researchers suggested that conducting similar studies in other shift-work-oriented industries and incorporating evaluation of individual differences would help to improve the prediction of fatigue.

Sleep Health and Hospitality Employment

The hospitality industry employs the highest proportion of shift workers and the highest percentage of youth (age 16 to 24 years). According to 2004 data from the Bureau of Labor Statistics, millions of Americans work alternative shifts (e.g., evening shift, night shift, rotating shift); of that group, the leisure and hospitality industries had the highest proportion (38.3%) of shift workers, followed by mining (31.9%) and transportation and utilities (27.9%) (USDL, 2005). More recently, Torpey (2015)

summarized U.S. government 2011-2014 data and showed that food service workers (e.g., waiters and waitresses, bartenders, fast-food workers, and coffee shop workers) worked an evening shift (between 6 p.m. and 10 p.m.) at a rate that was approximately twice as high as the average rate of total employed people based on annual averages. Additionally, the hospitality industry employs the largest number of young workers. Based on 2014 data, there were a total of 18,442,000 workers between 16 and 24 years old; of that group, 4,573,000 (24.8%) young workers were employed in the leisure and hospitality industries, followed by 4,080,000 (22.1%) in wholesale and retail trade industries, and 2,988,000 (16.2%) in education and health service industries (USDL, 2015).

Hospitality management

Hospitality management is part of the general field of management; it is management within a hospitality context (e.g. hotel, restaurant). The primary principle of management is deploying resources efficiently and effectively. A manager is responsible for using the fewest resources to obtain the best outcomes (efficiency) and to accomplish the correct things (effectiveness) (Walker, 2013). “Correct things” are those which facilitate a business achieving its objectives and vision. Resources include money, people, time, and equipment. Managers are classified as top managers, middle managers, and front-line managers. The primary functions of management are planning, organizing, decision-making, communicating, motivating, and controlling (Walker, 2013).

Current employment issues in hospitality management

High labor turnover is still an unsolved hospitality human resources problem (Kusluvan, Kusluvan, Ilhan, & Buyruk, 2010) and Rowley and Purcell (2001) found that

stress was one cause of turnover in the hospitality industry. In a study by McGinley, O'Neill, Damaske, and Mattila (2014), workplace stress was identified as a reason for career change among hospitality managers. McGinley et al. (2014) examined the reasons for career change among entry-level hotel managers using a grounded theory approach. A total of 12 interviewees (four males and eight females) were recruited using snowball sampling. The semi-structured interviews with open-ended questions were conducted via face-to-face meetings, Skype™, or telephone. Five themes emerged from subsequent open coding of the data: job satisfaction, work-life conflict, career progression, social support and professional identification, and other career opportunities. Work-life conflict and dissatisfaction with career progression were the two most common reasons participants gave for leaving the hotel industry. Specifically, participants indicated that their personal time was adversely affected by managerial responsibilities and their personal life was affected by stress from the workplace. Common coping strategies for work stress were sleep and alcohol abuse. Additionally, participants indicated that they were dissatisfied with the level of uncertainty in the promotion processes. Unlike previous studies, the researchers argued that job dissatisfaction might not lead directly to young hotel managers' career changes.

Likewise, hospitality jobs can be emotionally taxing and *emotional labor* may lead to turnover. Emotional labor is “the management of feeling to create a publicly observable facial and bodily display; emotional labor is sold for a wage and therefore has exchange value” (Hochschild, 1983, p. 7). Kusluvan et al. (2010) reviewed numerous papers related to human resources management in tourism and hospitality and found that the ability to provide emotional labor had been used as a selection criterion during the

hiring process; however, the pressure to provide expected emotional displays was also a major cause of burnout. A study of 338 Korean foodservice employees showed that emotional labor was positively related to turnover intention (Jung & Yoon, 2014). Goss-Turner, in a handbook of hospitality management, mentioned that tension and stress resulting from emotional labor can increase the turnover rate in the hospitality industry (Goss-Turner, 2014, pp. 92-93).

In sum, considering the relatively high need for shift workers in the hospitality industry, sleep health issues should not be ignored, especially in hospitality management. However, there is a lack of studies focusing on hospitality shift workers' sleep health. Understanding the benefits of sleep health may assist managers in developing strategies for removing stressors (e.g., emotionally taxing work) or reducing stress from the hospitality workplace, thus potentially improving job performance and decreasing employee turnover rate.

Sleep Health and College Students

Sleep health is a concern not just for shift workers but also for college students. In an extensive review, Hershner and Chervin (2014) indicated that common sleep problems for college students were daytime sleepiness, sleep loss, and irregular sleep schedule. The researchers summarized the causes and consequences of these sleep problems. The potential causes of college students' sleep problems included class and/or work schedules, sleep disorders, and bad habits (e.g., taking alcohol as a sleep aid, having caffeine after lunch, and using technology before bed). Consequently, these sleep problems may have a negative impact on a student's mood, driving ability, and academic performance. Academic success is often a priority for college students; therefore, an in-

depth review of previous works focusing on the relationship between sleep health and academic performance will be addressed next.

Sleep health and academic performance

The impact of sleep problems on college students' academic performance has been studied for more than forty years and mixed results were found. The key findings of previous works were 1) relatively high grades were reported by college students who had a very good sleep quality (Gomes, Tavares, & de Azevedo, 2011), slept more than nine hours (Kelly, Kelly, & Clanton, 2001), and did not delay their sleep (Lack, 1986); 2) GPA was significantly impacted by daytime sleepiness, sleep duration, and sleep latency (Chiang et al., 2014; Singleton & Wolfson, 2009); and 3) correlations between sleep variables and grades/GPAs were not consistent. Some researchers found that student grades/GPAs were not significantly correlated with sleep variables, such as daytime sleepiness, dissatisfaction with sleep, sleep hours, and sleep quality (Howell et al., 2004; B. R. Peters, Joireman, & Ridgway, 2005), while some researchers reported GPA was negatively correlated with sleep variables, such as daytime sleepiness, delayed bedtime, sleep duration, sleep schedule, and time awake before arising (Singleton & Wolfson, 2009; Taylor, Vathauer, Bramoweth, Ruggero, & Roane, 2013). A summary table (Table 2.1) provides an overview of these mixed findings. Studies were ordered by year.

Table 2.1 *Findings related to sleep and academic performance*

Author(s)	Country	N	Age range in years (mean \pm SD)	Major/ School	Key findings
Lack (1986)	South Australia	211	16-50 (23 \pm n.a.)	General	<ul style="list-style-type: none"> Delayed sleep resulted in a lower course final grade than non-delayed sleep.

Table 2.1 (continued)

Author(s)	Country	N	Age range in years (mean \pm SD)	Major/ School	Key findings
Kelly et al. (2001)	USA	148	18-42 (19.9 \pm 3.85)	General	<ul style="list-style-type: none"> • Long sleep hours (≥ 9 h) resulted in a higher overall college GPA than short sleep hours (≤ 6 h).
Howell et al. (2004)	Canada	414	17-50 (20.1 \pm 3.8)	General	<ul style="list-style-type: none"> • Daytime sleepiness and sleep quality were not significantly correlated to official GPA and course grade.
Peters et al. (2005)	USA	231	18-41 (19.0 \pm 2.82)	General	<ul style="list-style-type: none"> • Oversleeping was negatively correlated to GPA. • Sleep variability during week, sleep hours, dissatisfaction with sleep, difficulty sleeping, and falling asleep during the day were not significantly correlated to GPA.
Singleton & Wolfson (2009)	USA	236	18-22 (n.a. \pm n.a.)	General	<ul style="list-style-type: none"> • Daytime sleepiness and sleep schedule were significantly correlated to official cumulative GPA and semester GPA. • Oversleep and bedtime delay were not significantly correlated to official cumulative GPA and semester GPA. • Sleep duration was significantly correlated to official cumulative GPA, but not official semester GPA. • Daytime sleepiness and sleep duration significantly impacted official cumulative GPA.
Gomes et al. (2011)	Portugal	1,654	17-25 (19.98 \pm 1.65)	General	<ul style="list-style-type: none"> • Very good sleep quality resulted in higher grades than very poor, poor, and good sleep quality.
Taylor et al. (2013)	USA	867	n.a. (19.8 \pm 1.9)	Psychology	<ul style="list-style-type: none"> • Total sleep time (TST), time awake before arising, TST inconsistency, and quadratic terms of TST were significant predictors of official cumulative GPA.
Chiang et al. (2014)	USA	172	93% between 18-24 years (n.a. \pm n.a.)	Hospitality & Non-Hospitality	<ul style="list-style-type: none"> • Sleep latency significantly affected official cumulative GPA. • Sleep medicine significantly affected official semester GPA.

Table 2.1 (continued)

Author(s)	Country	N	Age range in years (mean \pm SD)	Major/ School	Key findings
Haraszti et al. (2014)	Hungary	753	18-35 (21.23 \pm 3.12)	Physiology	<ul style="list-style-type: none"> • Social jetlag^a has a significant impact on the weekly average grade, but not on the final exam grade.

Note. n.a.: not available.

^aSocial jetlag was defined as the differences “between sleep timing on workdays and weekends” (Haraszti, Ella, Gyöngyösi, Roenneberg, & Káldi, 2014).

Sleep health and student employees

Working simultaneously while attending school is common for college students. A recent report targeting students whose ages were between 16 and 24 years old, showed that about 5.7 of 12 million college students (46.3%) were employed, while about 1.7 of 9 million high school students (18.2%) were employed (USDL, 2015). Considering the smaller numbers of students and more limited impact of work on sleep health due to a law limiting the number of hours minors can work (Fair Labor Standards Act of 1938) and the regulation of their academic schedules, high school students were excluded from this study.

College students intermingle work and study for different reasons. For some students who have financial needs, a job is necessary to cover tuition and/or living costs. For other students, industrial experience (i.e., work experience or internship) is required for graduation; most hospitality programs require a certain number of work hours to graduate (Kay & DeVeau, 2003). However, student employees can be challenged by maintaining the delicate balance between their work, study, and sleep health. For example, student employees' sleep health can be influenced by sacrificing sleep time to work and study, or can be impacted negatively by the pressures coming from work and studies.

Trockel, Barnes, and Egget (2000) sampled 185 freshmen from a large private U.S. university to determine which health-related behaviors could serve as predictors for student GPA. The set of predictor variables studied included sleep habits, work hours, exercise, eating, mood status, perceived stress, spiritual or religious habits, and social support. Sleep habits referred to wake-up time, bedtime, and the number of sleep hours on weekdays and weekends. Student GPA was measured using official records of students' semester GPA (on a 4-point scale). Other data were collected using a self-report questionnaire via mail delivery or telephone interview. All participants were living on campus; no age data were reported. A forward stepwise regression was used to identify predictors of student GPA. As a result, participants' semester GPA were significantly predicted by weekday wake-up time ($\beta = -.251, p < .05$), study of spiritually oriented material ($\beta = .168, p < .05$), weekly work hours ($\beta = -.193, p < .05$), weekend wake-up time ($\beta = -.230, p < .05$), and strength training ($\beta = .133, p < .05$), explaining a total of 25.1% of variation. The findings might suggest that waking up late and having more work hours per week have a negative impact on college students' grades.

Miller, Danner, and Staten (2008) explored the effects of work hours on sleep hours and student GPA among undergraduate students. Data were collected at a southeastern U.S. university. A self-report survey was mailed and 903 of 1,700 surveys (53.1% response rate) were completed and returned to the researchers. Participants were between 18 and 26 years old (mean age = 20.2 ± 1.5 years) and more than half of them were female (61.0%). Participants were classified into three groups based on their weekly work hours as follows: (1) short group: less than 10 work hours ($n = 523, 57.9\%$); (2) medium group: between 10 and 19 work hours ($n = 206, 22.8\%$); and (3) long group:

equal to 20 or more work hours ($n = 172, 19.0\%$). Two binary variables were identified as the dependent variables for conducting the logistic regression analyses, including short sleep hours (i.e., sleeping less than seven hours per night) and good grades (i.e., having a GPA of 3.0 or higher). Based on the results of odds ratio, there was a 1.45 times greater likelihood of short sleepers being in the long work hour group than the short work hour group (odds ratio = 1.450, $p = .052$). Conversely, participants working 20 hours or more were less likely to achieve a GPA of 3.0 or greater than those in the low work hour group (odds ratio = 0.432, $p < .001$). No significance was found for the medium group, as compared to the low group.

Having good sleep health can be beneficial for student employees' learning and memory abilities there in turn benefiting their studies and work performance. Evidence regarding the beneficial relationship between sleep, learning, and memory has been reviewed in previous studies (Curcio, Ferrara, & De Gennaro, 2006; Hershner & Chervin, 2014). In addition, a positive relationship between sleep quality and job performance has been found in a study sampling 117 student employees from a large state university (Chiang et al., 2014). However, a strong connection between sleep health and academic performance, the priority when attending college, has not been found.

Pilcher, Vander Wood, and O'Connell (2011) conducted an experimental study to determine whether the effects of extended work hours and sleep loss on task performance were mediated by working as a team. A total of 24 college students (mean age = 20.2 \pm 1.9 years, 15 males) were recruited from Clemson University in South Carolina, USA. Participants worked on a specific test for 16 hours under a condition of no sleep the prior eight hours, resulting in 24 hours of total awake time. The test tool used to evaluate

individual and team-based performance included tracking and cognitive tasks. The findings suggested that the negative effects of sleep loss and extended work hours on task performance may be weakened when working as a team.

Oswalt and Wyatt (2015) compared undergraduate and graduate students' sleep behaviors using secondary data taken from the American College Health Association-National College Health Assessment (ACHA-NCHA) II survey conducted in the fall of 2009. After removing 7,527 subjects with missing data from the dataset, a total of 26,681 responses were used, 23,721 undergraduate students and 2,960 graduate students from 55 different U.S. universities. The researchers selected ten demographic items and six sleep-related items for data analysis. Participants were asked on how many of the last seven days they had experienced the following five sleep items: getting enough sleep, waking up too early, feeling daytime sleepiness, going to bed because they could not stay awake, and difficulty falling asleep. The sixth sleep item asked them to rate the impact of sleepiness using a 5-point scale (1 = no problem at all to 5 = a very big problem). Data were analyzed using descriptive statistics. Compared to undergraduate students, graduate students had higher percentages of males (41.4% vs. 35.1%), Asian/Pacific Islanders (28.8% vs. 8.4%), and international students (35.6% vs. 7.3%), and a lower percentage of full-time students (84.8% vs. 95.4%). A higher percentage of graduate students were in a relationship (36.7% vs. 13.2%) and lived off campus (73.8% vs. 30.6%). On average, graduate students reported that they got enough sleep on 3.47 ± 2.01 days in a week, while undergraduate students reported getting enough sleep on 2.94 ± 1.90 days in a week. Within the past week, graduate students reported feeling sleepy during the daytime every 2.5 days ($M = 2.77, SD = 2.04$), while undergraduate students experienced daytime

sleepiness every 2 days ($M = 3.40$, $SD = 2.07$). Other sleep behaviors were experienced on fewer than 2 days for both student groups. About half of the participants reported having a little problem with sleepiness: 11,269 (47.5%) undergraduates and 1,558 (52.6%) graduate students. The percentage of undergraduates ($n = 4,362$, 18.4%) who reported serious or very serious problems with sleepiness was higher than the percentage of graduates ($n = 336$, 11.4%) who reported the same problems. The composition of the two sample groups was different in gender, race, international status, relationship status, and living environment. Graduate students' sleep behaviors were slightly different than those of undergraduate students.

Sleep health and hospitality undergraduates

Hospitality education emphasizes industrial experience. Related work experience is commonly required for hospitality students before graduation and is considered important for their future career success. As a hospitality students, a student's sleep health and studies may be negatively affected by the irregular work schedule, and at the same time poor sleep health may affect a student's physical, mental, and social health, as well as his/her academic success. Brand, Hermann, Muheim, Beck, and Holsboer-Trachsler (2008) explored whether a nonstandard work schedule affected hospitality and tourism student employees' sleep and/or mental health by examining the relationships between sleep, work, and strain among Swiss student employees in the hospitality and tourism industry. Participants were student employees at the Swiss School of Tourism and Hospitality in Passugg, Switzerland who worked as part of their program requirements. A total of 92 participants (48.4% response rate) completed a one-week sleep log and six questionnaires, including a depression questionnaire and a trait- and

state-anxiety questionnaire. The anxiety questionnaires measured trait-anxiety (anxiety produced by personality traits) and state-anxiety (anxiety produced by a stressful situation or event). A series of *t*-tests and correlations were used for data analysis. Subjective sleep quality was shown to be negatively correlated with depression ($r = -0.61, p < .001$), state-anxiety ($r = -0.32, p < .01$), and trait-anxiety ($r = -0.58, p < .001$) among hospitality and tourism student employees. The researchers also found that increased work hours were associated with decreased sleep hours ($r = -0.46, p < .001$) as well as higher levels of insomnia ($r = 0.49, p < .001$). Weekend work hours had negative relationships with depression ($r = -0.29, p < .05$) and trait-anxiety ($r = -0.25, p < .05$). However, no effect was found between weekend work schedule and sleep. The researchers concluded that working on weekends might affect hospitality and tourism student employees' affective state (e.g., depression and trait-anxiety), but the effect of weekend work schedule on sleep remains unknown.

Only a few studies focused on the relationship between sleep health and academic performance for hospitality students; one study found that the relationship between sleep and academic performance is weak with a large unexplained variance (Chiang et al., 2014). It is possible that some students achieve high grades using their own strategies (e.g., drinking caffeinated beverages) to cope with sleep problems (e.g., daytime sleepiness, delayed bedtime, poor sleep quality, sleep disturbances, sleep deprivation). In other words, the effects of sleep health on academic performance might be hidden, which would pose a challenge to promoting the importance of sleep health in education as well as assisting students to balance sleep health, study, and work.

Conservation of Resources (COR) Theory

Overview of the COR theory

The COR theory is a theory about stress and motivators of stress; the theory was developed by Hobfoll (1989). Resources play a significant role in the COR theory. A resource is defined as anything owned by a person; examples of resources include time, money, energy, and personality traits. When people predict or experience stressful challenges resulting in the threat of or actual loss of resources, they are motivated to protect or gain resources (Halbesleben, Neveu, Paustian-Underdahl, & Westman, 2014; Hobfoll, 1989). In particular, the COR theory focuses on common resources rather than individual specific resources (Hobfoll, 2011). In other words, the COR theory is concerned with the fluctuation of common resources utilized by a group of people when a stressor exists (Hobfoll, 2011). The two principles and four corollaries of the COR theory have been addressed in articles published by Hobfoll (Hobfoll, 2001, 2011; Hobfoll & Lilly, 1993), but there is no known systematic overview of the principles and corollaries. Halbesleben et al. (2014) published an in-depth review of the COR theory and provided a concise delineation of the principles, corollaries, and example studies encapsulated in a table (see Table 2.2).

Table 2.2 *Basic tenets of conservation of resources theory*

Name	Description	Example studies testing tenet
Principle 1	Resource loss is more salient than resource gain.	R. T. Lee & Ashforth (1996)
Principle 2	People must invest resources to gain resources and protect themselves from losing resources or to recover from resource loss.	Halbesleben, Harvey, & Bolino (2009); Halbesleben & Wheeler (2008); Ng & Feldman (2012); Vinokur & Schul (2002)

Table 2.2 (continued)

Name	Description	Example studies testing tenet
Corollary 1	Individuals with more resources are better positioned for resource gains. Individuals with fewer resources are more likely to experience resource losses.	Demerouti, Bakker, & Bulters (2004); Mäkikangas, Bakker, Aunola, & Demerouti (2010); Whitman, Halbesleben, & Holmes (2014)
Corollary 2	Initial resource losses lead to future resource losses.	Demerouti et al. (2004)
Corollary 3	Initial resource gains lead to future resource gains.	Hakanen, Peeters, & Perhoniemi (2011); Halbesleben & Wheeler (in press); Mäkikangas et al. (2010); Xanthopoulou, Bakker, Demerouti, & Schaufeli (2009)
Corollary 4	Lack of resources leads to defensive attempts to conserve remaining resources.	Halbesleben (2010); Halbesleben & Bowler (2007); Halbesleben & Wheeler (2011)

Note. Adapted from “Getting to the “COR”: Understanding the Role of Resources in Conservation of Resources Theory,” by J. R. B. Halbesleben, J.-P. Neveu, S. C. Paustian-Underdahl, and M. Westman, 2014, *Journal of Management*, 40, p. 1337. Copyright 2014 by the SAGE Publications (see Appendix A).

Application of the COR theory

The COR theory was initially proposed as a theory to explain the relationship between stress and trauma, but it is also applicable to other topics, such as employee burnout, emotional labor, organizational behaviors, positive psychology, and work schedule demands (Brotheridge & Lee, 2002; Halbesleben et al., 2014; Hobfoll, 2011; V. Peters et al., 2016). Regarding sleep health, the COR theory has been applied in several fatigue studies (Taylor, Jason, Shiraishi, Schoeny, & Keller, 2006; Vela-Bueno et al., 2008). Taylor et al. (2006) conducted an experimental study to investigate the effectiveness of an illness management program for people with chronic fatigue syndrome. The program included group meetings for four months and individual counseling for nine months. A total of 23 participants were assigned to complete the program and 24 participants were assigned to a control group. The COR gains and losses

were applied and measured by the conservation of resources evaluation (COR-E), a measurement of resources developed by Hobfoll, Lilly, and Jackson (1991). Data were collected at three time periods: baseline, group meeting phase, and individual meeting phase. The results showed that people participating in the program reported increasing resource gain and decreasing resource loss, while people in the control group reported decreasing resource gain and increasing resource loss.

