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Assessing Sleep Hygiene Awareness Among Emerging Adults Utilizing a Brief Vignette

Jessica Troy Hinojosa
University of Wisconsin-Milwaukee

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ASSESSING SLEEP HYGIENE AWARENESS AMONG EMERGING ADULTS

UTILIZING A BRIEF VIGNETTE

by

Jessica T. Hinojosa

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ABSTRACT

ASSESSING SLEEP HYGIENE AWARENESS AMONG EMERGING ADULTS UTILIZING
A BRIEF VIGNETTE

by

Jessica T. Hinojosa

The University of Wisconsin-Milwaukee, 2021
Under the Supervision of Professor W. Hobart Davies, PhD

Emerging adults may have misconceptions about how sleep hygiene behaviors affect sleep quality, suggesting they may not be aware of what is considered unhealthy sleep hygiene. Vignettes provide a unique approach to understanding sleep hygiene awareness in emerging adults, as no known studies have used this approach. The current study aimed to assess the utility of a vignette to identify emerging adults' awareness of negative sleep hygiene behaviors. A community sample of emerging adults completed an online survey including a demographics questionnaire, the *Sleep Health Index*[®] (SHI), the Sleep Hygiene Questionnaire (SHQ), and a vignette measure of sleep hygiene awareness. Findings revealed that emerging adults overall may lack awareness about maladaptive sleep hygiene behaviors; however, they were more knowledgeable about daytime napping and caffeine consumption. Sleep hygiene awareness was also significantly correlated with subscales of the SHI and SHQ. Women demonstrated higher sleep hygiene awareness, poorer sleep quality, and poorer sleep hygiene than men. This was the first study to develop a vignette to assess sleep hygiene awareness and is a promising method that may be useful in tailoring sleep hygiene interventions for emerging adults.

Keywords: emerging adults, sleep hygiene awareness, sleep health, vignette

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Assessing Sleep Hygiene Awareness Among Emerging Adults Utilizing a Brief Vignette

The current recommendations proposed by the National Sleep Foundation suggest that individuals over the age of 18 years obtain 7 to 9 hours of sleep each night (Hirshkowitz et al., 2015). Despite the recommendations for sleep duration and the importance of sleep throughout key developmental stages from infancy through emerging adulthood, the prevalence of poor sleep seems to be increasing in society, especially in emerging adult populations (Sheehan et al., 2019). Emerging adults, defined to be between the ages of 18 and 25 years old, are a particularly vulnerable population to poor sleep quality and quantity due to the varying levels of instability this population experiences (Arnett, 2000). More specifically, emerging adults may experience challenges related to autonomy, healthcare transition from pediatric to adult care, and mental health (Gill, 2014; Rosenberg, 2016; Walker, 2017). A portion of emerging adults may also particularly be at risk for developing sleep difficulties due to academic and/or occupational obligations (Wolfson, 2010). Because emerging adults experience a unique set of stressors and challenges that may impact their sleep quality when transitioning from adolescence to adulthood, more attention is needed on the emerging adult population to better understand the behaviors and attitudes about sleep hygiene that contribute to problematic sleep health within this population.

Sleep health is known to be a complex area of research that is affected by both physiological and psychological mechanisms. Therefore, it is imperative to have an understanding of these mechanisms and terminology associated with sleep as discussed below by Harrington and Lee-Chiong (2012), Walker (2017), Gellis and Lichstein (2009), and Bathory and Tomopoulos (2017) among other literature. From a physiological basis, a typical sleep cycle consists of two types of sleep: non-rapid eye movement *(NREM) sleep* and rapid eye movement *(REM) sleep*. NREM, or restorative sleep, consists of four stages that fluctuate between levels of

deep sleep and characterized by the amplitude of brain waves. REM sleep, also known as paradoxical sleep, is typically when dreaming occurs. Additionally, brain activity has been shown to be similar to that of wakefulness. Together, NREM and REM sleep are regulated by a *circadian rhythm* which is the body's natural, internal biological clock that regulates metabolic rate, hormone secretion, and body temperature in addition to the melatonin secretion within the brain that aids in the initiation of sleep. Aside from the physiological basis of sleep, individuals' behaviors may influence sleep quality either positively or negatively. These behaviors that influence sleep quality in such a way are collectively characterized as *sleep hygiene.* Included in sleep hygiene is an individuals' *sleep chronotype*, or individuals' preference of what time they go to bed. Other factors such as *sleep latency* (i.e., the time it takes to fall asleep) or *sleep duration* (i.e., the number of hours of sleep needed to feel well-rested) may also be affected by sleep hygiene behaviors. The adequacy of sleep is often discussed in terms of *sleep quality* as well, which refers to feeling well-rested or that one experienced minimal awakening after sleep onset (Blunden et al., 2004).

Prevalence of Sleep Difficulties

The prevalence of adults with poor sleep duration (i.e., adults that receive less than 7 hours of sleep each night) ranges from between one-third to two-thirds of adults (Center for Disease Control and Prevention; CDC, 2017). Furthermore, of those adults that do not receive adequate sleep, approximately 33% were reported to be emerging adults. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), Insomnia Disorder is the most common sleep disorder and is characterized by difficulties initiating sleep, maintaining sleep, and/or returning back to sleep upon early waking. It is reported that about one-third of adults experience insomnia-related symptoms with about 10-15% experiencing significant impairments

in daytime functioning (American Psychiatric Association, 2013). In the college student

population specifically, a review demonstrated that the prevalence of poor sleep quality has

ranged from 10% to 45% (Tavernier & Willoughby, 2014). A more recent study involving

college students found that approximately 60% of college students experienced deficits in their

sleep quality (Becker et al., 2018).

Sleep from Infancy to Adolescence

Sleep has been known to play a key role in physiological, psychological, and social

development throughout key developmental stages (Bathory & Tomopoulos, 2017; Walker,

2017). Past work has evidenced that adequate sleep during infancy (12 to 15 hours of sleep each

night (Hirshkowitz et al., 2015) promotes sensory system development including touch, motion,

memory, emotion, hearing, smell and taste (Graven & Browne, 2008). For school aged children,

it has been further supported that adequate sleep is crucial for efficient cognitive functioning and

proper development of brain structures (e.g., the hippocampus; Dutil et al., 2018). In particular,

research has demonstrated the importance of NREM sleep due to its implications in promoting

brain maturation in areas essential for learning and cognition (Page et al., 2018). All stages of

sleep including wakefulness, NREM sleep and REM sleep must be adequate to promote memory

consolidation to retain what is learned beginning in infancy and across the lifespan (Dutil et al.,

2018; Graven & Browne, 2008). In a review regarding the impacts of childhood sleep

deficiencies, sleep problems have also been shown to be predictive of mood problems later on in

life (Beebe, 2011).