Another fatigue study did not actually apply the COR theory but recommended that the COR theory be applied in future research. Trougakos, Hideg, Cheng, and Beal (2014) investigated the relationship between three types of lunch break activities (social, working, and relaxing) and fatigue, moderated by autonomy. Participates included 103 of 300 administrative employees (34.3% response rate, mean age = 39.52 ± 10.72 years old) from a large U.S. university. Lunch break activities, autonomy, and peer-rating fatigue were measured using a 7-point Likert scale (1 = not at all to 7 = to a great extent). Daily online surveys were used to collect data for 10 consecutive days. Results suggested a significant moderation effect of autonomy. When the levels of autonomy were low, participants' coworkers observed high levels of fatigue if the participants reported a great extent of social and/or work lunch break activities. In contrast, low levels of fatigue were revealed when participants reported high levels of relaxing lunch break activities even if levels of autonomy were reported to be low. Trougakos et al. (2014) suggested that the COR theory's inclusion of the idea of resource recovery and depletion could be applied in future research to help better understand the contrasting effect of lunch break activities on fatigue.

Measurement of the COR theory

In the COR theory, four factors of resources are defined as follows: 1) objects (e.g., home), 2) conditions (e.g., marriage, tenure, and seniority); 3) personal characteristics (e.g., personal skills); and 4) energies (e.g., time, money, and knowledge) (Hobfoll, 1989). The definitions of the four resource categories are addressed in Table 2.3.

Table 2.3 *Definitions of resource categories*

Resource categories	Definition	Examples
Objects	Physical items of value due to their utility, rarity, or symbolism	Housing, transportation
Conditions	States of being that have value due to their general desirability	Marriage, tenure, seniority
Personal characteristics	Traits that help people to recover from stressful events	Personal skills, hardiness, self-efficacy
Energies	Resources that are valued in that they lead to acquiring other resources	Time, money, knowledge

Note. Adapted from “Not all resources are created equal: COR theory, values, and stress,” by N. A. Morelli, C. J. L. Cunningham, 2012, *The Journal of Psychology*, 146, p. 394. Copyright 2012 by the Taylor & Francis (see Appendix A).

Hobfoll et al. (1991) developed an instrument to measure resource gain and loss, the conservation of resources evaluation (COR-E) tool. To determine a set of resources for developing the instrument, a group process was used whereby groups of people were first asked to create a list of resources that were important to them. Comparing the lists, people were allowed to add or remove resources from the lists. The process was repeated until no additional resources were added, and one final list emerged from all groups. The final list included a total of 74 resources. Next, two sample groups of 74 adults and 255 undergraduate students were asked to quantify the gain and loss of the 74 resources using a 7-point scale (1 = little gain or loss to 7 = great loss of gain) and indicate if the gain or

loss was recent or more distant but within the past year. Finally, principal components analysis was conducted separately for the two sample groups. Five factors (e.g., financial, personal, and work accomplishment) were extracted from the adult data and six factors (e.g., financial, personal, intimacy, and marriage/children) were extracted from the student data. Given the varied results between the sample groups, Hobfoll et al. (1991) neither concluded there was an exact number of factors nor categorized the 74 resources into the four domains of the COR theory.

One main concern of the COR-E is that the scale was too long, repetitive, and resources had not been clearly identified. To overcome these limitations of the COR-E, some researchers employed a different approach and selected specific variables as resources to develop a conceptual model and measured the variables using scales adapted from other researchers rather than using the COR-E (e.g., Alarcon, Edwards, & Menke, 2011). Halbesleben et al. (2014) discussed the advantages and disadvantages of the approach when selecting specific resource variables. The approach was advantageous as focusing on the variables of interest; however, the approach biased the results by assuming the selected resource variables were the only resources utilized by people recovering from the life challenges studied.

Theoretical Framework

To understand the resource utilization that impacts the effect of sleep health on academic performance for undergraduate students, the COR theory was used as a theoretical framework for this study. Constructs identified were resources (i.e., objects, conditions, energies, and personal characteristics), stress, sleep health, and academic

performance. The following sections will introduce the relationship between each construct, hypotheses, and proposed model. Control variables will be discussed as well.

External and internal resources

Resources were classified into four categories: objects, conditions, personal characteristics, and energies (Hobfoll, 1989). Examples of resources are advancement in education or job training, personal health, and time. As addressed in Table 2.2, the COR theory (corollaries 2 and 3) suggests that initial resource gain/loss leads to future resource gain/loss (Hobfoll, 2001, 2011; Hobfoll & Lilly, 1993). In this study, three categories—objects, conditions, and energies—were classified as external resources, and the remaining category—personal characteristics—was classified as internal resources. The distinction between external resources and internal resources was made based on the cause and effect relationships in our model between these four resource categories (see Table 2.3 for definitions of each category).

Stress

The COR theory views stress as the cause and outcome of unbalanced resources (Hobfoll, 2011), meaning a high level of stress is caused by the loss of resources and then a high level of stress can lead to the loss of resources. Based on the concepts of the COR theory, negative relationships between external resources and stress are hypothesized.

Hypothesis 1, 2 & 3: There is a negative relationship between external resources and stress.

Hypothesis 4: There is a negative relationship between stress and internal resources.

Sleep health

As discussed in previous sections, sleep health seems to play an important role in the balance of health, work, and study for undergraduate students. In this study, good sleep health is viewed as the cause and outcome of balanced resources. Therefore, positive relationships between resources and sleep health are hypothesized.

Hypothesis 5, 6 & 7: There is a positive relationship between external resources and sleep health.

Hypothesis 8: There is a positive relationship between sleep health and internal resources.

Academic performance

GPA is not the only indication of academic success, but it has widely been used as the measure of academic performance (see Table 2.1). Students' GPAs can be influenced by individual factors (e.g., intelligence, personality, health problems, test-taking abilities, work ethic) and environmental factors (e.g., class/program/school environment, socioeconomic status) (Hershner & Chervin, 2014). In this study, the effect of resources, stress and sleep health on undergraduate students' GPAs is the main area of interest.

Although no known study has determined the relationship between resources and student GPA, personal characteristics—one of the four resource category—can be considered a potential individual variable relating to student GPA (Hershner & Chervin, 2014).

Students with more resources (personal characteristics) are expected to perform better and have higher GPAs than those with less resources, according to the COR theory (Hobfoll, 2011). Therefore, a positive relationship between internal resources and student GPA is hypothesized. Based on the review of literature, a negative relationship between

stress and student GPA and a positive relationship between sleep health and student GPA are hypothesized.

Hypothesis 9: There is a positive relationship between internal resources and academic performance.

Hypothesis 10: There is a negative relationship between stress and academic performance.

Hypothesis 11: There is a positive relationship between sleep health and academic performance.

Hypotheses and proposed model

Based on the COR theory, we hypothesize that loss of object, condition, and/or energy resources leads to high level of stress or poor sleep health, and high level of stress or poor sleep health leads to future loss of resources of personal characteristics. This cycle has the potential consequence of impacting college students' academic performance. Using the COR theory as the theoretical framework, the following are the proposed hypotheses and model (Figure 2.1). Paths based on the COR theory are bolded.

Hypothesis 1, 2 & 3: There is a negative relationship between external resources and stress.

Hypothesis 4: There is a negative relationship between stress and internal resources.

Hypothesis 5, 6 & 7: There is a positive relationship between external resources and sleep health.

Hypothesis 8: There is a positive relationship between sleep health and internal resources.

Hypothesis 9: There is a positive relationship between internal resources and academic performance.

Hypothesis 10: There is a negative relationship between stress and academic performance.

Hypothesis 11: There is a positive relationship between sleep health and academic performance.

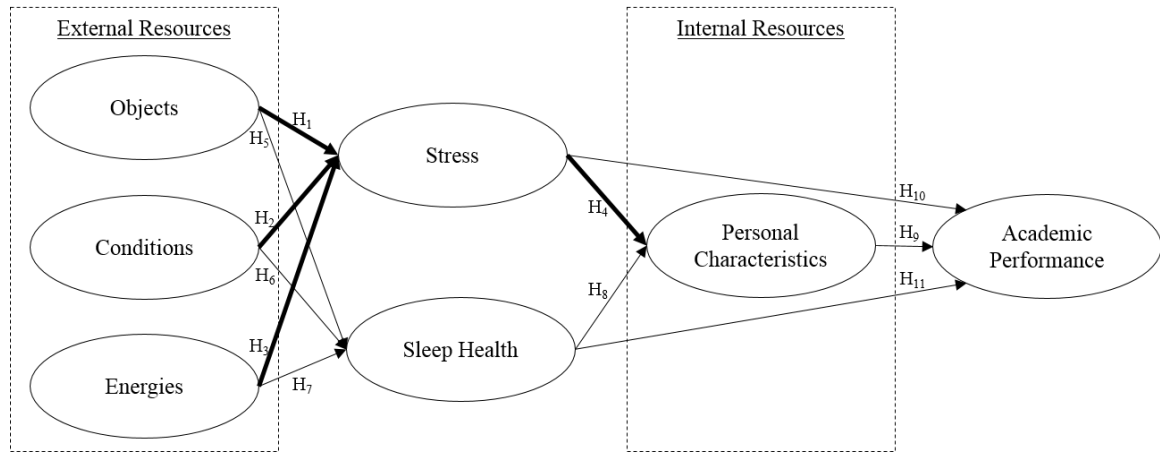


Figure 2.1. Proposed model. Paths based on the COR theory are bolded.

Control variables

These relationships identified in the proposed model can be moderated by work shift, workplace, hours worked, consumption of caffeinated beverages, alcohol consumption, socioeconomic status (SES), and parental factors (i.e., parental education, parental expectation). In a German study using a sample of 142 college students, increased consumption of caffeinated beverages and decreased sleep quality and alcohol consumption were reported during times when exams were administered (Zunhammer, Eichhammer, & Busch, 2014). A stronger effect of alcohol consumption on the relationships in the proposed model is expected in hospitality undergraduates than non-hospitality undergraduates because hospitality students seem to have higher levels of alcohol consumption than non-hospitality students. Borchgrevink, Sciarini, and Borchgrevink (2010) found that hospitality students ($n = 262$) consumed more alcohol

more often than students in other majors ($n = 628$). In another alcohol consumption study, Kitterlin, Tanner, and Agrusa (2012) sampled 550 foodservice management students and found that alcohol consumption behaviors differed based on participants' age and sex. Participants between 21 to 22 years old had a significant higher level of alcohol consumption than those 20 years old or younger. Also, male participants reported a higher level of alcohol consumption than female participants. Looking at students at 5th grade and follow up at 8th grade, Grossman, Kuhn-McKearin, and Strein (2011) found that parental expectation, gender, and SES were correlated with student achievement (e.g., reading and math tests). In Vartanian, Karen, Buck, and Cadge's (2007) study, they found that Asian parents had high expectations for their children to complete college. Comparing Whites and Chinese Americans, Pearce (2006) found that higher parental expectation was associated higher student achievement for both ethnic groups. These findings suggest that SES and parental factors may have potential effects on college students' academic performance.

This review of sleep health research included an overall of the trend in current sleep research, addressed sleep health issues of two high-risk populations (shift workers and college students), and identified gaps in current scholarship regarding the relationship between hospitality student employees' sleep health and academic performance. To fill the gaps, a theoretical framework was established based on the conservation of resources theory.

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CHAPTER 3. METHODS

The purpose of this study was to explore the relationship between sleep health and academic performance among hospitality undergraduates. First, use of human subjects is addressed. Second, rationale and structure of the two-phase research design (Phase I and Phase II) are discussed. Third, sample selection, data source, data request processes, and data analysis for Phase I are explored. Fourth, the instrument development, sample selection, questionnaire distribution, and data analysis for Phase II are examined.

Results were expected to provide an explanation for the relationship between sleep health and academic performance. To achieve this goal, the research objectives were to:

- explore the impact of health issues on academic performance from undergraduate students' perspectives.
- examine the relationship between sleep health, resources, stress, and academic performance of undergraduates.
- determine if individual and/or institutional characteristics moderate the relationship between sleep health, resources, stress, and academic performance among undergraduates.
- determine whether differences in individual and/or institutional characteristics exist between hospitality and non-hospitality undergraduates.
- determine whether differences in the relationship between sleep health, resources, stress, and academic performance exist between hospitality and non-hospitality undergraduates.

Use of Human Subjects

The primary researcher completed the Human Subjects Research Assurance Training and is certified by Iowa State University (ISU). The research protocol, Phase II only, was submitted and reviewed by the Human Subjects Review Committee at ISU to ensure the protection of human participants' rights, safety, and welfare. The primary researcher contacted human subjects and collected data only after approval had been received from the ISU Institutional Review Board (IRB). An approval was received on May 23, 2016 (IRB ID: 16-236; see Appendix B). Two modifications (Appendix B) were reviewed and approved prior to implementing changes to the survey distribution process.

Research Design

This study involved a two-phase design to achieve the research objectives—Phase I and Phase II. In Phase I, a longitudinal study analyzing secondary data was conducted to identify the most influential health issues impacting undergraduate students' academic performance. Phase I also aimed to confirm the research model, with respect to sleep health and stress variables, used for Phase II. In Phase II, a cross-sectional study analyzing primary data examined the relationship between sleep health, resources, stress, and academic performance among hospitality and non-hospitality undergraduates. A self-report, web-based questionnaire was developed and used for data collection.

Phase I: Secondary Data

Sample selection

Participants were undergraduate students who completed the American College Health Association-National College Health Assessment (ACHA-NCHA) survey during fall semesters 2003, 2007, 2008, and 2013. Institutions self-select to participate in the

survey and many participate on a regular basis. Anonymous data are released to outside researchers who receive permission to use the ACHA-NCHA data, so outside researchers would not be able to identify participants and their institutions. Based on the ISU IRB, the IRB review is not required for the use of existing data, which “were collected for purposes *other than* the proposed project and are provided to the investigator without *any* identifiers” (ISU IRB, 2016, p. 5). Therefore, human subject approval was not sought for Phase I.

Data source

The American College Health Association (ACHA) has conducted its ACHA-NCHA survey every fall and spring semester since Spring 2000. The ACHA-NCHA survey contains items related to behavioral, sexual, mental, and physical health along with demographic characteristics. Although some researchers have published analyses of the ACHA-NCHA data, these studies have been narrow in design, focusing on a specific health issue, such as sleep habits or limited to one survey period and/or one institution (e.g., Becker, Adams, Orr, & Quilter, 2008; Buhi, Marhefka, & Hoban, 2010; Oswalt & Wyatt, 2015).

Data request process

The ACHA-NCHA survey data (a secondary data source) were selected for the following reasons: (1) the data are collected through a national survey of college students; (2) the survey has been conducted for the past 15 years and continues; (3) the survey covers the three dimensions of health defined by the WHO; and (4) the survey has been shown reliable and valid (ACHA, n.d.). Permission (Appendix C) to acquire and use the ACHA-NCHA data was requested and obtained from the ACHA (2015). Due to question modifications, there are two data collection periods, including Period I: Spring

2000 to Spring 2008; and Period II: Fall 2008 to present. For consistency, two separate trend comparisons were conducted using two time points from each data collection period, Fall 2003 and 2007 for Period I; and Fall 2008 and 2013 for Period II.

Data analysis

Academic performance was measured by self-reported letter grade (e.g., A, B, C, and D/F). For each survey period, health issues were ranked based on the percentage of participants experiencing a lower grade on an exam/important project, a lower grade in the course, an incomplete/dropped the course, or significant disruption in practicum work resulting from health issues. The relationships between health issues and grades were analyzed using correlations.

Phase II: Primary Data

Following secondary data analysis, a self-report, web-based questionnaire was developed and pilot tested. The final questionnaire was delivered electronically to collect primary data on sleep health, resources, stress, and academic performance using a sample of hospitality and non-hospitality undergraduates. This section consists of instrument development, sample selection, distribution, and data analysis.

Instrument development

This subsection addresses the development processes of the web-based questionnaire, which was used for collecting data. This subsection consists of questionnaire initial content, expert panel review, pilot study, and questionnaire final revision.

Questionnaire initial content. The initial questionnaire consisted of five sections including sleep health, resources, stress, academic performance, and demographic items.

Measurements were adapted from existing research scales, and their application in previous studies, reliability, and validity will be discussed.

Sleep health. Buysse (2014, p. 17B) developed a measurement of sleep health that includes five questions on satisfaction with sleep, alertness during waking hours, timing of sleep, sleep efficiency, and sleep duration (SATED). Approximately 30 years ago, Buysse first developed the Pittsburgh Sleep Quality Index (PSQI), a widely used sleep instrument (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). The PSQI was originally designed to assess sleep quality for patients with sleep disorders, but was found applicable to the general population. And then later, Buysse developed the SATED scale, a new index for measuring sleep health specifically designed for the general population (Buysse, 2014). Both the new concept—sleep health—and the need for the new instrument came from Buysse’s more recent observations about sleep research and the changing nature of the field (Buysse, 2014). In the SATED scale, five items measured sleep health using a 3-point scale (0 = rarely/never, 1 = sometimes, and 2 = usually/always). A total score of zero indicates poor sleep health and a total score of 10 indicates good sleep health. Because the SATED scale is a newly developed index, no known studies, to date, have evaluated its reliability and validity.

Resources. The conservation of resources evaluation (COR-E) was originally developed utilizing the COR theory as underpinning (Hobfoll, Lilly, & Jackson, 1991); for the current study, the COR-E was utilized to measure resource loss and gain. Only selecting COR items related to the variables of interest, internal reliability in previous work was between .85 and .94 (Ennis, Hobfoll, & Schro, 2000; Hobfoll, Johnson, Ennis, & Jackson, 2003; Ironson et al., 1997). Using the entire COR-E is beneficial to avoid

biasing the results by limiting specific resources (Halbesleben, Neveu, Paustian-Underdahl, & Westman, 2014). The original version of the COR-E includes 74 items in a resource loss scale and repeated the 74 items in a resource gain scale, both of which used a 5-point scale (0 = not at all/not applicable, 1 = to a small degree, 2 = to a moderate degree, 3 = to a considerable degree, and 4 = to a great degree) (Hobfoll, 2011, pp. 145-147). However, the 148-item scale was likely unrealistic to use for this study; researchers have found a negative relationship between the length of the questionnaire and completion (Galesic & Bosnjak, 2009). Shortening the length of the COR-E was needed to encourage participants to complete the questionnaire, and there was no known published shortened version. To shorten the COR-E, the loss and gain scales were combined into one loss/gain scale, given that the exact same 74 items were used in both of the loss and gain scales and a negative relationship between resource loss and gain has been found in a previous study (Taylor, Jason, Shiraishi, Schoeny, & Keller, 2006). In this approach, items were shortened from 148 items to 74 items. A 5-point scale were utilized; ratings were as follows: 1 = a great deal of loss or threat of loss, 2 = some loss or threat of loss, 3 = no gain, no loss or threat of loss, 4 = some gain, and 5 = a great deal of gain.

Stress. Items for measuring stress were adapted from the Perceived Stress Scale (PSS) developed by Cohen, Kamarck, and Mermelstein (1983). The PSS is a widely used scale for stress measure, assessing the frequency of feeling stressful experiences. Cohen and Williamson (1988) conducted a comparison between three versions of the PSS (14-item, 10-item, and 4-item versions) and the researchers suggested the 4-item version had adequate reliability to measure perceived stress (Cronbach's alpha = .60). Lee (2012)

reviewed previous work using the PSS and found reliability of the 4-item PSS (PSS-4) was between .67 and .82. PSS-4 has been shown a reliable, valid instrument (Leung, Lam, & Chan, 2010; Mitchell, Crane, & Kim, 2008). Therefore, PSS-4 was employed using a 5-point scale, rating from 0 = never, 1 = almost never, 2 = sometimes, 3 = fairly often, to 4 = very often. In the PSS-4 scale, there were two positively and two negatively stated items; researchers needed to reverse the scores of the two positively stated items for analysis. The two original questions were “How often have you felt confident about your ability to handle your personal problems?” and “How often have you felt that things were going your way?” A total score was determined by summing the four items therefore this total score ranged between zero and 16. A higher score indicated a higher level of perceived stress.

Academic performance. Self-report cumulative grade point average (GPA) was used as a measure of academic performance, followed by a question asking about the grading scale used at participants’ respective institutions (e.g., 4- or 5-point scale). In research by Chiang (2013), self-report data were almost 80% accuracy (135 out of 172 participants) when comparing participant’s self-reported cumulative GPA to his/her official cumulative GPA.

Demographic items. Demographic data were collected, including sex, age, race/ethnicity, academic major, classification status (e.g., freshman, sophomore), workplace, managerial or supervisory responsibility, work shift, getting sufficient sleep, paid work hours, length of employment in current job, usage of alcohol, usage of sleep aids (e.g., Ambien[®], Unisom[®], antihistamine), consumption of caffeinated beverages, and usage of technology before bed.

Expert panel. An expert panel reviewed all items for confirming content validity. Professional fields of the experts included hospitality management (n = 3), psychology (n = 1), and sociology (n = 1). Revisions were made based on experts' comments. These revisions included: 1) developing an alternative research model; 2) adding an additional recruitment criterion; 3) rephrasing and reorganizing the questionnaire; 4) reducing and randomizing resource items; 5) using another version of the stress scale; and 6) adding additional demographic items.

First, considering the causation between variables, experts suggested that the resource variable could be divided into two variables, one grouping the resources of objects, conditions, and energies and the other one indicating the resources of personal characteristics. Second, experts suggested that excluding programs outside of the United States could be added onto the recruitment criteria considering different curriculum design and the percentage of undergraduates having a job in other countries may not be similar to the United States. Third, experts suggested removing "N/A" and rephrasing "past month" to "past four weeks" to reduce confusion. Demographic items related to sleep health were moved to the sleep health section for better flow. Fourth, experts suggested that the 74 resource items could be reduced to eliminate duplication and to increase participants' completion rate. Details of the reducing process is addressed in Appendix D. In addition, the order of resource items was randomized to avoid exaggerated reliability caused by grouping items (Goohue & Loiacono, 2002). Fifth, reducing the resource items allowed more space so experts suggested that the more reliable 10-item version of the PSS could be substituted for the 4-item version. Sixth, experts suggested adding four institutional characteristic items (domestic or international

student, hours of work requirement, hours of internship requirement, and study abroad) because these may impact the results. Home address zip code and job title were added to obtain more demographic information. Parental education and expectation are two potential variables that have potential impacts on college students' academic performance therefore these two items were added (Tan & Yates, 2011). After expert panel review, a revised questionnaire was used for the pilot study.

Pilot test. A pilot study was conducted in the middle of summer 2016 at Iowa State University, a public university in the Midwest, to confirm the questionnaire was understandable and reliable, as well as to conduct a factor analysis for the COR-E. The population for the pilot study was all undergraduate students ($N = 7,669$) who were registered in summer courses at Iowa State University. The primary researcher requested a list of email addresses from the Office of the Registrar and undergraduates who were on the list received a recruitment email with a link to the online survey (Appendix E). The online survey included an informed consent form, a questionnaire, and a pilot evaluation form following by a drawing page (Appendix E). The drawing data were kept separate from the survey data in order to keep all participants anonymous. Each participant had an opportunity to enter into a drawing for a 1-in-50 chance of winning a \$25 Amazon.com® gift card. Pilot data were collected over four weeks between July 11th and August 5th. A reminder was sent two weeks into the data collection period. It was possible that one student participated in the survey multiple times because students' email addresses were not recorded for keeping them anonymous. In order to reduce the possibility of duplicate responses, students who already participated in the drawing were eliminated from the email list before sending the reminder,

There were 477 out of 7,669 (6.2% response rate) undergraduates who agreed to participate the pilot study. A total of 433 (5.6% response rate) valid responses was received. Revisions were made based on participants' comments. These revisions included: 1) improving responsive design features, 2) editing grammatical errors, 3) revising specific items, and 4) clarifying resource section. First, participants suggested that using a mobile friendly setting and numbering system (i.e., a scale of 1 to 5) would make it easier to take the survey. Second, the entire questionnaire was proofread again because participants pointed out there were some minor grammatical errors. Third, several items were revised for specific reasons. For example, an option "prefer not to answer" was added onto race/ethnicity item to avoid sensitivity issues. Amount of alcoholic drinks was narrowed from a four week total to an average per week to help participants more easily calculate their alcohol consumption. Business major was added as an option for academic major item because several participants perceived that the survey was slanted towards hospitality management majors. Current employment item was rephrased considering one might work multiple jobs. Fourth, approximately one-third of participants commented that the resource section was confused. The researchers rephrased the section instructions and left the example item on the top, moved the potentially one confusing item to the bottom, and randomized the rest of the items. In addition, a factor analysis was conducted for the resource section to determine whether to remove, add, or modify items.

For factor analysis, a sample size of 433 was sufficient as recommended by Tinsley and Tinsley (1987). The output was generated using Qualtrics®. The SPSS statistical software package (Version 23.0, 2016) was utilized for data analysis. Principal

components analysis (PCA) with varimax rotation method, were conducted to extract factors for the 19-item COR-E (Appendix D). Prior to PCA, the suitability of data for factor analysis were determined based on the Kaiser-Meyer-Olkin value exceeded .60 (value = .83) (Kaiser, 1970, 1974) and the Bartlett's Test of Sphericity was significant (Bartlett, 1950). According to Kaiser's (1960) criterion—eigenvalue equal to or greater than one—and scree plot, four factors were determined for further investigation. Table 3.1 shows the eigenvalues and total variance for principal component analysis of resource items. The four-factor solutions explained a total of 51.50% of the variance of the resource items. Table 3.2 shows the mean scores, standard deviations, and factor loadings of resource items.

Table 3.1 *Eigenvalues and total variance for principal component analysis of resource items*

Factor	Eigenvalues ^a	% of Variance
1	5.083	26.750
2	1.648	8.671
3	1.601	8.427
4	1.453	7.647
5	1.071	5.635
6	0.925	4.868
7	0.878	4.620
8	0.833	4.384

Note. ^aEigenvalues greater than 1 are in boldface type.

Table 3.2 Mean scores, standard deviations, and factor loadings of resource items

Items	Mean ^b	SD	Factor Loading			
			Factor 1	Factor 2	Factor 3	Factor 4
Acquiring adequate clothing	3.23	.665	.508^c	.296	.039	.206
Obtaining personal transportation	3.07	.672	.417	.069	.084	.090
Acquiring adequate food	3.10	.822	.452	.349	-.007	.258
Obtaining housing that suits my needs	3.15	.695	.359	.500	.031	.120
Maintaining intimacy with spouse or partner	2.98	.824	.098	.612	-.003	-.067
Maintaining intimacy with at least one friend	3.16	.912	.089	.733	-.091	.004
Having companionship	3.06	.863	.158	.741	.137	-.057
Receiving affection from others	3.12	.862	.154	.740	.011	.047
Having loyalty of friends	3.11	.741	.154	.571	-.045	.130
Feeling that I am unsuccessful ^a	2.97	.848	.062	.029	.840	-.109
Feeling valuable to others	3.03	.837	.081	.646	.084	.213
Feeling that my life is out of control ^a	2.93	.849	.082	.023	.851	.081
Having a sense of optimism	3.07	.884	.071	.537	.395	.298
Having motivation to get things done	2.93	1.039	.119	.510	.296	.244
Having savings or emergency money	2.94	1.009	.756	.034	.041	.015
Having financial help if needed	3.01	.693	.565	.226	.016	.054
Acquiring adequate income	3.13	.951	.797	.062	.023	-.070
Having time for adequate sleep	2.91	1.052	.173	.105	-.004	.808
Having free time	2.99	1.222	.057	.072	.012	.861

Note. ^aScores of these items were reversed.

^bA 5-point Likert type scale ranging from 1 to 5 (1 = a great deal of loss, 2 = some loss, 3 = no gain, no loss, 4 = some gain, and 5 = a great deal of gain) was used in this section.

^cFactor loadings greater than .50 are in boldface type.

Questionnaire final revision. The final questionnaire consisted of five sections including sleep health, resources, stress, academic performance, and demographic items. Measurement reliability and validity are addressed below.

Sleep health. In the SATED scale (Buysse, 2014, p. 17B), a revision was made for the item asking how often the participant slept between six and eight hours per day. The sleep duration was changed from between six and eight hours to between seven and nine hours because the recommended sleep duration for young adults (18-25 years old) was updated by the National Sleep Foundation (Hirshkowitz et al., 2015) after Buysse (2014) published his SATED scale. In the current study, Cronbach's alpha was .58 for the SATED scale. Because the SATED scale was initially developed as a diagnostic assessment, the reliability of the scale may be reduced using the questionnaire format.

In addition, a total of seven sleep-related items were added or removed from the demographic section. One item was added to ask participants' amount of alcoholic beverage consumption. One alcoholic drink is defined as a 12 oz. can or bottle of beer or wine cooler, a 5 oz. glass of wine, or a 1.5 oz. shot of liquor straight or in a mixed drink ("What is a standard drink?," n.d.). Participants were asked to indicate the number of drinks per week using the following increments: 0, 1-2, 3-6, 7-14, 15-30, and over 30. Seven drinks for women and 14 drinks for men per week indicate moderate drinking habits according to the National Institutes on Alcohol abuse and Alcoholism ("Drinking levels defined," n.d.). Four items regarding frequency of drinking alcoholic beverages, taking sleep aids (e.g., Ambien[®], Unisom[®], antihistamine), consuming caffeinated beverages (e.g., coffee, tea, chocolate, soft drinks, and energy drinks), and using technology before bed were asked using a 5-point scale (1 = never to 5 = always). Two

items asked about participants' perceived impact of caffeinated beverages and technology on their sleep using a 5-point scale (1 = strongly disagree to 5 = strongly agree).

Resources. Resource items were reduced from 74 items to 19 items by categorizing four factors, selecting at least three items per factor, and deleting the rest of the items due to duplication (See Appendix D for details). The 19-item COR-E used a 5-point scale (1 = a great deal of loss, 2 = some loss, 3 = no gain and no loss, 4 = some gain, and 5 = a great deal of gain). There were two negatively stated items which were "feeling that I am unsuccessful" and "feeling that my life is out of control." Scores of these two negatively stated items were reversed for data analysis. In the current study, Cronbach's alpha for each subscale of the original 19 items on the COR-E was .62 for objects, .79 for conditions, .55 for personal characteristics, and .70 for energies (n = 817). Due to the low reliability, additional analysis was done with only the sample having complete data and Cronbach's alpha was .73 for objects, .79 for conditions, .68 for personal characteristics, and .72 for energies (n = 654) indicating acceptable reliability (DeVellis, 2012, p. 109).

Stress. The 4-item PSS (PSS-4) was replaced by the 10-item PSS (PSS-10) to measure stress as recommended by the expert panel. Cohen and Williamson (1988) suggested the PSS-10 had respectable reliability to measure perceived stress (Cronbach's alpha = .78). Previous work using the PSS-10 reported its reliability was between .74 and .91 (Lee, 2012). PSS-10 has been shown a reliable, valid instrument (e.g., Mitchell et al., 2008; Roberti, Harrington, & Storch, 2006). In this study, PSS-10 was employed using a 5-point scale, rating from 1 = never, 2 = almost never, 3 = sometimes, 4 = fairly often, to 5 = very often. There were four positively and six negatively stated items; scores

of the four positively stated items were reversed for analysis. The four positively stated questions were “How often have you felt confident about your ability to handle your personal problems?”; “How often have you felt that things were going your way?”; “How often have you been able to control irritations in your life?”; and “How often have you felt that you were on top of things?” Scores of these four positively stated items were reversed for data analysis. A total score was determined and ranged between 5 and 50. A higher score indicated a higher level of perceived stress. In the current study, Cronbach’s alpha was .84 for the PSS-10 indicating very good reliability (DeVellis, 2012, p. 109).

Academic performance. A question asking about the grading scale used at participants’ respective institutions (e.g., 4- or 5-point scale) was removed because all participating institutions used a 4-point scale.

Demographic items. Sleep-related items were moved to sleep health section. Demographic data were collected, including sex, age, race/ethnicity, classification status (e.g., freshman, sophomore), international status, permanent address zip code, academic major, work/internship requirement, study abroad program, and parental education. Parental expectation was measured by five items adapted from the family expectation-driven motivation subscale of the Student Motivation for Attending University (SMAU, Cote & Levine, 1997; Dennis, Phinney, & Lizette, 2005; Phinney, Dennis, & Osorio, 2006). Parent expectation scale used a 5-point scale (1 = strongly disagree to 5 = strongly agree) and its Cronbach’s alpha was .82, indicating very good reliability (DeVellis, 2012, p. 109). Seven items regarding employment were placed at the end of the questionnaire, including workplace, job title, managerial/supervisory responsibility, work shift, getting sufficient sleep, paid work hours, and length of employment in current job.

Sample selection

The target population for this study was hospitality and business undergraduates in the United States. Students outside of the United States were excluded because curriculum design and percentage of undergraduate students having jobs may differ across countries. Participants were recruited from institutions inside of the United States that had the following criteria: a) a 4-year baccalaureate degree program, b) more than 1,000 enrolled hospitality undergraduates, c) a semester system, and d) both hospitality and business colleges and/or schools. *The Guide to College Programs in Hospitality, Tourism, & Culinary Arts* (ICHRIE, n.d.) was used as the database for institution selection. All undergraduates from both hospitality and business colleges and/or schools were included. Four institutions met the criteria— Florida International University, University of Central Florida, University of Houston, and University of Nevada-Las Vegas. No private institution matched the identified criteria. The primary researcher then visited the websites for each institution to confirm the information provided in the database and check program requirements (i.e., internship requirement, numbers of required credits) (ICHRIE, n.d.). Due to a low response rate, the primary researcher extended the target institutions to an additional six universities in the United State (for a total of 10) using convenience sampling, which followed the selection criteria without the limitation of enrollment number. The additional six institutions were Kansas State University, Oklahoma State University, Pennsylvania State University, Purdue University, San Jose State University, and University of South Carolina.

Distribution

For survey distribution, the primary researcher developed a recruitment email, a cover letter including the informed consent form, and an online version of the final questionnaire (Appendix F). The output was generated using Qualtrics[®]. An expected sample size was approximately 300 hospitality and 300 business undergraduates. The desired minimum sample size was 152 undergraduates for each major according to power analysis (Faul, Erdfelder, Lang, & Buchner, 2007). After receiving IRB approval and modifications from ISU (see Appendix B), the primary researcher contacted the selected colleges or schools. The primary researcher was not directed to go through the IRB process at other institutions. An email requesting assistance was sent to individual contacts. A follow-up email was sent if the individual contacts did not reply in a few weeks. If responses were not received over one week, the primary researcher made a conference call or left a voice message directly. For those individual contacts who were willing to help, a recruitment email was sent with a link accessing the online questionnaire and individual contacts forwarded to their colleagues or students. A recruitment email was sent directly to students in one hospitality program and two business programs because the primary researchers had access to email addresses. These mass emails were distributed via Constant Contact[®], an online marketing company recommended by primary researcher's university.

When students accessed the online questionnaire, a question was asked on the first page to receive participants' agreement. Data were collected during fall 2016. The earliest recruitment email was sent four weeks after semester started and the link was closed at the end of finals week. Two reminders were sent at the beginning of the second

and third week of the data collection period to increase the response rate as recommended by Dillman, Smyth, and Christian (2014). Each participant had an opportunity to enter into a drawing for a 1-in-25 chance of winning a \$25 gift card. Contact information for the drawing were collected separately from the survey data. Some participants had the opportunity to receive extra credit if their instructors provided it. Instructors had to offer an alternative activity to earn extra credit if their students chose not to participate in the survey.

Data analysis

The Statistical Package for the Social Sciences (SPSS, Version 23.0, 2016) and the Analysis of Moment Structures (AMOS, Version 24.0, 2016) was utilized for data analysis. Reliability, as a measure of internal consistency, was calculated for each identified variable (e.g., parental expectation, external resources, internal resources, and stress) using Cronbach's alpha. The degree of internal consistency reliability was determined based on the criteria identified by DeVellis (2012, p. 109), a coefficient alpha below .60 was considered unacceptable, between .60 and .65 was undesirable, between .65 and .70 was minimally acceptable, between .70 and .80 was respectable, and between .80 and .90 was considered very good. If the coefficient alpha is much above .90, DeVellis suggested scale developers consider shortening the scale. The values of Cronbach's alpha for scales used in this study were between .68 and .84 indicating acceptable reliability.

Convergent validity and discriminant validity were evaluated. To test validity, confirmatory factor analysis was performed. Convergent validity was assessed using factor loadings and average variance extracted (Fornell & Larcker, 1981). As

recommended by Hair, Black, Babin, and Anderson (2009), convergent validity is satisfied when factor loading more than 0.5 and the average variance extracted at a level of 0.5 or higher. Discriminant validity was accessed by the correlations between variables as recommended by Furr and Bacharach (2014).

Descriptive statistics including means, standard deviations, frequencies, and percentages were computed and used to analyze demographic information and the scaled data. Exploratory factor analysis with varimax rotation method, were performed to extract factors for one of the constructs—external resources. Structural equation modeling was used following Anderson and Gerbing's (1988) two-step approach. First, a confirmatory factor analysis was conducted to determine convergent validity and discriminant validity of the measurement model. Second, structural equation models were used to estimate the relationships between constructs by applying the maximum likelihood method.

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CHAPTER 4. STUDY, WORK, AND SLEEP: A STUDY ABOUT COLLEGE STUDENTS WORKING IN HOSPITALITY, LEISURE, SPORT, AND TOURISM INDUSTRIES

A paper to be submitted to the *Journal of Hospitality, Leisure, Sport, & Tourism Education*

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Abstract

This study compared hospitality student employees, non-hospitality student employees, and students without a job to ascertain their sleep and related behaviors, to examine the relationships between sleep and work conditions and to determine how strongly sleep relates to academic performance. An online survey was distributed to six universities with hospitality programs in the United States. Of the 736 participants, 175 (23.8%) were hospitality employees, 265 (36.0%) were non-hospitality employees, and 296 (40.2%) were not working. Data analysis included descriptive statistics, correlations, and analysis of variance (ANOVA). Results found that poor sleep was related to using sleep aids, taking caffeinated beverages, and having long work hours. Students' average grade points were associated with their sleep, work hours, and household income. Hospitality student employees' sleep score was slightly, but not significantly, lower than non-hospitality employees. A high percentage of hospitality student employees was shift workers and had long work hours. This research is beneficial for building a cooperative relationship among hospitality administrators, hospitality practitioners, and hospitality student employees.

Keywords: Academic performance, hospitality student employees, shift work, sleep

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1. Introduction

Academic ability, relevant work experiences, and good health are all important for college student success. From an educational perspective, our goal is for students to balance study, work, and health wellness. Sleep is a basic physiological need for all human beings. In other words, sleep is a vital component of health wellness. Sleep of shift workers, people who work evening, night shift, rotating shifts, split shifts, or irregular schedules (U.S. Department of Labor [USDL, 2005]), has been studied and significant results found. Poor sleep has been associated with absenteeism from work, work-related accidents, automobile accidents, and various diseases (Caruso & Rosa, 2012; Rosekind et al., 2010).

According to the Bureau of Labor Statistics in 2004, millions of Americans were shift workers; of that group, the leisure and hospitality industries had the highest proportion (38.3%) of shift workers (USDL, 2005). More recently, Torpey (2015) summarized U.S. government data from 2011 to 2014 and showed that foodservice employees worked in the evening (between 6 p.m. and 10 p.m.) at a rate that was approximately twice as high as the average rate of total employed people. Additionally, the hospitality industry employs the largest number of young workers. Based on 2014 data, there were a total of 18,442,000 workers between 16 and 24 years old; of that group, 4,573,000 (24.8%) young workers were employed in the leisure and hospitality industries, followed by 4,080,000 (22.1%) in wholesale and retail trade industries (USDL, 2015).

Based on existing literature and government data, hospitality student employees may be a population that would have a high potential risk of sleep problems. However,

few studies have explored the effect of sleep on academic performance for hospitality student employees. Due to a lack of associated information, it is difficult for hospitality educators and employers to assist in balancing student employees' study, work, and sleep. The purpose of this study was to demonstrate students' sleep as related to their sleep behaviors, work conditions, and academic performance using a sample of the college students working in hospitality, leisure, sport, and tourism industries.

2. Sleep and College Students

Sleep is a concern not just for shift workers but also for college students. In an extensive review, Hershner and Chervin (2014) indicated that common sleep problems for college students were daytime sleepiness, sleep loss, and irregular sleep schedules. The researchers summarized the causes and consequences of these sleep problems. The potential causes of college students' sleep problems included class and/or work schedules, sleep disorders, and bad habits (e.g., taking alcohol as a sleep aid, having caffeine after lunch, and using technology before bed). Consequently, these sleep problems may have a negative impact on a student's mood, driving ability, and academic performance. Academic success is often a priority for college students; therefore, an in-depth review of previous works focusing on the relationship between sleep and academic performance will be addressed next.

2.1. Sleep and academic performance

The impact of sleep problems on college students' academic performance has been studied for more than 40 years and mixed results were found. The key findings of previous works were: 1) relatively high grades were reported by college students who had very good sleep quality (Gomes, Tavares, & de Azevedo, 2011), slept more than nine

hours (Kelly, Kelly, & Clanton, 2001), and did not delay their sleep (Lack, 1986); 2) grade point average (GPA) was significantly impacted by daytime sleepiness, sleep duration, and sleep latency (Chiang, Arendt, Zheng, & Hanisch, 2014; Singleton & Wolfson, 2009); and 3) correlations between sleep variables and GPAs were not consistent. Some researchers found that student GPAs were not significantly correlated with sleep variables, such as daytime sleepiness, dissatisfaction with sleep, sleep hours, and sleep quality (Howell, Jahrig, & Powell, 2004; Peters, Joireman, & Ridgway, 2005), while some researchers reported GPA was negatively correlated with sleep variables, such as daytime sleepiness, delayed bedtime, sleep duration, sleep schedule, and time awake before getting out of bed (Singleton & Wolfson, 2009; Taylor, Vathauer, Bramoweth, Ruggero, & Roane, 2013). A summary table (Table 4.1) provides an overview of these mixed findings. Studies were ordered by year.

Table 4.1.
Findings related to sleep and academic performance.

Author(s)	Country	N	Age range in years (mean \pm SD)	Major/ School	Key findings
Lack (1986)	South Australia	211	16-50 (23 \pm n.a.)	General	<ul style="list-style-type: none"> • Delayed sleep resulted in a lower course final grade than non-delayed sleep (M = 58.8 vs. 63.7).
Kelly et al. (2001)	USA	148	18-42 (19.9 \pm 3.85)	General	<ul style="list-style-type: none"> • Long sleep hours (\geq 9 h) resulted in a higher overall college GPA than short sleep hours (\leq 6 h) (M = 3.24 vs. 2.74).
Howell et al. (2004)	Canada	414	17-50 (20.1 \pm 3.8)	General	<ul style="list-style-type: none"> • Daytime sleepiness and sleep quality were not significantly correlated to official GPA and course grade ($r = -.03$ to $.01$).
Peters et al. (2005)	USA	231	18-41 (19.0 \pm 2.82)	General	<ul style="list-style-type: none"> • Oversleeping was negatively correlated to GPA ($r = -.29$). • Sleep variability during week, sleep hours, dissatisfaction with sleep, difficulty sleeping, and falling asleep during the day were not significantly correlated to GPA ($r = -.10$ to $.02$).