Additionally, sleep has increasingly been shown to play a crucial role during adolescence

(Noland et al., 2009; Shochat et al., 2014).Within adolescence, the pubescent years additionally

require adequate and healthy sleep behaviors in order to promote healthy maturational

development (Bruce et al., 2017; Owens et al., 2014). The onset of puberty often prompts

changes in sleep health related to sleep chronotype (e.g., morning birds versus night owls;

Roenneberg et al., 2003) which may interfere with the management of daily responsibilities,

especially related to school and the transition into adulthood (Galland et al., 2017; Owens et al.,

2014). With that, adolescents' circadian rhythm takes a drastic shift where they are in need of

more sleep as their mind and body continues to develop (Walker, 2017). Further, adolescents are

more likely to engage in risk-taking behaviors (e.g., substance use), which may increase the

probability of engaging in those risk-taking behaviors if not receiving an adequate amount of

sleep and consequently impact their sleep quality (Shochat et al., 2014). Specifically, alcohol and

cannabis use in high school students have been shown to result in decreases in sleep duration and

sleep quality (Mike et al., 2016).

Sleep During Emerging Adulthood

Sleep continues to impact development in emerging adulthood (i.e., the developmental

stage in between adolescence and adulthood, generally ages 18 to 25; Arnett, 2000). Given that a

large portion of emerging adults are college students, they often experience subsequent changes

in their sleep patterns (Buboltz et al., 2001; Robbins & Niederdeppe, 2015). For example,

emerging adults may feel the need to stay up later in the night (while also getting up early the

following day) in order to meet the demands required of their college coursework (Wolfson,

2010). Conversely, some emerging adults may be at the peak of their physiological maturity and

experience shifting in sleep chronotype opposite that of adolescents with needs to go to bed

earlier and wake up earlier the following day (Blunden et al., 2004; Walker, 2017; Wolfson,

2010). Consequently, these shifts in sleep chronotype may result in the accumulation of sleep

debt, or the need to compensate for lost sleep by extending their wake time (Roenneberg et al., 2003).

The accumulation of sleep debt may also increase emerging adults' risk for mental health problems, such as depression and anxiety (Owens et al., 2014; Peach et al., 2016; Štefan et al., 2017). Research has also shown that inadequate sleep can result in the exacerbation of depression symptoms and worry (Gellis & Lichstein, 2009). Another study that investigated sleep difficulties in a large college student population evidenced that deficits in sleep quality were associated with the worsening of attention-deficit/hyperactivity disorder (ADHD) symptoms and greater impairments in daytime functioning (Becker et al., 2018). It has also been found that the quality and duration of sleep can have an impact on the development of interpersonal relationships. More specifically, poorer sleep quality has been found to result in poorer friendships and relationships with others (Tavernier & Willoughby, 2014).

Additionally, inadequate sleep has been shown to be associated with various physical health consequences. According to the CDC (2017), adults that received less than 7 hours of sleep each night were more likely to experience the following chronic health conditions: heart attack, coronary heart disease, stroke, asthma, chronic obstructive pulmonary disease, cancer, arthritis, depression, chronic kidney disease, and diabetes. Based on this, it appears that deficits in sleep duration particularly have an effect on cardiovascular health for adults. One study found that adolescents with a lower sleep duration were also more likely to be overweight suggesting an increased potential for health risks as they transition into adulthood (Noland et al., 2009). A review outlining physiological consequences of poor sleep indicated that inadequate sleep may be detrimental to immune system efficiency in fighting disease and infection, as well as,

endocrine system functioning in the regulation of hormones that maintain sleep-wake cycles (Okun, 2011).

While studies have supported that poor sleep can have a negative influence on mental and physical health, the research is often limited due to obscurities in the directionality of the relationship. Specifically, the relationship between sleep and a health condition is often bidirectional in nature (Becker et al., 2018; Bruce et al., 2017). For example, those who have chronic health conditions may experience sleep difficulties due to their condition, or conversely, individuals may have experienced sleep difficulties prior to the onset of their chronic health condition that exacerbates their condition.

Sleep Hygiene

Although there are many consequences that result from inadequate sleep, research shows that sleep problems often have etiology related to behavior that ultimately can be modified through sleep hygiene (Bathory & Tomopoulos, 2017) and may be key to preventing long-term sleep and health-related consequences. As has been previously stated, sleep hygiene is a collection of behaviors that influence sleep quality (Gellis & Lichstein, 2009). Addressing sleep hygiene is often a primary intervention strategy used to improve sleep (Bruce et al., 2017). Sleep hygiene behaviors have the potential to affect sleep (i.e., certain sleep hygiene behaviors may result in poorer sleep quality while others promote sleep quality), and are typically categorized as "good" and "bad" sleep hygiene. Individuals are said to have good sleep hygiene when they do not engage in poor sleep hygiene practices more than three times each week (Gellis & Lichstein, 2009), which includes, but not limited to the following behaviors: avoiding daytime naps, avoiding stimulant consumption too late in the day, utilizing the bed only for sleep, increasing exposure to natural light, and facilitating a calm and relaxing environment for sleep (Bruce et al.,

2017). Conversely, poor sleep hygiene includes sleeping in a noisy environment, uncomfortable room temperature, or engaging in behaviors that increase physiological arousal at bedtime (e.g., tasks that require an increased level of concentration and emotional investment; Gellis & Lichstein, 2009).

Furthermore, maladaptive sleep hygiene behaviors involving technology use have been evidenced in past work. Recent research on sleep hygiene practices has found that increased technology use was associated with poorer sleep quality (Galland et al., 2017). Technology use may be disrupting sleep duration, specifically, due to possible blue light that is emitted from electronic devices, the viewing of distressing media content, and interfere with the consistency of healthy sleep hygiene routines (Bathory & Tomopoulos, 2017). One study in particular found that in the hour before sleep, 96% of adults under the age of 30 years used some type of technology with 67% of those adults using a cell phone (Gradisar et al., 2013). Another study involving undergraduate college students where media use and access to internet and TV within the bedroom were associated with a later bedtime and waketime (Custers & Bulck, 2012). Social media use has also been shown to influence sleep quality. For example, a study that examined the effect of media use on sleep quality showed that freshman college students' Twitter activity was significantly related to poorer sleep quality (Garett et al., 2018).

Gender Differences in Sleep Hygiene and Sleep Quality

Previous findings have suggested that there are distinct differences in sleep hygiene practices and sleep quality among men and women. For example, women may be less likely to have poor sleep quality because it has been shown that men are at an increased risk for poor sleep quality based on their tendency to self-medicate by engaging in more substance use or use alcohol as a sleep aid (Gellis & Lichstein, 2009). An adolescent sample showed that boys were

more likely to engage in caffeine consumption and sleep in later the next day when compared to girls (Lee et al., 1999), which may suggest that women are more likely to engage in good sleep hygiene behaviors and have more consistent sleep scheduling. In a study that explored gender differences in sleep quality using objective measures of sleep (i.e., polysomnography), it was found that women demonstrated overall better sleep quality, minimal sleep disturbance, and fewer complaints about their sleep than men (Bixler et al., 2009).

On the other hand, research has suggested that women tend to experience poorer sleep health than men. For example, Andrijevic and colleagues (2018) found that sleep quality was worse among female college students than males. Conversely, one study found that adolescent girls overall are more likely to have poorer sleep hygiene than boys (Galland et al., 2017). In a sample of college students, findings revealed that women may exhibit increased challenges maintaining sleep, experience more feelings of tiredness, and partake in more daytime napping when compared to men (Buboltz et al., 2001). Other findings reveal no significant differences in sleep hygiene practices based on gender (John, 2014). Due to the mixed findings related to gender differences in sleep hygiene behaviors and sleep quality, it is imperative that further research be conducted so as to better identify and predict potential risk factors for developing sleep difficulties or sleep disorders. Additionally, the further identification and understanding of gender differences in sleep hygiene will allow for more individualized intervention approaches that can be used to promote better sleep quality among emerging adults.

Sleep Hygiene Awareness

Although it has been mostly established which sleep hygiene behaviors promote quality sleep (e.g., going to bed at the same time each night, engaging in calming activities before bedtime) and which sleep hygiene behaviors detract from good sleep quality (e.g., drinking

alcohol and/or caffeinated beverages close to bedtime), it is possible that awareness and knowledge of positive sleep hygiene may be lacking, especially in emerging adult populations. For example, one study found that a student population had misconceptions about various sleep hygiene behaviors such as that napping during the day, engaging in substance use, and exercising within two hours of their bedtime did not negatively influence their sleep quality (Andrijevic et al., 2018). Another study that examined sleep hygiene knowledge in a sample of undergraduate students found that nearly 25% of them had poor knowledge of sleep hygiene with nearly two-thirds of them consuming caffeinated beverages relatively close to their bedtime (Felix et al., 2017). A study examining adolescents' perceptions of sleep behaviors demonstrated that they were able to successfully identify contributors to their poor sleep (e.g., too much schoolwork, stress, and watching television); however, within the same sample there were individuals that felt some behaviors (e.g., watching television) were actually beneficial for their sleep quality (Noland et al., 2009). Prior research examining associations between sleep hygiene knowledge and sleep hygiene practices in a college student population found significant, positive correlations (Brown et al., 2002). That is, better sleep hygiene knowledge mirrored better sleep hygiene practices. Based on the literature described previously, it continues to be evident that emerging adults may not be aware or lack the education of which behaviors are good and bad for their sleep health. Therefore, more attention should be placed on emerging adults' sleep hygiene awareness as it relates to their own sleep hygiene practices and overall sleep health.

Measures of Sleep Hygiene Awareness

There are several validated measures that assess sleep knowledge and awareness. The Sleep Hygiene Knowledge Questionnaire (SHKQ) has been used to identify the knowledge of behaviors that may help or interfere with sleep patterns (Andrijevic et al., 2018). Another

measure, the Sleep Hygiene Awareness and Practices Scale (SHAPS), instructs respondents to rate various sleep behaviors from beneficial to disruptive as well as identify engagement in sleep behaviors (Felix et al., 2017). A relatively recent review has also identified several measures used in parent populations to assess knowledge of child sleep (e.g., Basic Sleep Knowledge, Knowledge of the Sleep of Young Children Questionnaire; McDowall et al., 2017). However, the measures described above and in McDowall et al. (2017) do not provide application of an individual's sleep knowledge. Felix and colleagues' (2017) study further suggested that adequate sleep hygiene knowledge may not be a deterrent from engaging in negative sleep hygiene behaviors and that many sleep health education programs may not be retaining information well enough to apply the knowledge directly to their own lives. Other research has additionally shown similar findings supporting that sleep knowledge on its own is not predictive of the intent to engage in sleep hygiene practices or sleep quality (Strong et al., 2018). Therefore, a more comprehensive measure is needed to better understand if emerging adults are able to adequately apply their awareness of good and bad sleep hygiene practices through another format, such as a vignette, rather than just simply reporting on individual behaviors in a questionnaire.

Vignettes, in particular, have been used more commonly within marketing or business settings; however, they are used within psychology to examine outcomes and processes such as in attitudes that may influence decision-making processes (Gronhoj & Bech-Larsen 2010). This approach to measure development demonstrated a unique method to incorporating both quantitative and qualitative strategies. Within the field of sport psychology, vignettes have been shown to be useful in allowing individuals to creatively disclose mental and physical health concerns related to their injury (Wadey et al., 2018). To date, there are no known efforts that have been made to develop vignette measures in sleep health research. Thus, this methodology

may serve as an aid in refining sleep health education and promotion programs by evaluating sleep hygiene awareness through the direct application of individuals' sleep hygiene knowledge to real world scenarios. Given the creative and open-ended approach, vignettes may be modified on an individualized basis (Ongena et al., 2013). Furthermore, utilizing vignettes in sleep health research may prove to be superior to self-report questionnaires by limiting the likelihood of a social desirability bias.