Table 4.1.
(continued)

Author(s)	Country	N	Age range in years (mean \pm SD)	Major/ School	Key findings
Singleton & Wolfson (2009)	USA	236	18-22 (n.a. \pm n.a.)	General	<ul style="list-style-type: none"> • Daytime sleepiness and sleep schedule were significantly correlated to official cumulative GPA and semester GPA ($r = -.25$ to $-.18$). • Oversleep and bedtime delay were not significantly correlated to official cumulative GPA and semester GPA ($r = -.10$ to $-.01$). • Sleep duration was significantly correlated to official cumulative GPA ($r = -.15$), but not official semester GPA ($r = -.06$). • Daytime sleepiness and sleep duration significantly impacted official cumulative GPA ($\beta = -.21$ and $-.13$).
Gomes et al. (2011)	Portugal	1,654	17-25 (19.98 \pm 1.65)	General	<ul style="list-style-type: none"> • Very good sleep quality resulted in higher grades than very poor, poor, and good sleep quality ($M = 3.29$ vs. 3.30, 3.28, and 3.43).
Taylor et al. (2013)	USA	867	n.a. (19.8 \pm 1.9)	Psychology	<ul style="list-style-type: none"> • Total sleep time (TST), time awake before arising, TST inconsistency, and quadratic terms of TST were significant predictors of official cumulative GPA ($R^2 = .344$).
Chiang et al. (2014)	USA	172	93% between 18-24 years (n.a. \pm n.a.)	Hospitality & Non-Hospitality	<ul style="list-style-type: none"> • Sleep latency significantly affected official cumulative GPA ($B = -.12$). • Sleep medicine significantly affected official semester GPA ($B = -.15$).
Haraszti et al. (2014)	Hungary	753	18-35 (21.23 \pm 3.12)	Physiology	<ul style="list-style-type: none"> • Social jetlag^a has a significant impact on the weekly average grade ($B = -1.81$), but not on the final exam grade ($B = -0.17$).

Note. n.a.: not available.

^aSocial jetlag was defined as the differences “between sleep timing on workdays and weekends” (Haraszti, Ella, Gyöngyösi, Roenneberg, & Káldi, 2014).

In addition to sleep, there may be other variables impacting college students’ academic performance, such as parental expectation and socioeconomic status (SES).

Looking at students at 5th grade and follow up at 8th grade, Grossman, Kuhn-McKearin,

and Strein (2011) found that parental expectation, gender, and SES were correlated with student achievement (e.g., reading and math tests). In Vartanian, Karen, Buck, and Cadge's (2007) study, they found that Asians parents had high expectations for their children to complete colleges. Comparing Whites and Chinese Americans, Pearce (2006) found that higher parental expectation was associated higher student achievement for both ethnic groups. These findings suggest that SES and parental factors may have potential effects on college students' academic performance.

2.2. Sleep and student employees

Working simultaneously while attending school is common for many college students. A recent report targeting students between 16 and 24 years old, showed that about 5.7 (46.3%) of 12 million college students were employed, while about 1.7 (18.2%) of 9 million high school students were employed (USDOL, 2015). Considering the smaller numbers of high school students working and limited impact of work on sleep due to a law limiting the number of hours minors can work (Fair Labor Standards Act of 1938) along with regulated academic schedules, high school students were excluded from this study.

College students intermingle work and study for different reasons. For some students who have financial needs, a job is necessary to cover tuition and/or living costs. For other students, industrial experience (i.e., work experience or internship) is required for graduation; most hospitality programs require a certain number of intern or work hours to graduate (Kay & DeVeau, 2003). However, student employees can be challenged by maintaining the delicate balance between their study, work, and sleep. For

example, student employees' sleep can be influenced by sacrificing sleep time to work and study, or can be impacted negatively by the pressures coming from work and studies.

Researchers have studied the relationship between sleep, work, and student employees' grades. Sampling 185 student employees from a large private U.S. university, Trockel, Barnes, and Egget (2000) used a forward stepwise regression and identified that sleep habits and work hours might serve as predictors for student employees' grades. In another study sampling 903 student employees from a southeastern U.S. university, Miller, Danner, and Staten (2008) explored the effects of work hours on sleep hours and student GPA using odds ratio. Participants were classified into three groups based on their weekly work hours: (1) short group: less than 10 work hours ($n = 523, 57.9\%$); (2) medium group: between 10 and 19 work hours ($n = 206, 22.8\%$); and (3) long group: equal to 20 or more work hours ($n = 172, 19.0\%$). Two binary variables were identified as the dependent variables for conducting the logistic regression analyses, including short sleep hours (i.e., sleeping less than seven hours per night) and good grades (i.e., having a GPA of 3.0 or higher). As a result, there was a 1.45 times greater likelihood of short sleepers being in the long work hour group than the short work hour group (odds ratio = 1.450, $p = .052$). Conversely, participants working 20 hours or more were less likely to achieve a GPA of 3.0 or greater than those in the short work hour group (odds ratio = 0.432, $p < .001$). No significance was found for the medium group, as compared to the short group.

Having good sleep can be beneficial for student employees' learning and memory abilities there in turn benefiting their studies and work performance. Evidence regarding the beneficial relationship between sleep, learning, and memory has been reviewed in

previous studies (Curcio, Ferrara, & De Gennaro, 2006; Hershner & Chervin, 2014). In addition, a positive relationship between sleep quality and job performance has been found in a study sampling 117 student employees from a large state university (Chiang et al., 2014). However, a strong connection between sleep and hospitality student employees' academic performance, the priority when attending college, has not been found in the hospitality-related literature.

2.3. Sleep and hospitality undergraduates

Hospitality education emphasizes industrial experience. Related work experience is commonly required for hospitality students before graduation and is considered important for their future career success. For hospitality students, sleep and studies may be negatively affected by the irregular work schedule, and at the same time poor sleep may affect students' physical, mental, and social health, as well as their academic success. Brand, Hermann, Muheim, Beck, and Holsboer-Trachsler (2008) explored whether a nonstandard work schedule affected hospitality and tourism student employees' sleep and/or mental health by examining the relationships between sleep, work, and strain among Swiss student employees in the hospitality and tourism industry. A total of 92 participants (48.4% response rate) completed a one-week sleep log and six questionnaires, including a depression questionnaire and an anxiety questionnaire. Sleep quality was shown to be negatively correlated with depression and anxiety ($r = -0.58, p < .001$) among hospitality and tourism student employees. The researchers also found that increased work hours were associated with decreased sleep hours as well as higher levels of insomnia. Weekend work hours had negative relationships with depression and anxiety. However, no effect was found between weekend work schedule and sleep.

Only a few studies have focused on the relationship between sleep and academic performance for hospitality student employees; one study found that the relationship between sleep and academic performance is weak (Chiang et al., 2014). It is possible that some students achieve high grades using their own strategies (e.g., drinking caffeinated beverages) to cope with sleep problems (e.g., daytime sleepiness, delayed bedtime, poor sleep quality, sleep disturbances, sleep deprivation). In other words, the effects of sleep on academic performance might be hidden, which would pose a challenge to promoting the importance of sleep in education as well as assisting students to balance study, work, and sleep.

The above review of literature has identified research gaps in current scholarship regarding the relationship between sleep, work, and academic performance in college students, student employees, and hospitality undergraduates. Based on the review, the following research questions will be answered.

- How do the sleep and related behaviors of hospitality student employees, non-hospitality student employees, and students without a job compare?
- How does sleep relate to work conditions of hospitality student employees, non-hospitality student employees, and students without a job?
- How strongly sleep relate to the academic performance of hospitality student employees, non-hospitality student employees, and students without a job?

3. Methods

3.1. Population and sample

The target population was undergraduate students working in the hospitality, leisure, sport, and tourism industries in the United States. This study compared the results

of hospitality student employees, non-hospitality student employees, and students who did not have a job. The sample was recruited from six universities geographically dispersed throughout the U.S. having a 4-year baccalaureate hospitality program and a semester system. The database used for university selection was *The Guide to College Programs in Hospitality, Tourism, & Culinary Arts* (ICHRIE, n.d.).

3.2. Instrument

An online survey was developed and used for collecting data. An expert panel review and a pilot test were conducted to confirm the content validity of the instrument. Items were revised based on experts' and participants' comments. Three sections of the instrument, sleep health, academic performance and demographic items, were designated for the purpose of this study.

A measurement of sleep health was adapted from Buysse (2014, p. 17B) including five items: satisfaction with sleep, alertness during waking hours, timing of sleep, sleep efficiency, and sleep duration (SATED). While SATED uses a 3-point scale (0 = rarely/never, 1 = sometimes, and 2 = usually/always), the range of the total score is between 0-10 whereby zero indicates poor sleep health and 10 indicates good sleep health. In addition, there were seven sleep-related items including participants' amount of alcoholic beverage consumption, frequency of drinking alcoholic beverages, taking sleep aids (e.g., Ambien[®], Unisom[®], antihistamine), using technology before bed, and consuming caffeinated beverages (e.g., coffee, tea, chocolate, soft drinks, and energy drinks), as well as perceived impact of technology and caffeinated beverages on sleep.

Self-report cumulative grade point average (GPA) was used as a measure of academic performance. In research by Chiang (2013), self-report GPA data were 80%

accurate (135 out of 172 participants) when comparing participants' self-reported cumulative GPAs to their official cumulative GPAs.

Demographic data were collected, including sex, age, race/ethnicity, classification status (e.g., freshman, sophomore), academic major, work/internship requirement, parental education, parental expectation, and permanent address zip code. Zip codes were then linked to median household income for the county (U.S. Census Bureau, 2016). Parental expectation was measured by five items adapted from the family expectation-driven motivation subscale of the Student Motivation for Attending University (SMAU, Cote & Levine, 1997; Dennis, Phinney, & Lizette, 2005; Phinney, Dennis, & Osorio, 2006). Parent expectation scale used a 5-point Likert-type scale (1 = strongly disagree to 5 = strongly agree and was found to be reliable with a Cronbach's alpha of .82. Seven items regarding employment were placed at the end of the instrument, including workplace, job title, managerial/supervisory responsibility, work shift, getting sufficient sleep, paid work hours, and length of employment in current job.

3.3. Data collection and analysis

A recruitment email with a link to the online survey was sent to students directly or via institutional contacts (e.g., research directors, department chairs, instructors) during fall 2016. Two reminders were sent at the beginning of the second and third week of the data collection period to increase the response rate as recommended by Dillman, Smyth, and Christian (2014). Contacts were asked to send reminders as well; however, the researchers were not able to verify they were actually sent. Demographic information and the scaled data were analyzed using descriptive statistics, Cronbach's alpha, correlations, and analysis of variance (ANOVA).

4. Results and Discussion

4.1. Sample demographics

There were 736 participants; of those, 175 (23.8%) were hospitality student employees, 265 (36.0%) were non-hospitality student employees, and 296 (40.2%) were students who did not have a job. A response rate could not be calculated due to distribution methods beyond our control. The majority of the sample was female (n = 460, 62.5%), 18-24 years old (n = 708, 96.2%), Caucasian (n = 501, 68.1%), and juniors or seniors (n = 493, 66.9%). Before graduating, about 30% (n = 219) of participants were required to complete an internship, while about 15% (n = 110) of participants were required to have work experience. The majority of participants were from counties where the median household income was between \$50,000 and \$74,999 (n = 513, 76.5%). Approximately 40% (n = 299) of participants reported that their parents' or guardians' highest education level was a bachelor's degree. Table 4.2 shows the details of the sample demographics.

In this sample, 438 (59.5%) of 736 participants were employed and this percentage is higher than the reported percentage of employed U.S. college students (46.3%, USDL, 2015). Of the 438 student employees, the majority did not have managerial or supervisory responsibilities (n = 312, 71.2%), worked 20 hours or less per week (n = 319, 72.5%), and started their current job two years ago or earlier (n = 380, 86.3%). About half of the student employees (n = 235, 53.5%) were shift workers. Of the 235 shift workers, 49.8% (n = 117) were employed in hospitality industries.

As shown in Table 4.2, the three groups (hospitality, non-hospitality, and not working) were similar in sex, age, race/ethnicity, classification status, median household

income, and parental education. The hospitality group had a higher percentage of participants who were hospitality majors than non-hospitality and not working groups (52.0% vs. 18.5% and 18.9%, respectively). Additionally, higher percentages of requiring internship and work experience were found in the hospitality group than the other two groups (51.4% vs. 23.0% and 23.1%; 33.1% vs. 6.8% and 11.5%, respectively). The hospitality and non-hospitality groups were similar in managerial or supervisory responsibilities and time spent at their current job but different in work shifts and hours. Of the hospitality group, 66.9% (117 out of 175) were shift workers, and this percentage was almost twice as many (38%) as reported by U.S. Department of Labor (2005). The hospitality group had a higher percentage of participants working over 20 hours per week than the non-hospitality group (38.9% vs. 20.0%, respectively).

Table 4.2.
Sample demographics ($N = 735-736$).

Item	Hospitality ($n = 175$)		Non- Hospitality ($n = 263-265$)		Not Working ($n = 295-296$)		Total ($N = 735-736$)	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>N</i>	%
Sex								
Female	124	70.9	174	65.7	162	54.7	460	62.5
Age								
18-24 years old	164	93.7	259	97.7	285	96.3	708	96.2
25 years old and older	11	6.3	6	2.3	11	3.7	28	3.8
Race/Ethnicity								
African-American (non-Hispanic)	7	4.0	8	3.0	6	2.0	21	2.9
Asian/Pacific Islanders	24	13.7	31	11.7	66	22.3	121	16.4
Caucasian (non-Hispanic)	121	69.1	187	70.6	193	65.2	501	68.1
Latino or Hispanic	21	12.0	26	9.8	18	6.1	65	8.8
Others	2	1.1	13	4.9	13	4.4	28	3.8
Classification Status								
Freshman	23	13.1	18	6.8	69	23.3	110	14.9
Sophomore	23	13.1	46	17.4	64	21.6	133	18.1
Junior	47	26.9	105	39.6	72	24.3	224	30.4
Senior	82	46.9	96	36.2	91	30.7	269	36.5
Academic Major								
Hospitality, Tourism, or Events	91	52.0	49	18.5	56	18.9	196	26.6
Others	84	48.0	216	81.5	240	81.1	540	73.4
Internship Requirement								
Yes	90	51.4	61	23.0	68	23.1	219	29.8
No	85	48.6	204	77.0	227	76.9	516	70.2

Table 4.2.
(continued)

Item	Hospitality (n = 175)		Non- Hospitality (n = 263- 265)		Not Working (n = 295- 296)		Total (N = 735- 736)	
	n	%	n	%	n	%	N	%
Work Experience Requirement								
Yes	58	33.1	18	6.8	34	11.5	110	14.9
No	117	66.9	247	93.2	262	88.5	626	85.1
Median Household Income^a								
\$25,000~\$49,999	23	14.5	25	9.7	22	8.7	70	10.4
\$50,000~\$74,999	119	74.8	210	81.4	184	72.4	513	76.5
\$75,000 or more	17	10.7	23	8.9	48	18.9	88	13.1
Parents' or Guardians' Highest Education Level								
Less than Bachelor's degree	77	44.0	107	40.4	91	30.7	275	37.4
Bachelor's degree	62	35.4	100	37.7	137	46.3	299	40.6
Professional degree	36	20.6	58	21.9	68	23.0	162	22.0
Managerial/Supervisory Responsibility*								
Yes	53	30.3	73	27.8	-	-	126	28.8
No	122	69.7	190	72.2	-	-	312	71.2
Work Shift*								
Day shift	58	33.1	146	55.3	-	-	204	46.5
Evening, overnight, or rotating shifts	117	66.9	118	44.7	-	-	235	53.5
Average Work Hours Per Week*								
Less than or equal to 20 hours	107	61.1	212	80.0	-	-	319	72.5
More than 20 hours	68	38.9	53	20.0	-	-	121	27.5
Start Current Job*								
2 years ago or less	152	86.9	228	86.0	-	-	380	86.4
More than 2 years ago	23	13.1	37	14.0	-	-	60	13.6
GPA > 3.0								
Yes	104	59.4	170	64.2	177	60.0	451	61.4
No	71	40.6	95	35.8	118	40.0	284	38.6

Note. *N = 438-440. ^aInformation was based on county data and international students were excluded (Hospitality n = 159, Non-hospitality n = 258, Not working n = 254, Total n = 671).

4.2. Sleep and related behaviors

The total sleep score indicated participants' satisfaction with sleep, alertness during waking hours, timing of sleep, sleep efficiency, and sleep duration (Buysse, 2014). On average, the total sleep score was 6.01 (± 2.40) for the entire sample. The mean of the total sleep scores for each group was 5.83 (± 2.36) for hospitality, 6.00 (± 2.43) for non-hospitality, and 6.13 (± 2.39) for non-working groups. Figure 4.1 shows a comparison of the total sleep mean scores between the overall sample and sample groups. According to the total sleep scores, participants' sleep health was middle level, trending toward good

sleep health (Buysse, 2014, p. 17B). Hospitality student employees' sleep health was relatively poorer than non-hospitality student employees and students who did not have a job. However, using ANOVA, no significant difference in total sleep scores was found between groups (see Table 4.4).

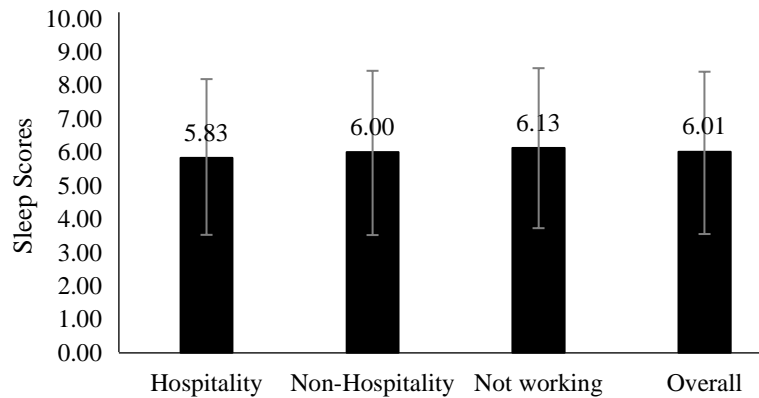


Fig 4.1. Mean of the total sleep scores (0 = poor sleep and 10 = good sleep). Error bars represent one standard deviation.

Potential causes of poor sleep may include high frequencies of using alcohol as a sleep aid, taking sleep aids, having caffeinated beverages in the afternoon to stay alert, and using technology before bed. The majority of participants reported less than seven drinks per week ($n = 578, 78.6\%$), which indicated that they were below the moderate level for drinking habits (“Drinking levels defined,” n.d.). Most participants reported never consuming alcoholic beverages ($n = 625, 85.1\%$) or sleep aids ($n = 574, 78.2\%$) to help them fall asleep. However, it should be noted that the legal drinking age in all states where data was collected was 21 years of age. Of total participants, 360 (48.9%) were under the age of 21 and of those 227 (30.8% of the total sample) reported consuming at least one to two drinks per week; therefore, this would mean they were drinking illegally. In other words, the percentage of participants using alcohol as a sleep aid was 14.9%, which was slightly higher than the percentage (11.4%) reported by another undergraduate-focused study (Taylor & Bramoweth, 2010). A large percentage of

participants usually used technology within an hour of going to bed ($n = 665$, 90.5%), though only 30.2% ($n = 222$) agreed that this behavior made it difficult for them to fall asleep. Similarly, the majority of participants sometimes consumed caffeinated beverages to help them stay alert ($n = 452$, 61.7%), but just 35.1% ($n = 258$) agreed this behavior made falling asleep difficult. Table 4.3 shows the means and standard deviations of sleep related behaviors and perceptions for the overall sample and sample groups. Results were similar among the three sample groups.

Table 4.3.
Comparison of sleep related behaviors and perceptions.

Item	Hospitality ($n = 175$)		Non- Hospitality ($n = 265$)		Not Working ($n = 296$)		Total ($n = 736$)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
	Amount of alcoholic drinks ^a	1.45	1.476	1.42	1.222	1.45	1.439	1.44
Frequency of consuming alcoholic drinks ^b	1.17	.481	1.22	.595	1.23	.572	1.21	.560
Frequency of taking sleep aids ^b	1.40	.809	1.34	.792	1.38	.795	1.37	.797
Perceived impact of technology on Sleep ^c	3.20	1.061	3.08	1.171	3.11	1.065	3.12	1.103
Frequency of using technology before bed ^b	4.57	.820	4.55	.830	4.56	.846	4.56	.833
Perceived impact of caffeinated beverages on sleep ^c	3.14	1.197	3.05	1.152	2.95	1.205	3.03	1.185
Frequency of consuming caffeinated beverages ^b	3.09	1.334	2.93	1.282	2.86	1.315	2.94	1.309

^aThe amount of alcoholic drinks per week included five categories (0 = 0 drinks, 1 = 1-2 drinks, 2 = 3-6 drinks, 3 = 7-14 drinks, 4 = 15-30 drinks, and 5 = over 30 drinks).

^bA 5-point scale was used (1 = never to 5 = always).

^cA 5-point scale was used (1 = strongly disagree to 5 = strongly agree).

The total sleep score comparisons based on sleep related behaviors are shown in Table 4.4. The total sleep mean score of participants who used alcohol as a sleep aid ($M = 5.65$, $SD = 2.16$) was 0.43 points lower than those who did not ($M = 6.08$, $SD = 2.43$), although no significant difference was found. Research has suggested that drinking alcohol before going to sleep changed peoples' normal sleep cycle and made them still feel tired after waking up, although it did help them fall asleep quickly (Ebrahim, Shapiro, Williams, & Fenwick, 2013). There was a significant difference between the total sleep mean score of participants who used sleep aids ($M = 5.54$, $SD = 2.35$) and

those who did not ($M = 6.13$, $SD = 2.40$). Increased frequency of nightmares has been identified as a common side effect of taking sleep aids (Rosenzweig, Breedlove, & Watson, 2005).

There was no statistically significant difference between the total sleep mean score of participants who used technology before bed ($M = 6.01$, $SD = 2.40$) and that of those who did not ($M = 5.67$, $SD = 2.46$). Almost all participants ($n = 723$, 98.2%) used technological devices before bed whereby this result might be biased due to highly unequal group sizes. Researchers have linked this behavior to insufficient sleep, sleep latency, and daytime sleepiness (Exelmans & Van den Bulck, 2016; Thomée, Eklöf, Gustafsson, Nilsson, & Hagberg, 2007).

Table 4.4.
Total sleep score comparisons.

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>
Employment				0.844	0.430
Hospitality industries	175	5.83	2.36		
Non-hospitality industries	265	6.00	2.43		
Not working	296	6.13	2.39		
Use alcohol as a sleep aid				3.647	0.057
Yes	109	5.61	2.16		
No	625	6.08	2.43		
Take sleep aids				7.818	< .01
Yes	160	5.54	2.35		
No	574	6.13	2.40		
Use technology before bed				0.245	0.621
Yes	723	6.01	2.40		
No	12	5.67	2.46		
Have caffeinated beverages				14.721	< .001
Yes	597	5.84	2.38		
No	135	6.71	2.35		
Shift workers*				2.476	0.116
Yes	235	5.77	2.35		
No	204	6.13	2.46		
Work hours per week*				5.341	< .05
Less than or equal to 20	319	6.09	2.32		
More than 20	121	5.50	2.57		
GPA >3.0				5.601	< .05
Yes	451	6.18	2.38		
No	284	5.75	2.41		

Note. * $N = 440$.

Regarding caffeinated beverage consumption, a significant difference in the total sleep mean score was found. The mean score of participants who had caffeinated beverages in the afternoon or evening ($M = 5.84, SD = 2.38$) was 0.87 points lower than those who did not ($M = 6.71, SD = 2.35$). The negative effect of caffeine on sleep included increasing the time it takes to fall asleep, reducing sleep hours, and resulting in insomnia, although the effects varied by when, how much, and how often an individual consumed caffeinated beverages (McKim, 2007).

4.3. Sleep and work conditions

Work conditions indicated work type (shift worker or non-shift worker) and work hours (10 hours or less, 11-20 hours, and more than 20 hours). As shown in Table 4.4, the total sleep mean score of shift workers ($M = 5.77, SD = 2.35$) was 0.36 points lower than that of non-shift workers ($M = 6.13, SD = 2.46$), but no significant difference was found. There was a significant difference between the total sleep mean score of participants working 20 hours or less per week ($M = 6.09, SD = 2.32$) and those working more than 20 hours ($M = 5.50, SD = 2.57$). This finding is in line with Miller et al's. (2008) study showing that college students working 20 hours or more were less likely to reach seven sleep hours or more.

4.4. Sleep and academic performance

The majority of participants reported their cumulative GPAs were higher than 3.0 ($n = 451, 68.7\%$). Similar percentages were found in the hospitality ($n = 104, 65.9\%$), non-hospitality ($n = 170, 67.2\%$), and non-working ($n = 177, 72.3\%$) groups (see Table 4.2). A significant difference in total sleep scores was found between participants with a

GPA of 3.0 or less ($M = 5.75$, $SD = 2.41$) than those with a GPA higher than 3.0 ($M = 6.18$, $SD = 2.38$).

Potential indicators of cumulative GPAs included sleep, work hours, median household income, parents' or guardians' education level, and parental expectation. Correlations between cumulative GPAs and potential indicators were computed (Table 4.5). Positive relationships were found between cumulative GPAs and total sleep scores ($r = .115$, $p < .01$) as well as county median household income ($r = .130$, $p < .01$). A negative relationship was found between cumulative GPAs and work hours ($r = -.154$, $p < .01$). Parental influence on cumulative GPAs was not found. The present findings in combination with similar results of previous studies (Chiang et al., 2014; Chiang & Arendt, 2016) may assist in explaining the weak relationship between sleep and student GPA. That is, despite a lack of sleep, students may use coping strategies to combat sleepiness or assist in falling asleep, which in turn helps them perform well academically.

Table 4.5.
Correlations between cumulative GPA and potential indicators.

Variable	<i>M</i>	<i>SD</i>	<i>r</i>	<i>p</i>
Total sleep score ^a	6.01	2.40	0.115	< .01
Work hours ^b	2.16	0.98	-0.154	< .01
Median household income ^c	\$59,580.02	\$12,442.95	0.130	< .01
Parents' or guardians' education level ^d	5.13	1.93	0.002	0.961
Parental expectation ^e	3.71	0.87	-0.079	< .05

Note. ^a0 = poor sleep health and 10 = good sleep health.

^bWork hours included five categories (1 = 10 hours or less, 2 = 11-20 hours, 3 = 21-30 hours, 4 = 31-40 hours, and 5 = over 40 hours).

^cInformation was based on county data and international students were excluded.

^dEducation level included eight categories (1 = less than high school, 2 = high school diploma or equivalent, 3 = some college, no degree, 4 = postsecondary non-degree award, 5 = associate's degree, 6 = bachelor's degree, 7 = master's degree, and 8 = doctoral or professional degree).

^eA 5-point scale was used (1 = strongly disagree to 5 = strongly agree).

5. Conclusions

The findings and implications of this study would be applicable to both hospitality and non-hospitality student employees. The most important findings of this study are that participants who had low sleep scores taking sleep aids to fall asleep, using caffeinated

beverages to stay alert, working long hours, or earning low GPAs. Including but not limited to sleep, multiple indicators of student GPA were studied and significant relationships were found between sleep, work hours, household income and student GPA. Specifically, hospitality student employee group had a higher percentage of shift workers, participants working over 20 hours, and internship/work experience requirements. On average, the sleep score reported by hospitality student employees was slightly lower than non-hospitality student employees and non-working students, but the three sample groups reported similar sleep related behaviors and GPAs.

5.1. Implications

Theoretically, this study contributes to enhance the knowledge of hospitality student employees' sleep, work, and study. Based on findings of this study, it can implied that hospitality student employees, an important workforce of hospitality industries, should be included as one of the potential target populations in sleep and shift work research.

Practically, this study is vital and applicable for developing curriculum, improving shift assignment, and assisting in work-life balance. Regarding hospitality curriculum, many programs require internships and/or work experiences before graduation. There is no doubt that internships and work experiences are necessary for hospitality students to gain overwhelming insight into future careers, find the best vocational fit, become more competitive than non-hospitality students, in order to increase their intention to stay in hospitality industries (Brown, Thomas, & Bosselman, 2015; Schoffstall, Arendt, & Brown, 2013).

Students struggling to balance sleep, study, and work often sacrifice sleep to study more or work longer hours; however, this sacrifice may result in excessive sleepiness, depression, or anxiety, which may further result in daytime dysfunctions (e.g., having difficulties understanding materials, taking longer to complete assignments/tasks) (Brand et al., 2008; Gillen-O'Neel, Huynh, & Fuligni, 2013; Hershner & Chervin, 2014). A better understanding of sleep will not only benefit hospitality administrators by making them aware of coping strategies (e.g., caffeinated beverages, sleep aids), but also by informing their program requirement decisions. Additionally, findings of this study may increase hospitality managers' attention to sleep and influence their scheduling practices. If both academic administrators and industrial practitioners understand the importance of sleep for students and show willingness to cooperate, students will be better able to balance their time spent studying, working, and sleeping instead of sacrificing one in favor of another.

5.2. Limitations

This study had a few limitations. First, the generalization of the results to other countries may be limited due to the differences in curriculum design and percentage of undergraduate students having jobs. Second, participants may underestimate their alcohol consumption due to impression management bias, ones attempt to make a good impression to others (Davis, Thake, & Vilhena, 2010).

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CHAPTER 5. WHY SHOULD WE STUDY SLEEP HEALTH IN HOSPITALITY AND TOURISM RESEARCH? A THEORETICAL PERSPECTIVE

A paper to be submitted to the *Journal of Hospitality & Tourism Research*

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ABSTRACT

Previous studies suggest that sleep health is a vital issue needing to be addressed in hospitality and tourism research; however, few known studies have focused on sleep health and its influences. This study developed and examined a new model to explore how sleep health interacts with stress and academic performance applying the conservation of resources (COR) theory. Participants were 654 undergraduate students with a hospitality or business major from six U.S. universities. Measures included resources (i.e., objects, conditions, energies, personal characteristics), stress, sleep health, and student performance. Data were analyzed using descriptive statistics and structural equation modeling. The results of the study showed that: 1) sleep health had a significant but weak effect on student grade point average (GPA), 2) stress had no significant effect on student GPA, and 3) students' majors did not moderate the relationships between resources, stress, sleep health and student GPA. Although sleep health seems not to be a strong predictor of academic performance, the study suggests that educators should not ignore the connection between sleep health and students' academic success and individual health. Theoretical implications are provided to help advance hospitality and tourism research using the COR theory.

KEYWORDS: Academic performance, conservation of resources (COR) theory, hospitality and tourism management, resources, sleep health, stress

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INTRODUCTION

Sleep and sleep research has garnered considerable attention in recent years. Sleep has been linked to a person's learning capabilities such as memory and attention (Curcio, Ferrara, & De Gennaro, 2006; Hershner & Chervin, 2014; Peigneux, Laureys, Delbeuck, & Maquet, 2001). Neuroscientists hypothesized that memory formation happens during sleep (Ambrosini & Giuditta, 2001; Giuditta et al., 1995; Plihal & Born, 1997; Smith, 2001). Recognizing and understanding the important relationship between sleep and learning in neuroscience, psychology, and neurobiology highlights the importance of sleep health in education; learning and memory are two key elements for student academic success. Poor sleep health may inhibit one's abilities to learn due to a lack of concentration, poor memory, or even depression.

There is evidence has shown that sleep health is compromised among college students. Common sleep problems for college students include sleep loss, delayed sleep, irregular sleep schedule, and daytime sleepiness (Hershner & Chervin, 2014; Lack, 1986; Singleton & Wolfson, 2009). College students' sleep health can also be impacted by working evening shifts, night shifts, rotating shifts, split shifts, or having irregular work schedules. Shift work can result in an irregular sleep schedule that leads to excessive daytime sleepiness, reduced performance, increased accidents, difficulties with personal relationships, and depression (Caruso & Rosa, 2012; "Shift Work and Sleep," n.d.). According to 2014 data, the highest percentage of college-aged employees were hired in the leisure and hospitality industries (U.S. Department of Labor, 2015); these industries often require shift workers.

Hospitality students commonly need industry experiences to meet program requirements. Internship/industry experience is required by most hospitality undergraduate programs (Kay & DeVeau, 2003) and industry professionals also ranked it as the most important curriculum component (Min, Swanger, & Gursoy, 2016). Recognizing that hospitality students' sleep health, in particular, may be affected by their program requirements, sleep health should be given more attention in hospitality education as well as hospitality industry. Additionally, sleep habits developed during this relatively young age may have implication for life-long overall health, such as cardiovascular disease and diabetes (Cleo, Isenring, Thomas, & Glasziou, 2017). Although the importance of sleep is on the forefront of many sleep research agendas (e.g., Buysse, 2014; Curcio et al., 2006; Hershner & Chervin, 2014), only a few hospitality studies have focused on sleep health (Brand, Hermann, Muheim, Beck, & Holsboer-Trachsler, 2008; Chiang, Arendt, Zheng, & Hanisch, 2014).

The conservation of resources (COR) theory is a conceptual model illuminating the action of conserving resources when experiencing stressful events (Hobfoll, 1989). Using the COR theory as the theoretical framework, the specific objectives of this study were to: 1) examine the relationship between resources, stress, sleep health and academic performance of undergraduate students and 2) determine whether differences in the relationship resources, stress, sleep health, and academic performance exist between hospitality and non-hospitality undergraduates.

Evolution of Sleep Research

The study of sleep is advancing rapidly as illustrated by the following three identified shifts in focus. First, the research purpose has shifted from focusing on the

treatment of sleep disorders to their prevention (Buysse, 2014), suggesting a change of focus from treating ill patients to promoting health of individuals. Second, to develop sleep research settings that mimic real life, the location of where sleep research participants are studied has changed from laboratories to real life-settings (e.g., home) (Buysse, 2014). Third, sleep studies have expanded beyond medical science to social science disciplines (e.g., psychology and sociology) (Buysse, 2014). Social scientists have begun paying attention to sleep-related issues, such as the effect of sleep on performance (e.g., Chiang et al., 2014; Snyder, 2003).

Responding to the evolving sleep research, a newer concept, sleep health, was put forth in an article published in the journal *Sleep* (Buysse, 2014). Sleep health is defined as “a multidimensional pattern of sleep-wakefulness, adapted to individual, social, and environmental demands, that promotes physical and mental well-being” (Buysse, 2014, p. 12). Buysse (2014) continued to suggest that “good sleep health is characterized by subjective satisfaction, appropriate timing, adequate duration, high efficiency, and sustained alertness during waking hours” (p.12). Notably, the definition and characteristics of sleep health encompass healthy individuals instead of patients with sleep disorders therefore distinguishing sleep health studies from sleep studies.

Sleep Health and Other Health Factors

Definition of Health. Human health is a broad concept that has been studied extensively. Studies included, but are not limited to, physical, mental, behavioral, sexual, and environmental health (e.g., Buhi, Marhefka, & Hoban, 2010; Horton & Snyder, 2009). Previous literature on the topic was reviewed to provide a specific definition for the proposed study. The World Health Organization (WHO, n.d.) defines health as “a

state of complete physical, mental and social well-being and not merely the absence of disease and infirmity”, a definition that has maintained since 1948. However, literature using the term “wellness” was also considered because of the overlap between health and wellness. From a historical perspective, Dunn (1959) claimed that health was a passive condition which differed from wellness, a dynamic concept, which is “a condition of change in which the individual moves forward, climbing toward a higher potential of functioning” (p. 447). Nevertheless, Dunn’s definition of wellness was similar to the WHO’s definition of health. Nowadays, the definitions of *health* and *wellness* are more similar, so although the WHO’s definition of health was adopted for the proposed study, literature using both terms will be reviewed and discussed.

Physical Health Factors Relating to Sleep Health. Sleep is a basic physiological need for everyone. Depriving sleep may produce fatigue (Minkel et al., 2012), cumulate sleep debt (Van Dongen, Rogers, & Dinges, 2003), and/or cause a series of inflammatory responses (Simpson & Dinges, 2007). A lack of and/or poor quality of sleep in the long-term may increase the risk of chronic illnesses such as obesity, diabetes, gastrointestinal disorders, hypertension, cardiovascular disease, Alzheimer’s disease, and cancer (Buxton & Marcelli, 2010; Hasler et al., 2004; Slats, Claassen, Verbeek, & Overeem, 2013).

Mental Health Factors Relating to Sleep Health. Continuous stress impacts individual sleep health. When under stress, the human body undergoes a series of reactions to help human beings produce and save energy (Kalat, 2008). Sleepiness is one of the symptoms of an exhausted immune system (Maier & Watkins, 1998); in other words, sleepiness might be a signal of experiencing prolonged stress.

Conversely, sleep health has an influence on certain aspects of mental health, such as individual emotion, mood, anxiety, depression, and stress (Baglioni et al., 2011; Minkel et al., 2012; Pilcher & Huffcutt, 1996). In a meta-analytic study, Baglioni et al., (2011) reported that the incidence of depression was twice as high in participants with insomnia as in participants without any sleep difficulties. In an experimental study, Minkel et al. (2012) suggested that the emotional threshold be reduced due to sleep loss. In sum, prolonged stress causing poor sleep health might impact the capability for emotional self-management, resulting in a vicious cycle.

Social Health Factors Relating to Sleep Health. Social and environmental demands vary between individuals. Each individual has to adequately manage and adapt their sleep patterns to social and environmental demands (Buysse, 2014), suggesting that sleep health is potentially related to social health. Jet lag disorders are common for air travelers whose circadian rhythm is disrupted due to changing time zones (Weingarten & Collop, 2013). Likewise, ‘social jetlag’, a term defined as the differences in sleep behaviors (e.g., sleep hours, sleep timing) between work days and days off, can also disrupt an individual’s circadian (Juda, Vetter, & Roenneberg, 2013; Wittmann, Dinich, Merrow, & Roenneberg, 2006). Lau et al. (2013) studied social jetlag in 1,139 college students with regard to their sleep behaviors between weekdays and weekends, and found the effects of social jetlag on quality of life and mood.

In conclusion, feeling sleepy is a potential warning sign of poor physical, mental, and/or social health. However, individuals’ overall health problems can be exacerbated when they reduce sleep hours and utilize inadequate sleep coping strategies (e.g., taking

caffeinated beverages to stay alert or using sleep aids to fall asleep) to meet the demands of work and daily life.

Conservation of Resources (COR) Theory

Overview of the COR Theory. The COR theory is a theory about stress and motivators of stress; the theory was developed by Hobfoll (1989). Resources play a significant role in the COR theory. A resource is defined as anything owned by a person; examples of resources include time, money, energy, and personality traits. When people predict or experience stressful challenges resulting in the threat of or actual loss of resources, they are motivated to protect or gain resources (Halbesleben, Neveu, Paustian-Underdahl, & Westman, 2014; Hobfoll, 1989). In particular, the COR theory focuses on common resources rather than individual specific resources (Hobfoll, 2011). In other words, the COR theory is concerned with the fluctuation of common resources utilized by a group of people when a stressor exists (Hobfoll, 2011).

Application of the COR Theory. The COR theory was initially proposed as a theory to explain the relationship between stress and trauma, but it is also applicable to other topics, such as employee burnout, emotional labor, organizational behaviors, positive psychology, and work schedule demands (Brotheridge & Lee, 2002; Halbesleben et al., 2014; Hobfoll, 2011; Peters et al., 2016). Regarding sleep health, the COR theory has been applied in several fatigue studies (Taylor, Jason, Shiraishi, Schoeny, & Keller, 2006; Vela-Bueno et al., 2008). Another fatigue study did not actually apply the COR theory but recommended that the COR theory be applied in future research (Troughakos, Hideg, Cheng, & Beal, 2014).

Measurement of the COR Theory. In the COR theory, four factors of resources are defined as follows: 1) objects (e.g., home), 2) conditions (e.g., marriage, tenure, and seniority); 3) personal characteristics (e.g., personal skills); and 4) energies (e.g., time and knowledge) (Hobfoll, 1989). Hobfoll et al. (1991) developed an instrument to measure resource gain and loss, the conservation of resources evaluation (COR-E) tool. To determine a set of resources for developing the instrument, a group process was used whereby groups of people were first asked to create a list of resources that were important to them. Comparing the lists, people were allowed to add or remove resources from the lists. The process was repeated until no additional resources were added, and one final list emerged from all groups. The final list included a total of 74 resources. Next, two sample groups of 74 adults and 255 undergraduate students were asked to quantify the gain and loss of the 74 resources using a 7-point scale (1 = little gain or loss to 7 = great loss of gain) and indicate if the gain or loss was recent or more distant but within the past year. Finally, principal components analysis was conducted separately for the two sample groups. Five factors (e.g., financial, personal, and work accomplishment) were extracted from the adult data and six factors (e.g., financial, personal, intimacy, and marriage/children) were extracted from the student data. Given the varied results between the sample groups, Hobfoll et al. (1991) neither concluded there was an exact number of factors nor categorized the 74 resources into the four domains of the COR theory.

One main concern of the COR-E is that the scale was too long, repetitive, and resources had not been clearly identified. To overcome these limitations of the COR-E, some researchers employed a different approach and selected specific variables as resources to develop a conceptual model and measured the variables using scales adapted

from other researchers rather than using the COR-E (e.g., Alarcon, Edwards, & Menke, 2011). Halbesleben et al. (2014) discussed the advantages and disadvantages of the approach when selecting specific resource variables. The approach was advantageous as focusing on the variables of interest; however, the approach biased the results by assuming the selected resource variables were the only resources utilized by people recovering from the life challenges studied.

Theoretical Framework

The COR theory was used as a theoretical framework for this study. Constructs identified were resources (i.e., objects, conditions, energies, and personal characteristics), stress, sleep health, and academic performance. The following sections will introduce the relationship between each construct, hypotheses, and conceptual framework.

External and Internal Resources. Resources were classified into four categories: objects, conditions, personal characteristics, and energies (Hobfoll, 1989). In this study, three categories—objects, conditions, and energies—were classified as external resources, and the remaining category—personal characteristics—was classified as internal resources. The distinction between external resources and internal resources was made based on the cause and effect relationships in our model between these four resource categories.

Stress. The COR theory views stress as the cause and outcome of unbalanced resources (Hobfoll, 2011), meaning a high level of stress is caused by the loss of resources and then a high level of stress can lead to the loss of resources. Based on the underpinnings of the COR theory, negative relationships between external resources and stress are hypothesized.

Hypothesis 1₀, 2₀ & 3₀: There is no relationship between external resources and stress.

Hypothesis 1_a, 2_a & 3_a: There is a negative relationship between external resources and stress.

Hypothesis 4₀: There is no relationship between stress and internal resources.

Hypothesis 4_a: There is a negative relationship between stress and internal resources.

Sleep health. As discussed in previous sections, sleep health seems to play an important role in the balance of health, work, and study for undergraduate students. In this study, good sleep health is viewed as the cause and outcome of balanced resources. Therefore, positive relationships between resources and sleep health are hypothesized.

Hypothesis 5₀, 6₀ & 7₀: There is no relationship between external resources and sleep health.

Hypothesis 5_a, 6_a & 7_a: There is a positive relationship between external resources and sleep health.

Hypothesis 8₀: There is no relationship between sleep health and internal resources.

Hypothesis 8_a: There is a positive relationship between sleep health and internal resources.

Academic performance. GPA is not the only indication of academic success, but it has widely been used as the measure of academic performance. Students' GPAs can be influenced by individual factors (e.g., intelligence, personality, health problems, test-taking abilities, work ethic) and environmental factors (e.g., class/program/school environment, socioeconomic status) (Hershner & Chervin, 2014). In this study, the effect of resources, stress and sleep health on undergraduate students' GPAs is the main area of interest. Although no known study has determined the relationship between resources and student GPA, personal characteristics—one of the four resource category—can be considered a potential individual variable relating to student GPA (Hershner & Chervin, 2014). Students with more resources (personal characteristics) are expected to perform better and have higher GPAs than those with less resources, according to the COR theory

(Hobfoll, 2011). Therefore, a positive relationship between internal resources and student GPA is hypothesized. Based on the review of literature, a negative relationship between stress and student GPA and a positive relationship between sleep health and student GPA are hypothesized.

Hypothesis 9₀: There is no relationship between internal resources and academic performance.

Hypothesis 9_a: There is a positive relationship between internal resources and academic performance.

Hypothesis 10₀: There is no relationship between stress and academic performance.

Hypothesis 10_a: There is a negative relationship between stress and academic performance.

Hypothesis 11₀: There is no relationship between sleep health and academic performance.