The Current Study

There is a multitude of research that demonstrates the importance of sleep health throughout development; however, there continues to be deficits in sleep quality and sleep hygiene, especially in emerging adult populations. Emerging adults may be at an increased risk for engaging in poor sleep hygiene habits due to increased feelings of uncertainty and inadequate coping skills during this developmental period. Further, they may lack the education and awareness to correct maladaptive sleep behaviors. Therefore, the primary aim of the current study was to explore the utility of a vignette that assesses emerging adults' awareness of sleep hygiene behaviors that either promote or worsen sleep quality. To date, there are no known studies that utilize vignettes to comprehensively examine sleep hygiene awareness in a community sample of emerging adults. The current study also aimed to examine how individuals' sleep hygiene awareness relate to sleep health and sleep hygiene practices. Based on the current aims, it was hypothesized that (1) there will be a significant, negative correlation between sleep hygiene awareness (assessed with a vignette) and sleep hygiene practices (assessed using the Sleep Hygiene Questionnaire), (2) sleep hygiene awareness will be significantly positively correlated with sleep health (assessed using the *Sleep Health Index*®), and (3) women will demonstrate better sleep hygiene awareness, have healthier sleep hygiene

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practices, and yield better sleep health than men. By understanding if emerging adults can accurately identify poor sleep hygiene behaviors, this may be an interactive and engaging way to set the stage for interventions to optimize those behaviors and promote better, restorative sleep.

Method

Participants

Community emerging adults ($N = 693$) aged 18-25 years old ($M_{age} = 21.76$, $SD = 1.94$) completed an online survey as a part of a larger study through the University of Wisconsin-Milwaukee across two semesters. Participants were deemed eligible to participate in the study if they were between the ages of 18 and 25 years old, had access to internet, and were English-speaking. Participants were mostly female (55.6%), single (56.4%), straight (79.3%), and college students (57.6%). The largest group reported living with a roommate (37.8%). Complete demographics can be found in Table 1. Race and ethnicity were reported using a different questionnaire in the two semesters. Participants that were given a selected choice format that combined categories of race and ethnicity for Semester 1 were predominantly White (61.2%). Those who were given the *Select all that apply* format for the race question and asked to identify whether or not they were of Hispanic origin in Semester 2 were predominantly White (82.8%) and non-Hispanic (83.7%). Refer to Table 2 for a summary of race/ethnicity frequencies.

Procedure

Vignette Development. Targeted behaviors were chosen based on the current literature and recommendations for sleep hygiene behaviors (e.g., Gellis & Lichstein, 2009; Hirshkowitz et al., 2015; Walker, 2017).The behaviors were then devised into a scenario featuring a college student routine with the following time points: morning, afternoon, early evening, late evening, and bedtime. Approximately 13 target behaviors were integrated across the entirety of the

vignette and can be identified as contributing to worsened sleep quality. Three psychologists who are certified Diplomates in Behavioral Sleep Medicine (DBSM) and experts in sleep hygiene and behavioral sleep health, were consulted to reach agreement on which behaviors were the "correct" target behaviors prior to coding.

Data collection. The procedure for the current study was approved by the Institutional Review Board (IRB) for each semester through the University of Wisconsin-Milwaukee. The undergraduate and graduate students involved in participant recruitment and data collection were required to complete a training in the ethical conduct of research before recruiting participants. If the students involved in participant recruitment were unable to obtain enough participants to meet the psychology course requirement, they were able to complete an alternate assignment so as to mitigate coercion for respondents to participate in the study. Informed consent was obtained from each participant before they completed the online Qualtrics survey which indicated that the participant understood that participation was completely voluntary, that they were at least 18 years of age, and that they understood that the student that recruited them would not be penalized if they chose not to participate in the study. Once informed consent was obtained, the current study was completed as part of a larger online Qualtrics survey and was completed in approximately 45 to 60 minutes. Participants were not compensated for their completion of the survey.

Measures

As a part of a larger online study, participants completed a demographics questionnaire, the Sleep Hygiene Questionnaire, the *Sleep Health Index*®, and completed a short response questionnaire accompanying a brief, written vignette. Questionnaires and measures are described below.

Demographics. Participants were asked to provide demographic information including: age, gender, sexual orientation, race, ethnicity, student status, current living situation, and marital status. For Semester 1, race and ethnicity was captured using a selected choice format that asked participants to answer the following question: What race/ethnicity do you consider yourself to be? Participants from Semester 2 identified their race using the same question frame from Semester 1; however, they were able to select all that applied instead of one answer. They subsequently identified their ethnicity by answering yes or no to the following question: Are you of Hispanic or Latina/o origin?

Sleep Hygiene Questionnaire (SHQ). The SHQ is a 19-item questionnaire that measures individuals' engagement in various behaviors related to sleep hygiene (Gellis & Lichstein, 2009). Specifically, participants were asked to identify how many days (0 to 7), on average, they engaged in a variety of behaviors that may influence their sleep quality (e.g., drank alcohol within 3 hours of bedtime, exercised within 4 hours of bedtime, watched television or streaming content in bed) over the past month. Subscales of the SHQ included Improper Sleep Scheduling, Sleep-Disrupting Products, Activating or Arousing Activities near bedtime, Bed Activities Other than Sleep, and Environmental Conditions. The SHQ total score was determined by calculating the sum of all items where higher scores on the SHQ are indicative of poorer sleep hygiene. .

Sleep Health Index® **(SHI).** The SHI was derived from the National Sleep Foundation and used to assess individuals' sleep health across three domains: Sleep Duration, Sleep Quality, and Disordered Sleep. The Sleep Duration subindex consisted of three items that assessed individuals' time spent in bed, perceived amount of sleep needed to achieve optimal functioning, and differences between time spent in bed on weekdays versus weekends. The Sleep Quality subindex consisted of six items that assessed participants' rating of sleep quality. The Disordered

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Sleep subindex included three items that asked respondents about their history of using sleep medications, being diagnosed with a sleep disorder, and discussing their sleep health with a medical provider. The Disordered Sleep subindex was reverse scored as follows: 0=7, 1=6, 2=5, 3=4. Specific items on the questionnaire included "In general, how would you rate your sleep quality?", "What time did you most often wake up for the day on work days or weekdays?", and "During the past 7 days, how many days did you wake up feeling well-rested, if any?". The total average SHI score was calculated by adding Sleep Duration, Sleep Quality, and Disordered Sleep subindices together and dividing by three, where the lowest possible score is zero and the highest possible score is 100. Higher scores on the SHI are representative of better sleep health and it has been shown to be a reliable ($\alpha = 0.75$) and valid measure (Knutson et al., 2017).

Sleep hygiene awareness vignette. A vignette was developed specifically for the purpose of the present study in order to assess emerging adult sleep hygiene awareness accuracy. The vignette briefly described a sample daily routine of a college student (see Figure 1). The vignette was broken down by morning, afternoon, early evening, late evening, and bedtime routines, which collectively had 13 target behaviors (see Table 3). Three sleep experts provided feedback on the intended target behaviors with 100% agreement on the target behaviors to confirm the "correct" number of target sleep hygiene behaviors. Participants were presented with five open-ended questions after reading through each section of the routine using the following question frame: "What (if anything) would you change about your roommate's [morning, afternoon, early evening, late evening, bedtime] routine?". The responses were scored based on the total number of targeted behaviors that were correctly identified with the lowest possible score being 0 and the highest possible score being 13. Higher scores on this vignette are indicative of better sleep hygiene awareness.

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Data Analysis

All statistical analyses were conducted using the IBM Statistical Package for the Social Sciences (SPSS) 25.0 Software (IBM Corp, 2017). Descriptive statistics were used to analyze the demographic data and to analyze the frequencies of correctly identified vignette target behaviors. For all statistical analyses, a significance level of $p < .05$ were used for each hypothesis.

Qualitative data. Responses to the sleep hygiene awareness vignette were coded by assessing the accuracy of the advice given based on the target behaviors of the vignette. All short responses were reviewed by a coding team consisting of four to six advanced undergraduate and graduate researchers to indicate if each participant accurately identified the targeted problematic sleep behaviors. The responses were categorized as correct (1) or incorrect (0) by the coding team and at least 80% agreement was obtained for each response. If participants appeared to make suggestions in reference to other time points aside from the one specified from the given question, those responses were recoded into their respective category. Responses that did not reflect behaviors from the sleep hygiene awareness vignette, but were relevant to the question, were categorized as "other" and not included in the total sleep hygiene awareness accuracy score. An overall accuracy score was calculated upon coding completion which indicated the total correct number of sleep hygiene behaviors that were identified out of the 13 behaviors targeted by the vignette.

Hypothesis testing. Spearman's rank-order correlations were conducted to determine the relationship between the sleep hygiene awareness scores and SHQ and SHI scores. An independent samples *t*-test was conducted to identify possible gender differences across sleep hygiene practices.

Results

Descriptive Statistics

Sleep hygiene awareness. Out of the 13 targeted behaviors, the number of correctly identified behaviors by respondents ranged from zero to 11 ($M = 3.90$, $SD = 2.44$). The behaviors that at least 50% of participants accurately identified included caffeine consumption too late in the day (69%) and daytime napping (62%). Behaviors that could use some improvement being identified (i.e., less than 25% of participants correctly identified them) included sleep duration (22%; i.e., *falling asleep at 1:00am*), watching *Netflix on the laptop in bed* (21%), *playing highly involved video* games (15%), doing *homework for several hours without distractions* (10%), watching *TV in* bed (9%), and playing *video games in bed* (4%). Refer to Table 4 for a summary of sleep hygiene behavior identification accuracy.

Correlations Between Sleep Measures and Sleep Hygiene Awareness

Refer to Table 5 for a summary of correlations. To examine the relationship between sleep hygiene awareness and sleep health (i.e., scores on the SHI and SHQ), Spearman's rank-order correlations were conducted. The results revealed that sleep hygiene awareness was not significantly correlated with total SHI scores, rho $= .044$, $p = .244$. However, when looking at specific subindices of the SHI, sleep hygiene awareness was significantly and positively correlated with Sleep Duration, rho $= .08$, $p = .037$ and Disordered Sleep scores, rho $= .11$, $p = .003$) indicating that better awareness of negative sleep behaviors is associated with better sleep duration and less disordered sleep (higher scores on Disordered Sleep indicate healthier sleep patterns). Sleep Quality scores were not significantly correlated with sleep hygiene awareness, rho $= -.05$, $p = .226$.

The results revealed that sleep hygiene awareness was not significantly correlated with total SHQ scores, rho = .03, p = .499. However, the Improper Sleep Scheduling subscale was significantly and negatively correlated with sleep hygiene awareness, rho = -.10, p = .009. The Activating or Arousing Activities Near Bedtime subscale was also significantly and positively correlated with sleep hygiene awareness, rho = .08, p = .047. The positive correlations between Sleep Hygiene Awareness and the Bed Activities Other than Sleep and Environmental Conditions subscales were non-significant. Likewise, the negative correlation between Sleep Hygiene Awareness and the Sleep-Disrupting Products subscale, (all p-values greater than .05).

Gender Differences Across Sleep Health Measures

All findings regarding patterns of gender differences are summarized in Table 6. An independent samples t-test revealed that women had significantly higher sleep hygiene awareness than men, p < .001. With regard to the SHI, no significant differences between men and women were found for SHI total scores, p > .05. Of the three subindices included on the SHI, women reported significantly lower sleep quality than men (p < .001); however, there were no significant gender differences between men and women for Disordered Sleep and Sleep Duration (all p-values greater than .05). Regarding the SHQ, women overall reported engaging in negative sleep hygiene behaviors significantly more days than men, p < .001. Only two subscales on the SHQ revealed significant differences between men and women: Activating or Arousing Activities near bedtime and Bed Activities Other than Sleep. Women reported engaging in activating or arousing activities near bedtime significantly more days a week in the last month than men, p < .05. Similarly, women reported engaging in bed activities other than sleep significantly more days a week in the last month than men, p < .001.

Discussion

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The primary purpose of the present study was to assess the potential utility of a vignette format for assessing sleep hygiene behaviors in emerging adults. The study additionally sought to determine whether sleep hygiene awareness is associated with measures of sleep health (i.e., SHI and SHQ scores) and if there are gender differences that exist across various aspects of sleep health. Overall, the findings indicated that although emerging adults demonstrated competencies in identifying negative sleep hygiene behaviors such as napping and caffeine consumption, it is evident that emerging adults may lack awareness about negative sleep hygiene behaviors related to engaging in non-sleep-related activities in bed and engaging in cognitively demanding tasks too close to bedtime. Additionally, sleep hygiene awareness scores were significantly correlated with subscales of the SHI and SHQ, and women reported significantly poorer sleep quality, engaged in more sleep hygiene behaviors, and scored higher in sleep hygiene awareness than men. Based on the findings, the study hypotheses were partially supported.