Hypothesis 11_a: There is a positive relationship between sleep health and academic performance.

METHODS

Population and Participants

The target population for this study was hospitality and business undergraduates in the United States. Students outside of the U.S. were excluded because requirements may differ across countries. *The Guide to College Programs in Hospitality, Tourism, & Culinary Arts* (ICHRIE, n.d.) was used for institution selection. Participants from six institutions, located across the U.S., and representing four time zones were recruited via a convenience sampling.

Instrument Development

An online questionnaire was developed and used for data collection. Measures included resources, stress, sleep health and academic performance. The researchers adapted a newly published sleep index designed for the general population, shortened an

existing scale developed for the COR theory, and utilized a common scale constructed for perceived stress. Five experts reviewed all items to confirm content validity. A pilot study was conducted to confirm the questionnaire was understandable and reliable.

Measurement Items

Sleep Health. Buysse (2014, p. 17B) developed a measurement of sleep health for the general population including five questions on satisfaction with sleep, alertness during waking hours, timing of sleep, sleep efficiency, and sleep duration (SATED). The SATED index was adapted for this study. The sleep duration item was updated by the National Sleep Foundation's new recommendations (7-9 hours/per night) (Hirshkowitz et al., 2015).

Resources. The conservation of resources evaluation (COR-E) was developed utilizing the COR theory as underpinning (Hobfoll et al., 1991); for the current study, the COR-E was utilized to measure resource loss and gain. Using partial COR items, internal reliability, in previous works, measured .85-.94 (Ennis, Hobfoll, & Schro, 2000; Hobfoll, Johnson, Ennis, & Jackson, 2003; Ironson et al., 1997). Given that selecting partial items from the scale proved reliable, we used a partial list to help make questionnaire length appropriate. In the current study, the COR-E was shortened to 19 items and placed in four categories by selecting at least three items per category and deleting duplicate items. The 19-item COR-E used a 5-point scale (1 = a great deal of loss, 2 = some loss, 3 = no gain and no loss, 4 = some gain, and 5 = a great deal of gain). There were two negatively stated items; scores of these items were reverse-coded for data analysis.

Stress. Items for measuring stress were adapted from the Perceived Stress Scale (PSS) developed by Cohen, Kamarck, and Mermelstein (1983). The PSS has widely been

used to measure stress. Previous work using the PSS-10 has shown it to be reliable (Cronbach's alpha between .74 and .91) (Lee, 2012) and valid (e.g., Mitchell et al., 2008; Roberti, Harrington, & Storch, 2006). In this study, PSS-10 was employed using a 5-point scale, rating from 1 = never, 2 = almost never, 3 = sometimes, 4 = fairly often, to 5 = very often. There were four positively and six negatively stated items; scores of the four positively stated items were reversed for analysis.

Academic Performance. This construct was measured using self-report cumulative GPAs; self-report GPAs have been found to be about 80% accurate (Chiang, 2013). Participants reported their GPAs by selecting one of nine intervals (e.g., 1 = less than 1.34, 9 = 3.68-4.00).

Data Collection

The primary researcher contacted selected colleges or schools by sending an email request to individual contacts. Next, a recruitment email was sent with a link accessing the online questionnaire and individual contacts forwarded it to their colleagues or students. The earliest recruitment email was sent four weeks after semester started and the questionnaire was closed at the end of finals week. To increase the response rate, two reminders were sent (Dillman, Smyth, & Christian, 2014). To encourage participation, participants could enter a drawing for a chance to win a \$25 gift card.

Data Analysis

The Statistical Package for the Social Sciences (SPSS, Version 23.0, 2016) and the Analysis of Moment Structures (AMOS, Version 24.0, 2016) were utilized. Exploratory factor analysis with varimax rotation method, were performed to extract factors for one of the constructs—external resources. Structural equation modeling was used following Anderson and Gerbing's (1988) two-step approach. First, a confirmatory

factor analysis was conducted to determine convergent validity and discriminant validity of the measurement model. Second, structural equation models were used to estimate the relationships between constructs by applying the maximum likelihood method.

RESULTS

Participant Profiles

After eliminating the invalid responses (e.g., under 18 years old and graduate students) and missing data, 654 responses were utilized. The majority was females (64.2%), 18-24 years old (96.5%), and Caucasians (69.1%). In terms of classification status, 41.4% were seniors, followed by 32.3% juniors, 18.8% sophomores, and 7.5% freshmen. Among majors, 179 (27.4%) participants were hospitality management, tourism, or event major, while 449 (68.7%) were business majors and 26 (3.9%) were other majors. Table 5.1 presents participant profiles for major groups and the entire sample.

[Insert Table 5.1 here.]

Measurement Model Reliability and Validity

An exploratory factor analysis (EFA) was conducted to identify the underlying structure of the external resource items. According to Kaiser's (1960) criterion—eigenvalue equal to or greater than one—and scree plot, three constructs were determined for further investigation, when the three-construct solutions explained a total of 52.3% of the variance of the external resource items. Based on the COR theory, the three constructs were identified as objects, conditions, and energies. The EFA results suggested that three energy items (i.e., money, financial help, and income) be respecified as object items. Factor loadings of the external resource items ranged from 0.45 to 0.86. The value of

Cronbach's alpha for each construct ranged from .72 to .79 indicating respectable reliability (DeVellis, 2012, p. 109).

Next, a confirmatory factor analysis (CFA) was performed to confirm the validation of the measurement model. One item was eliminated due to factor loading lower than 0.4. As shown in Table 5.2, the convergent validity was satisfied when all factor loadings were more than 0.5 (Hair, Black, Babin, & Anderson, 2009). The discriminant validity was confirmed when squared correlations between constructs (from 0.15 to 0.32) were equal or less than the average variance extracted (AVE) ranging from 0.32 to 0.57 (Furr & Bacharach, 2014).

[Insert Table 5.2 here.]

Structural Model Results

A structural model was conducted to estimate the proposed hypotheses and estimated parameters (Table 5.3). The structural model with estimated parameters for the entire sample was shown in Figure 5.1. Overall, the results of maximum likelihood estimation showed the model fit was $\chi^2 = 325.345$, $df = 6$, $p = .000$; GFI = 0.899; NFI = 0.596; IFI = 0.600; CFI = 0.592; and RMSEA = 0.285. As presented in Table 5.3, 6 out of 11 hypotheses were supported. In terms of external resources, energies had significant impacts on both stress and sleep health ($\beta = -.26$, $p < .001$ and $\beta = -.28$, $p < .001$, respectively). There was a negative relationship between stress and internal resources ($\beta = -.20$, $p < .001$), but a very weak relationship was found between sleep health and internal resources ($\beta = .09$, $p < .05$). Regarding academic performance, only sleep health had a significant positive relationship with student GPA ($\beta = .11$, $p < .01$). Finally, no significant difference was found between hospitality and business majors.

[Insert Table 5.3 here.]

[Insert Figure 5.1 here.]

DISCUSSION AND CONCLUSIONS

Sleep is important to human beings' physical, mental, and social health. Previous findings suggest that sleep health plays an important role in performance, but sacrificing sleep in order to perform better is a common phenomenon in current society. Given the importance of sleep health and its influence on performance, solid evidence is necessary to convince individuals and administrators to make student sleep health a priority. Existing literature provides a chance to develop a theoretical model explaining how sleep affects performance. However, the weak relationship between sleep health and performance in this study challenges the model development process.

The results of this study found that acquiring energy resources (e.g., time for sleep) had a positive influence on sleep health and reduced the level of stress, suggesting that assisting undergraduate students to better manage their time may enhance their mental health and sleep health. Most hospitality programs require students to have an internship or work experience in hospitality industries before graduation because of its influence on students' career decision making and intention (Brown, Thomas, & Bosselman, 2015; Chuang & Dellmann-Jenkins, 2010). Thus, honing time management skills seems to be a need for hospitality students to balance their sleep health, study and work.

Although the present findings did not support the direct effect of resources or stress on academic performance, other hospitality research showed that stress might affect other factors, such as student health or labor turnover. Using data from 717 hospitality students at 22 U.S. universities, Woods, Sciarini, and Johanson (2001) found

that participants' average stress scores were at a moderate level, indicating the possibility of a mental or physical illness due to stress (Kohn, Lafreniere, & Gurevich, 1990).

Furthermore, high labor turnover is still an unsolved hospitality human resource challenge (Kusluvan, Kusluvan, Ilhan, & Buyruk, 2010), and stress has been seen as one contributor to turnover in hospitality industries (Rowley & Purcell, 2001).

Sleep research has found strong evidence to support the linkage between sleep and learning; however, the model used in this study to examine how sleep health affects academic performance did not perform as well as expected. One reason for this may be that the COR theory may not apply for young adults. A reasonable explanation is that students may perform well even if they do not sleep well or feel stressed. In contrast, students may perform poorly even if they do not lack resources. For example, poor academic performance may be due to lacking interest or engagement, selecting ill-fitted majors, or facing life challenges. In addition, other potential factors may need to be considered in the model, such as time management skills or motivation.

Study limitations need to be mentioned. First, the generalization of the results may be limited due to a small sample size. Future research using equally and adequately sized groups may be able to find that there are differences between hospitality and non-hospitality students. Second, the COR theory is the most applicable theory for this study; however, the development of our new model is limited due to a lack of a well-developed, widely used COR-E scale in existing literature. Future researchers should consider refining the shortened COR-E scale employed in this study in order to enhance the model development process.

IMPLICATIONS

Theoretical

This study was the first known to use this model based on the COR theory studying the relationship between sleep and academic performance. The findings suggest linkage between sleep health and resource components of the COR theory as well as support resource gain/loss process in the COR theory. Although the measurement model worked well, the structural equation model needs additional examination.

Practical

The impact of poor sleep health can be recognized at different levels: individual, organizational (academia and industry), and societal. In terms of individuals, college students are at a life stage where they deal with stress from multiple stressors, have the autonomy to make their own decisions, and are responsible for their choices. Existing literature has presented the effect of sleep health on one's overall health, and this study suggests that energy (e.g., time) is a principal resource for college students to reduce stress levels and improve sleep health.

In terms of academia, poor sleep health can negatively impact college students' physical, mental, and social health, which has potential consequences for student engagement and academic performance. Given that students' academic success is directly associated with institutional outcomes, educators should realize the importance of assisting students in developing appropriate sleep habits, resource management skills, and stress coping strategies.

In terms of industry, sleep health has been linked to learning capability as well as productivity, efficiency, and safety. These connections have important implications for

the hospitality business sector, a sector where shift work is common and might lead to irregular sleeping habits. If student employees are unhealthy, practitioners might expect resulting low productivity, increased risk of accidents, and more “sick” days.

General

In terms of society, while findings have implications for individuals, educators and practitioners, there are broader implications. Adults’ inadequate sleep habits developed at young age may have long-term effects on impaired health or emotional issues, which would consequently reflect on societal economics and healthcare costs.

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TABLES & FIGURES

Table 5.1
Participant Profile

Item	Hospitality (<i>n</i> = 179)		Business (<i>n</i> = 449)		Total (<i>N</i> = 654)	
	<i>n</i>	%	<i>n</i>	%	<i>N</i>	%
Sex						
Female	152	84.9	255	56.8	420	64.2
Age						
18-24 years old	171	95.5	436	91.1	631	96.5
25 years old and older	8	4.5	13	3.0	23	3.5
Race/Ethnicity						
African-American (non-Hispanic)	5	2.8	14	3.1	20	3.1
Asian/Pacific Islanders	29	16.2	69	15.4	102	15.6
Caucasian (non-Hispanic)	125	69.8	308	68.6	452	69.1
Latino or Hispanic	16	8.9	40	8.9	57	8.7
Others	4	2.2	18	4.0	23	3.5
Classification Status						
Freshman	7	3.9	41	9.1	49	7.5
Sophomore	22	12.3	101	22.5	123	18.8
Junior	47	26.3	161	35.9	211	32.3
Senior	103	57.5	146	32.5	271	41.4

Table 5.2
Description Information and Confirmatory Factor Analysis for External Resource Items

Construct Item	Mean	SD	Standardized Loading	Cronbach's Alpha	AVE
Objects				0.73	0.32
Acquire adequate clothing	3.31	0.751	0.58		
Acquire adequate food	3.18	0.870	0.57		
Obtain housing that suits my needs	3.20	0.688	0.57		
Have savings or emergency money	2.79	1.057	0.58		
Have financial help if needed	3.12	0.792	0.55		
Acquire adequate income	2.93	0.967	0.57		
Conditions				0.79	0.45
Maintain intimacy with spouse or partner	3.14	0.892	0.58		
Maintain intimacy with at least one friend	3.33	0.880	0.66		
Have companionship	3.27	0.904	0.78		
Receive affection from others	3.31	0.892	0.72		
Have loyalty of friends	3.39	0.835	0.58		
Energies				0.72	0.57
Have time for adequate sleep	2.59	1.000	0.69		
Have free time	2.73	1.186	0.82		

Note. AVE = average variance extracted. Model fit indices are as follows: chi-square = 245.810, *df* = 62, *p* = .000; goodness-of-fit index = 0.944; adjusted goodness-of-fit index = 0.918; comparative fit index = 0.917; incremental fit index = 0.917; root mean square error of approximation = 0.067. A 5-point Likert type scale ranging from 1 to 5 (1 = a great deal of loss, 2 = some loss, 3 = no gain, no loss, 4 = some gain, and 5 = a great deal of gain) was used in this section.

Table 5.3
Estimated Parameters

Hypothesized Path	Standardized Coefficients	Results
H1a Objects → Stress	.007	Not supported
H2a Conditions → Stress	-.020	Not supported
H3a Energies → Stress	-.263***	Supported
H4a Stress → Personal characteristics	-.195***	Supported
H5a Objects → Sleep health	.115**	Supported
H6a Conditions → Sleep health	-.107*	Not supported
H7a Energies → Sleep health	.282***	Supported
H8a Sleep health → Personal characteristics	.087*	Supported
H9a Personal characteristics → Academic performance	-.040	Not supported
H10a Stress → Academic performance	-.041	Not supported
H11a Sleep health → Academic performance	.108**	Supported

Note. H = hypothesis. Fit indices: chi-square = 325.345, $df = 6$, $p = .000$; GFI = .899; AGFI = .530; NFI = .596; IFI = .600; CFI = .592; RMSEA = .285.
* $p < .05$, ** $p < .01$, *** $p < .001$.

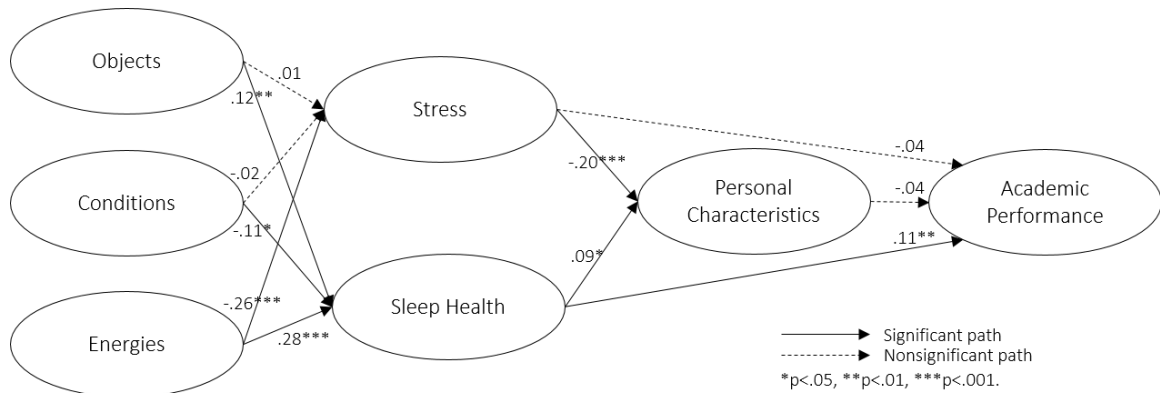


Figure 5.1

Structural Model with Estimated Parameters

CHAPTER 6. GENERAL CONCLUSIONS

The last chapter provides general conclusions for the entire dissertation, which aimed to explore the relationship between sleep health and academic performance and to examine the difference in that relationship between hospitality and non-hospitality students. This two-phase study had five objectives. The first objective was studied in Phase I and the second through fifth objectives were in Phase II. Results are summarized for each objective. After the summary of results, implications, limitations, and recommendations for future research can be found.

Summary of Results

Phase I Results

Objective 1: Explore the impact of health issues on academic performance from undergraduate students' perspectives

Receiving longitudinal data from a national survey, a total of 73,214 valid responses were utilized for Phase I of this study. Table B (Appendix G) shows participant profile. First, stress and sleep difficulties were ranked as the top two health issues, according to the percentage of participants who reported that those health issues affected their academic performance, and the rankings did not change over time (See Table C in Appendix G). In the Fall 2013, 30.1% of participants ($n = 7,407$) perceived that stress affected their academic performance, a decrease of less than one percent from Fall 2003 (30.5%, $n = 2,914$). The percentage of participants reporting that sleep difficulties affected their academic performance has remained steady at about 20% over the past decade, from 23.9% ($n = 2,286$) in Fall 2003 to 21.5% ($n = 5,298$) in Fall 2013. It seems likely that stress and sleep problems among undergraduate students have not been

effectively solved. Second, positive relationships were found between stress and sleepiness ($r = 0.33, p < .01$ in Fall 2008 and $r = 0.35, p < .01$ in Fall 2013); however, no statistical impact of stress and sleepiness on self-report grades were found. A slightly negative relationship was found between students' stress level and grade ($r = -0.04, p < .01$ in Fall 2008 and $r = -0.06, p < .01$ in Fall 2013) as well as between level of sleepiness and grade ($r = -0.07, p < .01$ in Fall 2008 and $r = -0.08, p < .01$ in Fall 2013).

Phase II Results

Objective 2: Examine the relationship between sleep health, resources, stress, and academic performance of undergraduates

A structural model, based on the COR theory, was conducted to examine the relationship between sleep health, resources, stress, and academic performance. In Chapter Five, Figure 5.1 shows the structural model with estimated parameters. The overall model fit was $\chi^2 = 325.345, df = 6, p = .000$; GFI = 0.899; NFI = 0.596; IFI = 0.600; CFI = 0.592; and RMSEA = 0.285. Six out of eleven hypotheses were supported (See Table 5.3). In terms of external resources, energies had a significant impact on stress ($\beta = -.26, p < .001$) as well as on sleep health ($\beta = -.28, p < .001$). A negative relationship was found between stress and internal resources ($\beta = -.20, p < .001$), but a weak relationship was found between sleep health and internal resources ($\beta = .09, p < .05$). Finally, sleep health had a significant positive relationship with student GPA ($\beta = .11, p < .01$).

Objective 3: Determine if individual and/or institutional characteristics moderate the relationship between sleep health, resources, stress, and academic performance among undergraduates

Individual characteristics included sex (females vs. males), classification (freshmen and sophomores vs. juniors and seniors), and work type (shift workers vs. non-shift workers). Institutional characteristic was internship (required vs. not required). Using the multiple group structural equation modeling, no significant difference was found: sex ($\Delta\chi^2 = 12.227$, $df = 11$, $p = .347$), classification ($\Delta\chi^2 = 12.240$, $df = 11$, $p = .346$), shift work ($\Delta\chi^2 = 17.350$, $df = 11$, $p = .098$), and internship ($\Delta\chi^2 = 8.419$, $df = 11$, $p = .675$). These findings suggest that these characteristics did not moderate the relationship between sleep health, resources, stress, and academic performance among undergraduate students. Other characteristics, such as age and work hours, were not examined due to insufficient sample size.

Objective 4: Determine whether differences in individual and/or institutional characteristics exist between hospitality and non-hospitality undergraduates

In Chapter Four, a comparison between hospitality and non-hospitality student employees is shown in Table 4.2. The two groups were similar in sex, age, race/ethnicity, classification status, median household income, parental education, managerial or supervisory responsibilities, and time spent at their current job. The hospitality group had a higher percentage of participants who were hospitality majors than non-hospitality (52.0% vs. 18.5%). Additionally, higher percentages of requiring internship (51.4% vs. 23.0%) and work experience (33.1% vs. 6.8%) were found in the hospitality group. The hospitality and non-hospitality groups were different in work shifts and hours. The hospitality group had a higher percentage of participants having shift work (66.9% vs. 44.7%, respectively), or working over 20 hours per week (38.9% vs. 20.0%, respectively) than the non-hospitality group.

Objective 5: Determine whether differences in the relationship between sleep health, resources, stress, and academic performance exist between hospitality and non-hospitality undergraduates

Group comparison was conducted using the multiple group structural equation modeling. No significant difference was found between hospitality and non-hospitality majors ($\Delta\chi^2 = 8.679$, $df = 11$, $p = .651$). The structural model with estimated parameters for each major group is shown in Figure A (Appendix G).

General Conclusions

In the current study, undergraduate students perceived that stress and sleep difficulties were most influential on their academic performance. However, neither the relationship between stress and academic performance nor between sleep and academic performance were found. These theoretical findings were not aligned with undergraduate students' perspectives.

In general, undergraduate students' sleep health might be impacted by sleep aid usage, caffeinated beverage consumption, or long work hours. The effect of sleep health on academic performance was not strong and direct, but the impact of sleep health on individuals' overall health is associated with students' academic success. In particular, this study examined the differences between hospitality and non-hospitality students as well as student employees. The findings of this study suggest that current college student sleep issues are equally applicable to hospitality students.

To assist hospitality students in balancing their sleep health, study, and work, it is necessary to have students, program administrators and industrial practitioners to

cooperate with each other. To be effective, students need to understand the importance of sleep health and their responsibilities of their personal health.

Implications

This study contributes to the current body of literature from numerous perspectives including theoretical, methodological, and practical. From a theoretical perspective, this study contributes to enhancing the understanding of undergraduate students' perspectives by analyzing longitudinal data from a large sample of 73,214 U.S. undergraduate students. Also, the findings contribute to filling a gap by using the COR theory to explain the mixed findings reported in previous work discussing the relationship between sleep and academic performance.