Evaluation of Vignette Methodology

This is the first study to date to create a vignette measure to assess community emerging adults' sleep hygiene awareness. The top three behaviors that participants were able to accurately identify included daytime napping, caffeine consumption too late in the day, and technology use (i.e., media and cell phone use), which suggests that emerging adults may have accurate conceptions of how these specific behaviors impact sleep quality which contrasts with findings from prior research (Andrijevic et al., 2018; Felix et al., 2017). Additionally, these behaviors may not need as much attention in sleep hygiene interventions or education programs. The sleep hygiene behaviors that may still have misconceptions included engaging in non-sleep related activities *in bed* (e.g., videogames, TV), engaging in cognitively demanding tasks in the hours leading up to bedtime (e.g., homework), exercising too close to bedtime, consuming alcohol, and

receiving less than the recommended seven hours of sleep each night. These misconceptions have been highlighted and supported by Andrijevic et al. (2018) and Noland et al. (2009).

Because there continues to be some degree of unawareness of healthy sleep hygiene behaviors by emerging adults, vignette methods have the potential to be useful in clinical settings with further refinement of the targeted behaviors and with further establishment of reliability and validity. Prior research has assessed knowledge and competencies through validated vignette measures in educational settings. In their study, Brovelli and colleagues (2014) used a vignette format as a way to assess and measure teachers' pedagogical knowledge. A group of science teachers were provided a series of vignette teaching scenarios where they were asked to identify problematic teaching practices. Another study has identified that vignettes that are developed in an open-ended format to assess competency in a given discipline is particularly beneficial for facilitating effective problem-solving and critical thinking (Jeffries & Maeder, 2011). Within a clinical context, this justification for validated vignette measures may be a key tool to help clients enhance their level of awareness surrounding problematic sleep hygiene behaviors, as well as, help them identify which behaviors may be contributing to their sleep problems.

The findings from the sleep hygiene awareness vignette may additionally be useful for determining specific theoretical frameworks that can be used to motivate emerging adults to engage in healthier sleep hygiene behaviors and increase emerging adults' knowledge and awareness of maladaptive sleep hygiene behaviors. Some support has been established in applying sleep hygiene knowledge to theoretical frameworks such as the Health Belief Model (Knowlden & Sharma, 2014) or the Theory of Planned Behavior (Ajzen, 2020). The Health Belief Model is a comprehensive model that explains the possible motivations and decision-making processes involved in engaging in behaviors that affect health and has been applied to

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aspects of health including diet, exercise, smoking cessation among other areas of preventative medicine (Conner & Norman, 2006). In applying the Health Belief Model to sleep health, it is noted that emphasis should be placed on perceived barriers (i.e., factors that interfere with obtaining adequate sleep) that contribute to positive and negative sleep hygiene behaviors, as those barriers will likely be the target of the sleep hygiene intervention (Grandner, 2019). The Theory of Planned Behavior focuses on attitudes towards engaging in behaviors and has been previously used to assess the understanding of sleep hygiene behaviors and behavioral intentions surrounding sleep hygiene practices (Strong et al., 2018). In their study, they found that behavioral intentions explained specific sleep hygiene behaviors; however, sleep hygiene knowledge was not related to behavioral intentions. Although minimal research has applied the Health Belief Model and the Theory of Planned Behavior to sleep hygiene and sleep health, these models may be a key asset in emerging adult sleep education and promotion interventions by challenging and targeting attitudes about potentially harmful sleep hygiene behaviors.

Review of Correlational Findings

With regard to the first hypothesis, it was predicted that sleep hygiene awareness scores would be negatively correlated with SHQ scores. Results indicate that only two subscales from the SHQ yielded significant findings: Improper Sleep Scheduling and Activating or Arousing Activities near bedtime. Interestingly, only Improper Sleep Scheduling on the SHQ was negatively correlated with sleep hygiene awareness which suggests that emerging adults are more knowledgeable about maintaining a consistent sleep schedule (i.e., waking up and going to bed at the same time each day) and may be more likely to have consistent sleep-wake times. With a majority of the sample being college students, it is possible that regulating sleep-wake schedules may be the most feasible sleep hygiene behavior to practice given the unique demands

that are required of college students (Brown et al., 2002). There was additionally a significant positive correlation between sleep hygiene awareness and Activating or Arousing Activities near bedtime on the SHQ, which suggests that although emerging adults demonstrated high awareness that stimulating activities contribute to poor sleep quality, they increasingly engaged in stimulating activities prior to their bedtime. This finding is similar to what Felix and colleagues (2017) found in that increased knowledge of behaviors that are good and bad for sleep health does not deter individuals from engaging in said behaviors.

It was anticipated that sleep hygiene awareness would be positively correlated with SHI scores; however, only Sleep Duration and Disordered Sleep subindices supported this hypothesis. The Sleep Duration subindex on the SHI was positively correlated with sleep hygiene awareness, demonstrating that emerging adults that are more aware of healthy sleep hygiene practices and more likely to receive the recommended number of hours of sleep each night. However, it is important to note that only about 22% of participants correctly identified sleep duration as being problematic in the given scenario. The positive correlation between sleep hygiene awareness and the Disordered Sleep subindex on the SHI indicates that emerging adults with more awareness of maladaptive sleep hygiene practices may be less likely to experience sleep-related concerns, or it is possible that emerging adults may be less likely to disclose sleep-related concerns. Minimal research has examined the disclosure of sleep concerns in primary care settings; however, in pediatric settings, parents are often less likely to disclose sleep-related concerns about their child to a provider (Blunden et al., 2004).

It is important to note that the correlations between sleep hygiene awareness and the SHI and SHQ were small, but significant correlations; however, there was a number of nonsignificant correlations present as well. It is possible that certain correlations with the SHQ were

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nonsignificant because the sleep hygiene awareness vignette simply did not address as many sleep hygiene behaviors as the SHQ did. For example, there was a zero correlation between sleep hygiene awareness and the Environmental Conditions subscale on the SHQ. This can be explained since the vignette did not target environmental factors (e.g., noise level, room temperature, or mattress comfortability). Revisions to the current vignette may be necessary in order to capture emerging adults' level of awareness by extending the targeted behaviors to a wider range of sleep hygiene practices and conditions. Prior research has shown that specific environmental conditions were not related to sleep quality outcomes (Knutson et al., 2017); however, it is possible that this may be dependent on the context. For example, Brown and colleagues (2002) suggested that college students are potentially exposed to a noisier environment in dorms which may negatively impact their sleep quality.

Gender Differences in Sleep Patterns

The third hypothesis regarding gender differences in sleep patterns was partially supported in that women demonstrated significantly higher sleep hygiene awareness when compared to men; however, findings related to SHI and SHQ scores revealed that women exhibited poorer sleep quality and sleep hygiene. The present study found that women reported significantly lower sleep quality than men which was contrasting with prior research that evidenced women exhibiting better sleep quality than men (Bixler et al., 2009; Gellis & Lichstein, 2009). Lee and colleagues (1999) previously found gender differences in the use of substances known to disrupt sleep (e.g., alcohol, and caffeine); however, the present study found no such differences between men and women. The contrasting evidence regarding sleep quality (e.g., see Gellis & Lichstein, 2009 and Andrijevic et al., 2018) and engagement in the utilization of sleep-disrupting products (Lee et al., 1999) demonstrates that further research is warranted to

provide clarity on possible differences within these areas of sleep health. The current study also revealed that women reported overall poorer sleep hygiene and reported engaging in activating or arousing activities prior to bedtime and bed activities other than sleep moreso than men. This finding is contrasting to the previous research that has identified women as having better sleep hygiene practices than men (Bixler et al., 2009; Gellis & Lichstein, 2009; Lee et al., 1999) and supports the research that women are more likely to experience challenges maintaining their sleep health (Buboltz et al., 2001) and engage in poorer sleep hygiene practices (Andrijevic et al., 2018; Galland et al., 2017). Due to the inconsistencies between the previous literature and the present findings, it is evident that further research is needed to clarify the gender differences in sleep hygiene practices and sleep health.

Despite women reporting poorer sleep quality and sleep hygiene behaviors than men, they still scored significantly higher in sleep hygiene awareness on the vignette measure. This finding also demonstrates consistency with the idea that sleep hygiene awareness and/or knowledge may not prevent engagement in maladaptive sleep hygiene behaviors (Felix et al., 2017). It is also possible that emerging adult women may experience a unique set of stressors and/or psychosocial challenges that may contribute to their inability to effectively manage their sleep health (Bulboltz et al., 2001; Mallampalli & Carter, 2014). Furthermore, it is possible that although women demonstrate better awareness of behaviors that are negatively related to sleep quality, they may be experiencing other physiological changes related to hormones or sleep-wake cycle changes that may be specific to women, especially during emerging adulthood (Blunden et al., 2004; Mallampalli & Carter, 2014, Walker, 2017; Wolfson, 2010).

Limitations

Although the present study yielded various significant findings, there are some limitations that need to be acknowledged. First, there was a lack of diversity in the sample because the sample consisted of mostly White, non-Hispanic college students that lived with a roommate. Consequently, the findings may not be generalizable or representative of all emerging adults. Second, given that the vignette is based on a college student routine, it is possible that lack of experience with the context of the routine interfered with getting an accurate representation of community emerging adults' awareness of maladaptive sleep hygiene behaviors, since a majority of the participants reported being full- or part-time college students. Third, caution should be taken when considering causality due to the bidirectionality often associated with sleep-related variables (Becker et al., 2018; Bruce et al., 2017) and due to the correlational nature of the study. Finally, considerations should be made regarding the order in which the sleep measures were provided to the participants. In the present study, the SHQ and SHI were provided to participants before the vignette measure, so it is possible that the questions from the SHQ and/or SHI primed participants' awareness about problematic sleep hygiene behaviors.

Future Directions

Given that the present study is the first to apply the use of vignettes as a means to shed light on the degree of sleep hygiene awareness emerging adults have, this work provides the foundation for continuing research on the application of vignettes in sleep health research. That being said, formal vignette testing should be conducted to determine the reliability and validity of this measure of sleep hygiene awareness. Additional contexts of the vignette (e.g., home, classroom, workplace) should also be considered to apply to other populations (e.g., parents, children, adolescents) as developmentally and situationally appropriate. Because emerging adults

mentioned behaviors that were not originally targeted in the study vignette, future studies should also revise the vignette in the current study to include a wider range of sleep hygiene behaviors that were not initially targeted (e.g., reading, meditation). Upon refining the vignette measure, future research should explore the utilization of more interactive tools (e.g., video or animation) to assess sleep hygiene awareness and potentially serve as a unique intervention approach to improving sleep health in emerging adult populations. Prior research has found that video-based methodologies for health promotion are significantly superior to written-based methodologies, such as vignettes (Al et al., 2018).

Conclusion

This is the first study to date that assessed the utility of sleep hygiene awareness in a community sample of emerging adults. The findings provided compelling evidence to suggest that emerging adults still need significant improvements in their sleep hygiene awareness and sleep health overall. Vignette-based methods have the potential to be effective within the domains of sleep health research and within the clinical assessment of sleep-related problems. Therefore, with further development and exploration, sleep hygiene awareness vignette assessments may prove to be superior to other standard sleep hygiene awareness measures (e.g., the SHAPS) and may demonstrate better utility across populations that extend beyond emerging adults.

Figure 1. Sleep Hygiene Awareness Vignette

Imagine that your roommate, who you know is a student, approaches you with concerns about their sleep quality. They proceed to ask you for advice on what they should change about their daily routine to improve their sleep quality. The following scenario maps out what their daily routine looks like. As you read through their routine, think about what might be contributing to your roommate's poor sleep quality.