From a methodological perspective, this study examined a new sleep health index and improved an existing resource scale. Given the demands on sleep health and resource measurements (Buysse, 2014; Halbesleben et al., 2014), this study benefits future research to establish reliable and valid measurements for sleep health research.

From a practical perspective, the findings serve as a further reference to develop support for enhancing students' sleep health, managing resources, and decreasing levels of stress. Understanding the benefits of sleep health may assist industrial practitioners in developing strategies for removing stressors (e.g., emotionally taxing work) or reducing stress from the hospitality workplace, thus potentially improving job performance and decreasing employee turnover rate. Recognizing the importance of sleep health may make managers consider student employees' sleep health while scheduling employee work shifts and possibly discourage scheduling back to back shifts. Moreover, sleep health has been linked to learning capability as well as productivity, efficiency, and

safety. These connections have important implications for the hospitality business sector, a sector where shift work is common and might lead to irregular sleeping habits.

In conclusion, young adults' (college students) inadequate sleep habits may have long-term effects on impaired health or emotional issues. Therefore, these effects could consequently reflect on societal economics and healthcare costs.

Limitations and Recommendations for Future Research

In Phase I, correlations were analyzed only for data collected in Fall 2008 and 2013. This statistical limitation was due to changes made by ACHA to the survey. In Phase II, a few limitations need to be mentioned. First, the generalization of the results may be limited due to a small sample size or the differences in curriculum design and percentage of undergraduate students having a jobs. Second, participants may underestimate or overestimate their responses (e.g., alcohol consumption, student GPA). Third, the model development is limited due to a lack of a well-developed, widely used COR-E scale in the existing literature.

For future study, researchers may consider a different recruitment process if they would like to focus on hospitality student employees in a country with a low percentage of undergraduate students having a jobs. Also, researchers should be aware of the effect of the response bias on their results. Finally, in order to improve the development process, researchers should consider refining the shortened COR-E scale employed in this study.

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APPENDIX B. HUMAN SUBJECTS IRB APPROVAL

New IRB Approval

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
1138 Pearson Hall
Ames, Iowa 50011-2207
515 294-4566
FAX 515 294-4267

Date: 5/23/2016

To: Yu-Chih Chiang
422 Stonehaven #8
Ames, IA 50010

CC: Dr. Susan Wohlsdorf Arendt
9E MacKay Hall
Tianshu Zheng
9W MacKay Hall

From: Office for Responsible Research

Title: Sleep health, resources, stress, and academic performance: Comparing hospitality and non-hospitality undergraduate students

IRB ID: 16-236

Study Review Date: 5/23/2016

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
 - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
 - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. **Only the IRB or designees may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

Please be aware that **approval from other entities may also be needed**. For example, access to data from private records (e.g. student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required by their policies. **An IRB determination of exemption in no way implies or guarantees that permission from these other**

Modified IRB Approval

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
2420 Lincoln Way, Suite 202
Ames, Iowa 50014
515 294-4566

Date: 11/17/2016

To: Yu-Chih Chiang
422 Stonehaven #8
Ames, IA 50010

CC: Dr. Susan Wohlsdorf Arendt
9E MacKay Hall
Tianshu Zheng
9W MacKay Hall

From: Office for Responsible Research

Title: Sleep health, resources, stress, and academic performance: Comparing hospitality and non-hospitality undergraduate students

IRB ID: 16-236

Study Review Date: 11/17/2016

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
 - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
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Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. **Only the IRB or designees may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

Please be aware that **approval from other entities may also be needed.** For example, access to data from private records (e.g. student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required

Modified IRB Approval

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Institutional Review Board
Office for Responsible Research
Vice President for Research
2420 Lincoln Way, Suite 202
Ames, Iowa 50014
515 294-4566

Date: 12/1/2016

To: Yu-Chih Chiang
422 Stonehaven #8
Ames, IA 50010

CC: Dr. Susan Wohlsdorf Arendt
9E MacKay Hall
Tianshu Zheng
9W MacKay Hall

From: Office for Responsible Research

Title: Sleep health, resources, stress, and academic performance: Comparing hospitality and non-hospitality undergraduate students

IRB ID: 16-236

Study Review Date: 12/1/2016

The project referenced above has been declared exempt from the requirements of the human subject protections regulations as described in 45 CFR 46.101(b) because it meets the following federal requirements for exemption:

- (2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey or interview procedures with adults or observation of public behavior where
 - Information obtained is recorded in such a manner that human subjects cannot be identified directly or through identifiers linked to the subjects; or
 - Any disclosure of the human subjects' responses outside the research could not reasonably place the subject at risk of criminal or civil liability or be damaging to their financial standing, employability, or reputation.

The determination of exemption means that:

- **You do not need to submit an application for annual continuing review.**
- **You must carry out the research as described in the IRB application.** Review by IRB staff is required prior to implementing modifications that may change the exempt status of the research. In general, review is required for any modifications to the research procedures (e.g., method of data collection, nature or scope of information to be collected, changes in confidentiality measures, etc.), modifications that result in the inclusion of participants from vulnerable populations, and/or any change that may increase the risk or discomfort to participants. Changes to key personnel must also be approved. The purpose of review is to determine if the project still meets the federal criteria for exemption.

Non-exempt research is subject to many regulatory requirements that must be addressed prior to implementation of the study. Conducting non-exempt research without IRB review and approval may constitute non-compliance with federal regulations and/or academic misconduct according to ISU policy.

Detailed information about requirements for submission of modifications can be found on the Exempt Study Modification Form. A Personnel Change Form may be submitted when the only modification involves changes in study staff. If it is determined that exemption is no longer warranted, then an Application for Approval of Research Involving Humans Form will need to be submitted and approved before proceeding with data collection.

Please note that you must submit all research involving human participants for review. **Only the IRB or designees may make the determination of exemption**, even if you conduct a study in the future that is exactly like this study.

Please be aware that **approval from other entities may also be needed.** For example, access to data from private records (e.g. student, medical, or employment records, etc.) that are protected by FERPA, HIPAA, or other confidentiality policies requires permission from the holders of those records. Similarly, for research conducted in institutions other than ISU (e.g., schools, other colleges or universities, medical facilities, companies, etc.), investigators must obtain permission from the institution(s) as required

APPENDIX C. DATA PERMISSION

ACHA-NCHA Data Use Permission



June 9, 2015

Yu-Chih Chiang, MS
Iowa State University
7E MacKay
Ames, IA 50011

Dear Yu-Chih,

Thank you for submitting a request to use ACHA-NCHA data in your project, "The impact of health factors on undergraduate students' academic performance over the past 10 years." Your request has been approved and enclosed you will find the ACHA-NCHA Reference Group Datasets you requested and the corresponding survey codebooks. Both institutional and student identifiers have been removed from the files.

The ACHA-NCHA rewritten and introduced as the ACHA-NCHA II beginning with the Fall 2008 data collection period. Comparisons between data collected with the original ACHA-NCHA (Spring 2000 – Spring 2008) may not be made with data collected from the ACHA-NCHA II.

A number of items on the ACHA-NCHA II were changed beginning with the Fall 2011 survey period. Edits were made to nq16 (alcohol consequences), nq54 (race and ethnicity), and nq65 (disabilities). Also, nq66 was added to capture student veteran status. **Data from these items should not be compared with data collected with the NCHA II between Fall 2008 and Spring 2011.**

I have enclosed a copy of our data use guidelines and agreement for your information. Your signed copy is on file in my office. Please note that additional studies using the ACHA-NCHA data acquired through this request require submission of a new data use request to the ACHA-NCHA Program Office.

As stated in the agreement, we would appreciate a copy of any final products that result from your research. We also ask that you add the following disclaimer to any article or presentation you make using the ACHA-NCHA data:

The opinions, findings, and conclusions presented/reported in this article/presentation are those of the author(s), and are in no way meant to represent the corporate opinions, views, or policies of the American College Health Association (ACHA). ACHA does not warrant nor assume any liability or responsibility for the accuracy, completeness, or usefulness of any information presented in this article/presentation.

Please don't hesitate to contact me if you have any questions.
Best of luck with your research,

Mary Hoban, PhD, MCHES
Director, ACHA-NCHA Program Office

Enclosure: ACHA-NCHA Data Use Guidelines and Agreement

APPENDIX D. REDUCING PROCESS OF RESOURCE ITEMS

After discussing the questionnaire in the expert panel review, experts commented that some resource items were duplicated and the entire questionnaire was too long. Experts suggested that the 74 resource items could be reduced to eliminate duplication and to increase participants' completion rate. An additional benefit of reducing the resource items was that shorter version enabled the researchers to measure perceived stress more reliably. Before reducing the resource items, the researchers used the relatively less-reliable 4-item version of the Perceived Stress Scale (PSS-4, Cronbach's alpha between .67 and .82) to avoid increasing the total items in the questionnaire. After reducing the resource items, the researchers were able to adapt a more reliable 10-item version of the Perceived Stress Scale (PSS-10, Cronbach's alpha between .74 and .91) (Lee, 2012). Therefore, the researchers reduced the number of resource items using the following process:

1. **Listing:** The researchers listed out the 74 resource items of the conservation of resources theory evaluation (Hobfoll, 2011, pp. 145-147).
2. **Grouping:** The researchers then grouped the 74 resource items based on the four resource categories identified by Hobfoll (1989) and a fifth category for items that may belong to more than one category. Here are Hobfoll's (1989) four categories with the one additional category listed in italics:
 - Objects
 - Conditions
 - Personal characteristics
 - Energies
 - *Multiple categories*
3. **Comparing:** Using the grouping results from Step 2, the researchers compared those results with the factor analysis results from Hobfoll, Lilly, and Jackson (1991), which used college students as its sample. In that study's results, five of 74 resource items were loaded into multiple factors and nine of 74 resource items were not loaded into any factor. Therefore, for comparison purposes, the researchers of this study added two categories, one for the multiple factor items and one for the no factor items. Hobfoll et al.'s (1991) six factors are listed here with the two additional categories listed in italics:
 - Personal/attainment
 - Financial
 - Time/financial
 - Work support/financial
 - Intimacy
 - Marriage/children
 - *Multiple factors*
 - *No factor*
4. **Selecting:** The researchers then selected multiple items for each of the four Hobfoll's (1989) categories from those items which were loaded on the same factors as found in Hobfoll et al.'s (1991) study. After the comparison completed in Step 3, four items were selected for the object category and five items were selected for each of the remaining

three categories: conditions, personal characteristics, and energies. Regarding the object category, only three grouped items were loaded together and the researchers only could find one more distinct item so that a total of four items were selected for the object category.

5. **Rephrasing:** The researchers did not rephrase any items.
6. **Reversing:** All the original five items of the personal characteristic category are positively stated. Therefore, the researchers reversed two of the five items from positive to negative statement in order to avoid acquiescence bias (DeVellis, 2012, pp. 83-84). The following are the original and reversed statements.
 - Feeling that I am successful → Feeling that I am unsuccessful
 - Feeling that I have control over my life → Feeling that my life is out of control
7. **Reviewing:** Finally, the final questionnaire was sent to the expert panel again to review and confirm the content validity of the 19 selected items (Table A).

References:

- DeVellis, R. F. (2012). *Scale Development*. Thousand Oaks, CA: SAGE Publications, Inc.
- Hobfoll, S. E. (1989). Conservation of resources: A new attempt at conceptualizing stress. *The American Psychologist*, 44(3), pp. 513-524.
- Hobfoll, S. E. (2011). Conservation of resources theory: Its implication for stress, health, and resilience. In *The Oxford handbook of stress, health, and coping* (pp. 127–147). New York, NY: Oxford University Press, Inc.
- Hobfoll, S. E., Lilly, R. S., & Jackson, A. P. (1991). Conservation of social resources and the self. In H. Veiel & U. Baumann (Eds.), *The meaning and measurement of social support: Taking stock of 20 years of research* (pp. 125-141). Washington, DC: Hemisphere.
- Lee, E. H. (2012). Review of the psychometric evidence of the perceived stress scale. *Asian Nursing Research*, 6(4), 121–127. doi:10.1016/j.anr.2012.08.004

Table A

Results of the resource item reducing process

Hobfoll's (1989) categories	Hobfoll's (1989) definition	Selected resource items	Hobfoll et al.'s (1991) factors
Objects	"Object resources are valued because of some aspect of their physical nature or because of their acquiring secondary status value based on their rarity and expense."	<ul style="list-style-type: none"> • Adequate clothing • Personal transportation (e.g., car and truck) • Adequate food • Housing that suits my needs 	<ul style="list-style-type: none"> • Personal/attainment • Time/financial • Time/financial • Time/financial
Conditions	"Conditions are resources to the extent that they are valued and sought after."	<ul style="list-style-type: none"> • Intimacy with spouse or partner • Intimacy with at least one friend • Companionship • Affection from others • Loyalty of friends 	<ul style="list-style-type: none"> • Intimacy • Intimacy • Intimacy • Intimacy • Intimacy
Personal characteristics	"Personal characteristics are resources to the extent that they generally aid stress resistance."	<ul style="list-style-type: none"> • Feeling that I am unsuccessful (reversed) • Feeling valuable to others • Feeling that my life is out of control (reversed) • Sense of optimism • Motivation to get things done 	<ul style="list-style-type: none"> • Personal/attainment • Personal/attainment • Personal/attainment • Personal/attainment
Energies	"[Energies] resources are typified not by their intrinsic value so much as their value in aiding the acquisition of other kinds of resources."	<ul style="list-style-type: none"> • Savings or emergency money • Financial help if needed • Adequate income • Time for adequate sleep • Free time 	<ul style="list-style-type: none"> • Financial • Financial • Financial • Time/financial • Time/financial

APPENDIX E. DOCUMENTS FOR PILOT STUDY**Recruitment Email (Pilot Study)**

Dear undergraduate student,

Has your sleep health affected your academic performance? You are being contacted to participate in a study about your sleep health. Your response is very important to this study and will be used to understand how sleep health relates to undergraduate students' academic performance.

This online questionnaire will take about 15-20 minutes to complete. If you agree to participate in this study, please click on the link below to proceed to the online questionnaire. Your participation in this study is completely voluntary and you may quit at any time. Be assured, your responses will remain confidential. Your name and any individual identifying information will not be published; only data compiled from all participants will appear in any publication.

If you decide to participate in this study, you will have the option of entering a drawing for an Amazon.com gift card in the amount of \$25.00 (one gift card will be awarded for every 50 individuals who participate).

The following is the questionnaire link:

http://iastate.qualtric.com/SE/?SID=SV_2c8p5GIUQMnkAeh

This study has obtained Institutional Review Board approval (IRB ID: 16-236) from the Office for Responsible Research at Iowa State University. The approval indicates that the rights and safety of subjects, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

If you have any questions regarding this questionnaire or if you would like a summary of research findings, please contact me at 515-509-4285 or yuchiang@iastate.edu.

Thank you so much for your assistance with this project. It is greatly appreciated.

Best regards,

Yu Chih (Karen) Chiang, PhD Candidate
Graduate Student
Iowa State University
yuchiang@iastate.edu

Susan W. Arendt, PhD, RD, CHE
Associate Professor
Iowa State University
sarendt@iastate.edu

INFORMED CONSENT DOCUMENT (PILOT STUDY)

Title of Study: Sleep health, resources, stress, and academic performance

Investigators: Yu Chih (Karen) Chiang and Susan W. Arendt

This is a pilot research study. Please take your time in deciding if you would like to participate. The purpose of this study is to explore the effects of sleep health on academic performance of undergraduate students. You are being invited to participate in this pilot study because you are undergraduate students at Iowa State University. You should not participate if you are less than 18 years of age.

If you agree to participate, you will be asked to complete an online pilot questionnaire and a questionnaire evaluation form. Your participation will last about 20 minutes. While participating in this study, you will not experience any risks. If you decide to participate in this study there will be no direct benefit to you. It is hoped that the information gained in this study will benefit society by determining what impact sleep health has on academic performance.

Your participation in this study is completely voluntary and you may refuse to participate or leave the study at any time. You can skip any questions that you do not wish to answer. If you refuse to participate, you will not experience a penalty or loss of benefits.

The responses provided by you on the questionnaire will be used to refine the final questionnaire. **Your response is very important to this pilot study.** To ensure confidentiality to the extent permitted by law, only researchers of this study will have access to the data. However, federal government regulatory agencies, auditing departments of Iowa State University, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information. Any individual identifying information will not be recorded; only data compiled from all participants will appear in any publication.

For further information about the study contact Yu Chih (Karen) Chiang at 515-509-4285, yuchiang@iastate.edu; or Dr. Susan Arendt at 515-294-7575, sarendt@iastate.edu. If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

Do you agree to participate in this survey?

- Yes
- No

Sleep Health Questionnaire (Pilot Study)

Welcome to the sleep health survey!

Thank you for agreeing to take part in this important survey measuring sleep health, resources, stress, and academic performance for undergraduate students. The information you provide will help us better understand the effect of sleep health on academic performance.

How old are you?

What is your classification status?

Freshman

Sophomore

Junior

Senior

Graduate student

Survey

SECTION I: Sleep Health

The next set of questions asks about how you slept over the **past four weeks**.

	Never	Rarely	Sometimes	Usually	Always
Over the past four weeks , how often were you satisfied with your sleep?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often did you stay awake all day without dozing?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often were you asleep (or trying to sleep) between 2:00 a.m. and 4:00 a.m.?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often did you spend less than 30 minutes awake at night? (This includes the time it takes to fall asleep and awakenings from sleep.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often did you sleep between 6 and 8 hours per day?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Over the **past four weeks**, how many drinks have you consumed? (One drink of alcohol is defined as a 12 oz. can or bottle of beer or wine cooler, a 5 oz. glass of wine, or a 1.5 oz. shot of liquor straight or in a mixed drink.)

0 drink 1-27 drinks 28-55 drinks 56-99 drinks 100 drinks or more

Over the **past four weeks**, how often have you used alcohol to help you fall asleep?

Never Rarely Sometimes Usually Always

Over the **past four weeks**, how often have you used sleep aids to help you fall asleep? (Examples of sleep aids: Ambien®, Unisom®, and antihistamine)

Never Rarely Sometimes Usually Always

Taking caffeinated beverages in the afternoon or evening makes it difficult for me to fall asleep at night.

Strongly agree Agree Neutral Disagree Strongly disagree

Over the **past four weeks**, how often have you consumed caffeinated beverages to help you stay alertness? (Examples of caffeinated beverages: coffee, tea, hot chocolate, soft drinks, and energy drinks)

Never Rarely Sometimes Usually Always

Using technology within an hour before going to bed makes it difficult for me to fall asleep at night.

Strongly agree Agree Neutral Disagree Strongly disagree

Over the **past four weeks**, how often have you used technology within an hour before going to bed?
(Examples of technology: TV, video games, computers, laptops, tablets, and smartphones)

Never

Rarely

Sometimes

Usually

Always

What is your sex?

Female

Male

What is your race/ethnicity?

African-American (non Hispanic)

Latino or Hispanic

Asian/Pacific Islanders

Native American

Caucasian (non Hispanic)

Other. Please specify:

Are you an international student?

Yes

No

What is the zip code of your home address?

What is your academic major?

- Hospitality management, tourism, or events.
- A major other than hospitality management, tourism, or events. Please specify:

My program requires that I do an **internship** while completing my program.

- Yes
- No

Indicate the hours of internship required:

Indicate credits related to internship:

My program requires that I have **work experiences** (different from an internship) while completing my program.

- Yes
- No

Indicate the hours of work experiences required:

Indicate credits related to work experiences:

I am currently on a study abroad program.

- Yes
 No

My parents' or guardians' highest level of education is ...

- Less than high school
 High school diploma or equivalent
 Some college, no degree
 Postsecondary non-degree award
 Associate's degree
 Bachelor's degree
 Master's degree
 Doctoral or professional degree

To what extent do you agree or disagree with the following statements?

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I am in college primarily because I am expected to get a degree.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My parent(s) would be very disappointed in me if I didn't get a college degree.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I owe it to my parent(s) to do well in college.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There were considerable pressures on me from my parent(s) to get a college degree.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It would let parent(s) down if I didn't succeed at college.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SECTION II: Resources

The next set of questions asks about your resource gain/loss over the past four weeks. **DO NOT RATE** the availability of the resource to you. We are interested in the **CHANGE** you have experienced in the resource.

FOR EXAMPLE: If the time for adequate sleep is still the same today as it has been over the past four weeks, then you select "no gain, no loss" for that resource item. If you have experienced more time for adequate sleep, then you would select "some gain" or "a great deal of gain." If you have experienced less time for adequate sleep, then you would select "some loss" or "a great deal of loss."

Over the **past four weeks**, I have experienced gain/loss in:

	A great deal of loss	Some loss	No gain, no loss	Some gain	A great deal of gain
Having financial help if needed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acquiring adequate food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having loyalty of friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling that I am unsuccessful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having a sense of optimism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having free time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maintaining intimacy with spouse or partner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acquiring adequate income	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Receiving affection from others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having motivation to get things done	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maintaining intimacy with at least one friend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having savings or emergency money	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Obtaining housing that suits my needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acquiring adequate clothing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Obtaining personal transportation (e.g., car and truck)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling that my life is out of control	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having time for adequate sleep	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling valuable to others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having companionship	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SECTION III: Stress

The next set of questions asks about the level of stress you experienced over the **past four weeks**.

	Never	Almost never	Sometimes	Fairly often	Very often
Over the past four weeks , how often have you been upset because of something that happened unexpectedly?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you felt that you were unable to control the important things in your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you felt nervous and "stressed"?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you felt confident about your ability to handle your personal problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you felt that things were going your way?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you found that you could not cope with all the things that you had to do	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you been able to control irritations in your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you felt that you were on top of things?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you been angered because of things that were outside of your control?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you felt difficulties were piling up so high that you could not overcome them?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SECTION IV: Academic Performance

How many cumulative credits have you earned?

- less than 10
- 10-24
- 25-49
- 50-64
- 65-79
- 80-94
- 95-109
- 110-120
- more than 120
- I do not know.

What is your cumulative GPA?

- 3.68-4.00
- 3.34-3.67
- 3.01-3.33
- 2.68-3.00
- 2.34-2.67
- 2.01-2.33
- 1.68-2.00
- 1.34-1.67
- less than 1.34
- I do not know.

SECTION V: Employment

Where are you currently employed?

- I am working in the hospitality industry (e.g., Campus dining/University dining, restaurants, health care food service, hotels).
- I am working, but not in the hospitality industry.
- I am not working at this time.

What is your current job title?

Do you have managerial or supervisory responsibility?

- Yes
- No

What shift do you usually work?

- Day shift (work hours between 8am and 4pm)
- Evening shift (work hours between 4pm and midnight)
- Overnight shift (work hours between midnight and 8am)
- Rotating shift, split shift, or employer-arranged irregular schedule

My work schedule allows me to get enough sleep.

Strongly agree

Agree

Neutral

Disagree

Strongly disagree

This semester, how many hours of paid work do you average each week?

less than or equal to 10 hours

31-40 hours

11-20 hours

more than 40 hours

21-30 hours

When did you start your current job?

less than 6 months ago

3-4 years ago

6 months to less than a year ago

more than 4 years ago

1-2 years ago

Drawing (Pilot Study)

OPTIONAL DRAWING:

As a way of thanking you for completing the Sleep Health survey, you are invited to enter a drawing for a \$25 Amazon gift card.

To enter, fill in your name and ISU email below. Only ISU emails will be considered and duplicate entries will be discarded.

Winners will be notified by email. Your entry information is kept separate from the previous survey responses and will only be used for the purpose of this drawing.

First Name

Last Name

ISU Email:

Powered by Qualtrics

Questionnaire Feedback Form (Pilot Study)

This pilot test is intended to test reliability and wording of the questionnaire. This questionnaire will be used for dissertation research in the hospitality industry. Please respond to the following questions:

1. Were the questions understandable?

If not, please indicate the question number and why it was difficult to understand:

2. Were the scales understandable?

If not, please indicate what you feel could be done to make the scale easier to understand:

3. Overall, what suggestions do you have to improve the questionnaire?

Thank you for all your help with this pilot test; your input is greatly appreciated.

APPENDIX F. DOCUMENTS FOR FINAL STUDY

Recruitment Email (Final Study)

Dear undergraduate students,

Has your sleep health affected your academic performance? You are being contacted to participate in a study about your sleep health. Your response is very important to this study and will be used to understand how sleep health relates to undergraduate students' academic performance.

This online questionnaire should take about 15-20 minutes to complete. If you agree to participate in this study, please click the link below to proceed to the online questionnaire. Your participation in this study is completely voluntary, and you may quit at any time. Be assured, your responses will remain confidential. Your name and any individual identifying information will not be published; only data compiled from all participants will appear in any publication.

If you decide to participate in this study, you will have the option of entering a drawing for a \$25.00 Amazon.com gift card (one gift card will be awarded for every 25 individuals who participate).

The following is the questionnaire link:

https://iastate.qualtrics.com/SE/?SID=SV_9NskxxoilwjNv0h

This study has obtained Institutional Review Board approval (IRB ID: 16-236) from the Office for Responsible Research at Iowa State University. The approval indicates that the rights and safety of human participants in this study are protected. If you have any questions about the rights of research subjects, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

If you have any questions regarding this questionnaire or if you would like a summary of research findings, please contact me at 515-509-4285 or yuchiang@iastate.edu.

Thank you so much for your assistance with this project. It is greatly appreciated.

Best regards,

Yu Chih (Karen) Chiang, PhD Candidate
Graduate Student
Iowa State University
yuchiang@iastate.edu

Susan W. Arendt, PhD, RD, CHE
Professor
Iowa State University
sarendt@iastate.edu

Iowa State University | 7E MacKay Hall, 2302 Osborn Dr, Ames, IA 50010

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Sent by yuchiang@iastate.edu in collaboration with

Constant Contact 

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INFORMED CONSENT DOCUMENT

Title of Study: Sleep health, resources, stress, and academic performance

Investigators: Yu Chih (Karen) Chiang and Susan W. Arendt

This is a research study. Please take your time in deciding if you would like to participate. The purpose of this study is to explore the effects of sleep health on academic performance of undergraduate students. You are being invited to participate in this study because you are a hospitality or business undergraduate student. You should not participate if you are younger than 18 years old.

If you agree to participate, you will be asked to complete an online questionnaire. Your participation should last about 20 minutes. While participating in this study, you will not experience any risks. If you decide to participate in this study, there will be no direct benefit to you. It is hoped that the information gained in this study will benefit society by determining what impact sleep health has on academic performance.

Your participation in this study is completely voluntary, and you may refuse to participate or leave the study at any time. You can skip any questions that you do not wish to answer. If you refuse to participate, you will not experience a penalty or loss of benefits.

Your response is very important to this study. To ensure confidentiality to the extent permitted by law, only researchers of this study will have access to the data. However, federal government regulatory agencies, auditing departments of Iowa State University, and the Institutional Review Board (a committee that reviews and approves human subject research studies) may inspect and/or copy your records for quality assurance and data analysis. These records may contain private information. Any individual identifying information will not be recorded; only data compiled from all participants will appear in any publication.

For further information about the study, contact Yu Chih (Karen) Chiang at 515-509-4285, yuchiang@iastate.edu, or Dr. Susan Arendt at 515-294-7575, sarendt@iastate.edu. If you have any questions about the rights of research subjects or research-related injury, please contact the IRB Administrator, (515) 294-4566, IRB@iastate.edu, or Director, (515) 294-3115, Office for Responsible Research, Iowa State University, Ames, Iowa 50011.

Do you agree to participate in this survey?

- Yes
 No

Sleep Health Questionnaire (Final Study)

Welcome to the sleep health survey!

Thank you for agreeing to take part in this important survey measuring sleep health, resources, stress, and academic performance for undergraduate students. The information you provide will help us better understand the effect of sleep health on academic performance.

How old are you?

What is your classification status?

- Freshman
- Sophomore
- Junior
- Senior
- Graduate student

SECTION I: Sleep Health

The next set of questions asks about how you slept over the **past four weeks**.

	Never (1)	Rarely (2)	Sometimes (3)	Usually (4)	Always (5)
Over the past four weeks , how often were you satisfied with your sleep?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often did you stay awake all day without dozing?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often were you asleep (or trying to sleep) between 2:00 a.m. and 4:00 a.m.?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often did you spend fewer than 30 minutes awake at night? (This includes the time it takes to fall asleep and awakenings from sleep.)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often did you sleep between 7 and 9 hours per night?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Over the **past four weeks**, on average, how many alcoholic drinks have you consumed per week? (One alcoholic drink is defined as a 12 oz. can or bottle of beer or wine cooler, a 5 oz. glass of wine, or a 1.5 oz. shot of liquor straight or in a mixed drink.)

- 0 drink/week
- 1-2 drinks/week
- 3-6 drinks/week
- 7-14 drinks/week
- 15-30 drinks/week
- over 30 drinks/week

Over the **past four weeks**, how often have you used alcohol to help you fall asleep?

- Never
- Rarely
- Sometimes
- Usually
- Always

Over the **past four weeks**, how often have you used sleep aids to help you fall asleep? (Examples of sleep aids: Ambien®, Unisom®, and antihistamine)

- Never
- Rarely
- Sometimes
- Usually
- Always

Taking caffeinated beverages in the afternoon or evening makes it difficult for me to fall asleep at night.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Over the **past four weeks**, how often have you consumed caffeinated beverages to help you stay alert? (Examples of caffeinated beverages: coffee, tea, hot chocolate, soft drinks, and energy drinks)

- Never
- Rarely
- Sometimes
- Usually
- Always

Using technology within an hour of going to bed makes it difficult for me to fall asleep at night.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

Over the **past four weeks**, how often have you used technology within an hour of going to bed? (Examples of technology: TV, video games, computers, laptops, tablets, and smartphones)

- Never
- Rarely
- Sometimes
- Usually
- Always

What is your sex?

- Female
- Male

Which category best describes you?

- African-American (non Hispanic)
- Asian/Pacific Islanders
- Caucasian (non Hispanic)
- Latino or Hispanic
- Native American
- Other. Please specify:
- Prefer not to answer

Are you an international student?

- Yes
- No

What is the zip code of your home address?

What is your academic major?

- Hospitality management, tourism, or events
- Business
- A major other than hospitality management, tourism, events, or business. Please specify:

My program requires that I complete an **internship** before graduating.

- Yes
- No

My program requires that I have **work experiences** (different from an internship) before graduating.

- Yes
- No

I am currently on a study abroad program.

- Yes
- No

My parents' or guardians' highest level of education is ...

- Less than high school
- High school diploma or equivalent
- Some college, no degree
- Postsecondary non-degree award
- Associate's degree
- Bachelor's degree
- Master's degree
- Doctoral or professional degree

To what extent do you agree or disagree with the following statements?

	Strongly disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly agree (5)
I am in college primarily because I am expected to get a degree.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My parent(s) would be very disappointed in me if I didn't get a college degree.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I owe it to my parent(s) to do well in college.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There were considerable pressures on me from my parent(s) to get a college degree.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It would let my parent(s) down if I didn't succeed at college.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SECTION II: Resources

The next set of questions asks whether you have gained or lost certain resources over the past four weeks. **DO NOT RATE** the availability of the resource to you. We are interested in the **CHANGE** you have experienced in the resource.

Here is an example to help you:

Using having time for adequate sleep as an example, if your time for sleep, recently, is the same as you have experienced over the **past four weeks**, you would select "no gain, no loss (0)." If you have experienced more time for sleep compared to the previous four weeks, you would select "some gain (1)" or "a great deal of gain (2)." If you have experienced less time for sleep, then you would select "some loss (-1)" or "a great deal of loss (-2)."

Over the **past four weeks**, I have experienced gain/loss in:

	A great deal of loss (-2)	Some loss (-1)	No gain, no loss (0)	Some gain (1)	A great deal of gain (2)
Having time for adequate sleep	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Obtaining personal transportation (e.g., car and truck)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acquiring adequate income	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling that my life is out of control	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having savings or emergency money	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having financial help if needed	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having free time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maintaining intimacy with at least one friend	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling valuable to others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having motivation to get things done	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acquiring adequate clothing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having loyalty of friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Receiving affection from others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having companionship	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Acquiring adequate food	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling that I am unsuccessful	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Obtaining housing that suits my needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Having a sense of optimism	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Maintaining intimacy with spouse or partner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SECTION III: Stress

The next set of questions asks about the level of stress you experienced over the **past four weeks**.

	Never (1)	Almost never (2)	Sometimes (3)	Fairly often (4)	Very often (5)
Over the past four weeks , how often have you been upset because of something that happened unexpectedly?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you felt that you were unable to control the important things in your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you felt nervous and "stressed"?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you felt confident about your ability to handle your personal problems?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you felt that things were going your way?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you found that you could not cope with all the things that you had to do?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you been able to control irritations in your life?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you felt that you were on top of things?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you been angered because of things that were outside of your control?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Over the past four weeks , how often have you felt difficulties were piling up so high that you could not overcome them?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

SECTION IV: Academic Performance

How many cumulative credits have you earned?

- less than 10
- 10-24
- 25-49
- 50-64
- 65-79
- 80-94
- 95-109
- 110-120
- more than 120
- I do not know.

What is your cumulative GPA?

- 3.68-4.00
- 3.34-3.67
- 3.01-3.33
- 2.68-3.00
- 2.34-2.67
- 2.01-2.33
- 1.68-2.00
- 1.34-1.67
- less than 1.34
- I do not know.

SECTION V: Employment

Where are you currently employed? (select all that apply)

- I am working in the hospitality industry (e.g., campus dining/university dining, restaurants, health care food service, hotels).
- I am working, but not in the hospitality industry.
- I am not working at this time.

What is your current job title(s)?

Do you have managerial or supervisory responsibility?

- Yes
- No

What shift do you usually work?

- Day shift (work hours between 8am and 4pm)
- Evening shift (work hours between 4pm and midnight)
- Overnight shift (work hours between midnight and 8am)
- Rotating shift, split shift, or employer-arranged irregular schedule

My work schedule allows me to get enough sleep.

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly disagree

This semester, how many hours of paid work do you average each week?

- less than or equal to 10 hours
- 11-20 hours
- 21-30 hours
- 31-40 hours
- more than 40 hours

When did you start your current job?

- less than 6 months ago
- 6 months to less than a year ago
- 1-2 years ago
- 3-4 years ago
- more than 4 years ago

Drawing (Final Study)

OPTIONAL DRAWING:

As a way of thanking you for completing the Sleep Health survey, you are invited to enter a drawing for a \$25 Amazon gift card.

To enter, fill in your name and email below. Only university emails will be considered and duplicate entries will be discarded.

Winners will be notified by email. Your entry information is kept separate from the previous survey responses and will only be used for the purpose of this drawing.

First Name

Last Name

Email

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APPENDIX G. ADDITIONAL STATISTICAL RESULTS

Table B

Participant profile

Characteristics	Fall 2003		Fall 2007		Fall 2008		Fall 2013	
	n	% ^c	n	% ^c	n	% ^c	n	% ^c
Gender								
Female	5,845	62.5	10,991	66.1	15,025	69.7	16,677	67.6
Male	3,510	37.5	5,634	33.9	6,498	30.1	7,913	32.1
Transgender ^b	-	-	-	-	33	0.2	90	0.4
Age								
18-20 years	6,607	69.9	9,455	56.7	14,304	66.4	14,703	59.6
21-24 years	2,257	23.9	4,964	29.7	5,701	26.5	7,315	29.7
25-29 years	316	3.3	997	6.0	685	3.2	1,227	5.0
30 years and over	276	2.9	1,274	7.6	850	3.9	1,412	5.7
Race^a								
White	8,342	85.5	13,302	78.8	16,431	78.1	17,560	70.5
Black	446	4.6	789	4.7	1,430	7.2	2,167	8.7
Hispanic or Latino/a	434	4.4	1,146	6.8	1,710	8.6	3,590	14.4
Asian or Pacific Islander	411	4.2	1,409	8.3	1,931	9.8	2,312	9.3
American Indian, Alaskan Native, or Native Hawaiian	124	1.3	275	1.6	355	1.8	458	1.8
Biracial or Multiracial ^b	-	-	-	-	848	4.3	935	3.8
Other	257	2.6	643	3.8	621	3.1	700	2.8
Year in school								
1 st year	3,954	40.5	5,004	29.6	7,090	32.7	7,063	28.4
2 nd year	2,246	23.0	3,719	22.0	4,438	20.5	5,567	22.4
3 rd year	1,688	17.3	3,648	21.6	5,134	23.7	5,852	23.5
4 th year	1,354	13.9	3,143	18.6	3,913	18.0	4,862	19.5
5 th year or more	512	5.2	1,373	8.1	1,104	5.1	1,550	6.2
Letter grade								
A	3,184	32.6	5,570	33.0	7,841	36.2	9,645	38.7
B	5,142	52.7	8,380	49.6	11,307	52.2	12,369	49.7
C	1,365	14.0	2,394	14.2	2,397	11.1	2,718	10.9
D/F	63	0.6	543	3.2	134	0.6	162	0.7

N = 73,214 (Fall 2003: *n* = 9,355-9,754, 21 institutions; Fall 2007: *n* = 16,625-16,887, 39 institutions; Fall 2008: *n* = 19,690-21,679, 40 institutions; and Fall 2013: *n* = 24,657-24,894, 57 institutions). The percentage is calculated based on the total number of participants who responded to the item.

^aParticipants could select multiple categories for this item.

^bThese items/options were not included into the ACHA-NCHA survey until Fall 2008.

^cTotals vary slightly due to rounding.

Table C

Frequencies and ranking of health issues in Fall2003, 2007, 2008, and 2013

Health issues	2003	2007	2008	2013	2003	2007	2008	2013
	(%)				(Ranking)			
Stress	30.5	33.8	28.6	30.1	1	1	1	1
Sleep difficulties	23.9	26.4	20.6	21.5	2	2	2	2
Anxiety ^a	-	-	18.9	20.9	-	-	3	3
Cold/Flu/Sore throat	23.7	26.3	16.5	14.8	3	3	4	4
Work ^a	-	-	13.4	14.0	-	-	5	5
Depression ^b	13.5	15.7	11.7	12.7	6	6	7	6
Internet use/computer games	11.6	15.5	11.4	11.8	7	7	8	7
Participation in extracurricular activities ^a	-	-	11.3	11.1	-	-	10	8
Concern for a troubled friend or family member	17.1	18.7	11.8	10.7	4	4	6	9
Relationship difficulties	14.9	16.0	11.4	9.2	5	5	8	10
Finances ^a	-	-	6.4	7.0	-	-	11	11
Death of a friend or family member	8.8	10.2	6.0	5.9	9	8	12	12
ADHD	6.6	7.2	4.5	5.4	11	10	15	13
Sinus infection/Ear infection/Bronchitis/Strep throat	9.3	10.0	5.9	5.0	8	9	14	14
Roommate difficulties ^a	-	-	6.0	4.9	-	-	12	15
Homesickness ^a	-	-	4.4	3.9	-	-	16	16
Alcohol use	8.5	6.7	4.4	3.6	10	11	16	17
Chronic health problem or serious illness	2.6	3.2	3.3	3.5	16	16	18	18
Chronic pain	2.6	3.8	2.7	2.9	16	15	21	19
Learning disability	3.5	4.0	2.9	2.9	14	14	20	19
Allergies	4.8	5.4	3.1	2.7	12	12	19	21
Injury	3.6	4.2	2.2	2.3	13	13	22	22
Drug use	3.2	2.2	2.0	1.5	15	17	23	23
Eating disorder/problem	1.4	1.3	1.2	1.3	18	18	24	24
Discrimination ^a	-	-	0.9	1.0	-	-	25	25
Pregnancy (yours or partner's)	0.8	1.2	0.9	0.8	19	19	25	26
Assault	0.6	0.7	0.7	0.7	20	20	27	27
Gambling ^a	-	-	0.4	0.3	-	-	28	28

N = 73,214 (Fall 2003: *n* = 9,522-9,754, 21 institutions; Fall 2007: *n* = 16,620-16,887, 39 institutions; Fall 2008: *n* = 21,310-21,679, 40 institutions; and Fall 2013: *n* = 24,421-24,894, 57 institutions). The percentage is calculated based on the total number of participants who responded to the item. ADHD = Attention Deficit/Hyperactivity Disorder.

^aThese items/options were not included into the ACHA-NCHA survey until Fall 2008.

^bIndicating depression/anxiety disorder/seasonal affective disorder for Fall 2003 and 2007; indicating depression only for Fall 2008 and 2013.

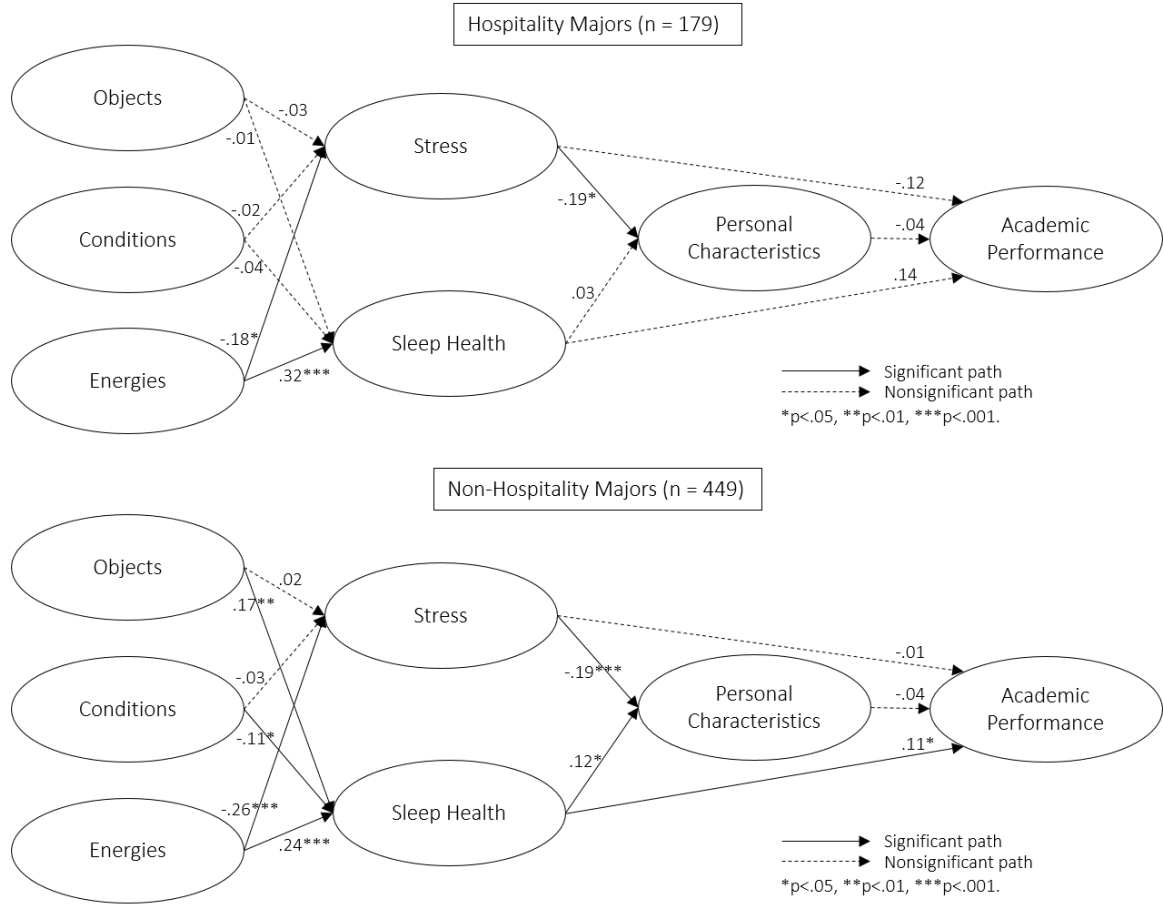


Figure A. Structural model with estimated parameters by majors