<u>Morning</u>	Your roommate's alarm goes off at 7:00 am, and they hit the snooze button several times before getting out of bed. At 7:30am, they lounge in bed for another 15 minutes and then drinks two cups of coffee along with a light breakfast. By 8:30am your roommate is ready for class and heads out the door. Already feeling exhausted and tired, your roommate attends classes from 9:00am to 12:00pm.
<u>Afternoon</u>	Your roommate eats lunch at 12:30 before attending afternoon classes from 1:00pm to 3:00pm. After class, they return to the dorm at 3:30pm, set an alarm for 5:00pm, and take a nap for 1.5 hours.
<u>Early Evening</u>	After waking up from their nap, your roommate watches TV in bed until 6:00pm. They go for a 30-minute run outside and by 7:00pm they have dinner in their dorm. At 8:00pm your roommate studies and does homework without distractions or interruptions for several hours.
<u>Late Evening</u>	At 9:00pm (3 hours before bedtime), they drink two cups of coffee and continues their studies. At 10:00 (2 hours before bedtime), they drink 2 beers while playing highly involved video games in bed. Fifteen minutes before bedtime, they do several reps of pushups and sit-ups and then get ready for bed.
<u>At Bedtime</u>	At midnight, your roommate turns out the lights and streams Netflix on their laptop in bed. They set their alarm for the next day for 7:00am and scrolls through social media on their cell phone until falling asleep at 1:00am.

Table 1

Participant Demographics

Characteristic	*n*	%
Gender		
Female	385	55.6
Male	296	42.7
Different Identity	12	1.7
Marital Status		
Single, never married, not currently partnered	389	56.4
Married	25	3.6
Divorced	2	0.3
Partnered but not married	274	39.7
Sexual Orientation		
Straight	549	79.3
Gay	32	4.6
Lesbian	8	1.2
Bisexual	79	11.4
Different Orientation	24	3.5
Student Status		
No	278	40.2
Yes (High School Student)	16	2.3
Yes (Part-Time College or Graduate Student)	62	9.0
Yes (Full-Time College or Graduate Student)	336	48.6
Living Situation		
Live with one parent	56	8.1
Live with both parents	167	24.2
Live with another family member (not parent)	16	2.3
Live with roommate(s)	261	37.8
Live with spouse/romantic partner	111	16.1
Live alone	65	9.4
Other	14	2.0

Note. $N = 693$

Table 2

Participant Race and Ethnicity

	n	%
Semester 1		
Race/Ethnicity		
African American/Black	11	4.4
Asian (including South Asian and Southeast Asian)	24	9.6
Latino/Hispanic	35	13.9
Middle Eastern	5	2.0
Pacific Islander	1	0.4
White	154	61.4
Mixed	20	8.0
Other	1	0.4
Semester 2		
Race		
African American/Black	24	5.4
Asian (including South Asian and Southeast Asian)	25	5.7
Middle Eastern	9	2.0
Native American/American Indian/Alaskan Native	9	2.0
Pacific Islander	5	1.1
White	365	82.8
My race is not listed	23	5.2
Ethnicity		
Hispanic	65	14.9
Non-Hispanic	371	85.1

Note. $N = 252$ for Semester 1 and $N = 441$ for Semester 2.

Table 3

Sleep Awareness Target Behaviors

Time of Day	Target Behavior(s)
Morning	
	Hitting the snooze button several times
	Lounge in bed
Afternoon	
	Nap for 1.5 hours
Early Evening	
	TV *in bed*
	Homework for several hours without distractions
Late Evening (3 hours before bedtime)	
	Drink two cups of coffee
	Drink two beers
	Playing highly involved video games
	Video games *in bed*
	Push-ups and sit-ups (15 minutes before bedtime)
Bedtime	
	Netflix on laptop *in bed*
	Scroll through social media on cell phone
	Falls asleep at 1:00am (< 7 hours of sleep)

Table 4

Sleep Hygiene Behavior Identification Accuracy

Target Behavior	Frequency	
	n	%
Morning		
Hitting the snooze button several times	267	38.5
Lounge in bed	178	25.7
Afternoon		
Nap for 1.5 hours	425	61.5
Early Evening		
TV *in bed*	63	9.1
Homework for several hours without distractions	72	10.4
Late Evening		
Drink two cups of coffee	479	69.1
Drink two beers	267	38.5
Playing highly involved video games	107	15.4
Video games *in bed*	30	4.3
Push-ups and sit-ups (15 minutes before bedtime)	196	28.3
Bedtime		
Netflix on laptop *in bed*	143	20.6
Scroll through social media on cell phone	325	46.9
Falls asleep at 1:00am (< 7 hours of sleep)	149	21.5

Note. $N = 693$. Frequencies represent the number and percent of participants that correctly identified the targeted behavior.

Table 5

Sleep Hygiene Awareness Correlations with SHI and SHQ

Variable	*n*	*M (SD)*	rho
SHI			
Sleep Quality	693	57.32 (17.63)	-.05
Sleep Duration	688	83.94 (25.87)	.08*
Disordered Sleep	693	67.66 (8.02)	.11**
Total	693	69.44 (11.58)	.04
SHQ			
Improper Sleep Scheduling	693	2.12 (1.19)	-.10**
Sleep-Disrupting Products	693	1.50 (1.37)	-.03
Activating or Arousing Activities near bedtime	693	2.15 (1.31)	.08*
Bed activities other than sleep	693	3.41 (1.52)	.02
Environmental Conditions	693	0.76 (1.10)	.00
Total	662	37.41 (14.99)	.03

Note. $*p < .05.$ $**p < .01.$

Table 6

Gender Differences Across Sleep Health Measures

Variable	Women		Men		*t*	df	*p*
	M	*SD*	*M*	*SD*			
Sleep Hygiene Awareness	4.249	2.385	3.453	2.427	4.288	679	<.001**
SHI							
Sleep Quality	55.173	17.324	60.091	17.409	-3.665	679	<.001**
Sleep Duration	84.407	25.600	84.002	25.509	0.204	674	.838
Disordered Sleep	67.843	8.202	67.376	7.816	0.758	649	.449
Total	68.922	11.862	70.300	11.093	-1.546	679	.123
SHQ							
Improper Sleep Scheduling	2.181	1.204	2.018	1.166	1.770	679	.077
Sleep-Disrupting Products	1.465	1.330	1.521	1.390	-0.539	679	.590
Activating or Arousing Activities	2.234	1.232	2.013	1.379	2.173	596	.030*
Bed Activities Other than Sleep	3.722	1.452	3.012	1.480	6.268	679	<.001**
Environmental Conditions	0.773	1.064	0.728	1.096	0.536	679	.592
Total	39.164	14.787	34.768	14.519	3.793	649	<.001**

*Note. *p* < .05. ***p* < .001*

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