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Student Nurses' Perception of Sleep Quality

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By

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Student Nurses' Perception of Sleep Quality

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ABSTRACT

Sleep health is an underrepresented topic in the literature. Poor quality of sleep can lead to sleep deprivation, which has serious health and social consequences. The first year of university encompasses new demands and challenges to learning. Nursing students and nurses who suffer from poor sleep quality are at risk of providing unsafe patient care. The purpose of this pilot study was to explore the perceived level of sleep quality of first year nursing students. This was a descriptive, cross-sectional study that was guided by Rosenstock's Health Belief Model. The participants completed an online survey that included the Pittsburgh Sleep Quality Index (PSQI) and demographic questions. A sample of 32 first year nursing students enrolled at a university in Southwestern Ontario participated in this study between weeks 12 and 14 of their second semester. Approximately 84% of participants had total PSQI scores of greater than 5, which is associated with poor sleep quality. The most common sleep disturbances reported by the participants were being unable to fall asleep within 30 minutes, waking up in the middle of the night or early morning, feeling too hot, stress or anxiety, and having a loud roommate. Significant correlations were found between sleep disturbance and needs medication to sleep, sleep latency and overall sleep quality, and age and sleep efficiency. More research on sleep quality in nursing students is required to gain a greater understanding of the predictors and consequences associated with poor sleep quality. Evaluation of targeted interventions is needed to prevent poor quality of sleep in nursing students and nurses in clinical practice.

DEDICATION

I would like to dedicate this thesis to my parents, Maureen Wall and Timothy Wall. You have always supported me in everything I do and encouraged me to find my true passion. I would not be where I am today without your unconditional love and support. Mom, I appreciate all the times you have read over my work and given me feedback on my presentations. Dad, thank you for always being there for me when I have needed your technical support. Thank you both for all of your patience and also always challenging me to do my best.

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CHAPTER 1

INTRODUCTION

Sleep is imperative for optimal physical and mental health and wellbeing (American Academy of Sleep Medicine, 2015; Centers for Disease Control and Prevention [CDC], 2017; National Heart, Lung, and Blood Institute [NHLBI], 2017). Poor quality of sleep and poor sleep habits may lead to sleep deprivation, which has serious health and social consequences (Hershner & Chervin, 2014). Sleep deprivation has been linked to a number of chronic medical conditions including cardiovascular disease, obesity, diabetes, hypertension, stroke, psychiatric disorders (e.g., anxiety and depression) and attention-deficit hyperactivity disorder (Ferrie, Kumari, Salo, Singh-Manoux, & Kivimäki, 2011; NHLBI, 2017). Despite these consequences, compared to other health issues, sleep health is an underrepresented topic in the literature (Ferrie et al., 2011; Knowlden, Sharma, & Bernard, 2012). In addition, risk factors such as obesity, alcohol misuse, exercise, and smoking are commonly addressed in healthcare; in comparison, sleep health is often ignored (Perry, Patil, & Presley-Cantrell, 2013).

There is a general lack of awareness in the public about sleep, including the amount of sleep needed, awareness of current sleep quality and the negative consequences sleep deprivation can have on personal health (Perry et al., 2013). Additionally, sleep disturbances have been linked to accidents and human error, including motor vehicle accidents and occupational injuries (Ferrie et al., 2011; Garbarino et al., 2016; Haag, Toren, & Lindberg, 2015; Kalsi, Tervo, Bachour, & Partinen, 2018). More specifically, in emergency department nurses, poor sleep quality is associated with higher perceived errors (Weaver, Stutzman, Supnet, & Olson, 2016).

Nurses with poor quality of sleep are more likely to feel stress from their profession and have a more difficult time handling unexpected and difficult problems in their life, when compared to nurses with good sleep quality (Ogunsemi, Afe, & Almohandes, 2017).

Similar to the general public, university students, including nursing students, lack knowledge about the acute and chronic health consequences of sleep deprivation, and the impact that it has on the quality and safety of the care they provide to patients (Agarwal, Eryuzlu, & Chawla, 2015; Thomas, McIntosh, Lamar, & Allen, 2017). The impact on patient safety has the potential to negatively affect clinical and professional practice (Agarwal et al., 2015; Thomas et al., 2017). In a study of nursing students who were given a list of 24 health concerns and asked to rank them, stress, cold/flu/sore throat, and worrying for friends/family were all ranked higher than concerns related to their own sleep problems; only a third ranked sleep difficulty as a threat to their academic success (Kernan & Wheat, 2008). This demonstrates that nursing students have a lack of awareness of the level of severity and susceptibility of sleep deprivation and its consequences, despite how frequently it is occurring.

Higher education is a time for student learning that encompasses new demands and challenges to learning (Adams et al., 2017; Ahrberg, Dresler, Niedermaier, Steiger, & Genzel, 2012). Enrolment in the first academic year of nursing has been found to negatively affect sleep quality in nursing students (Benavente, da Silva, Higashi, Guido, & Costa, 2014). The first academic year of university poses an extreme risk for sleep deprivation, as "this is a time of minimal adult supervision, erratic schedules, and easy access to over-the-counter, prescription, and recreational drugs" (Marhefka, 2011, p. 22). Additionally, the first year of university has been found to be a time where students have

to balance new social opportunities with increased academic demands (Adams et al., 2017). Finally, attending university may involve residing in a dormitory for the first time, which has been associated with poor sleep quality (Adams et al., 2017; Lashkaripour, Bakhshani, & Mafi, 2012; Lund, Reider, Whiting, & Prichard, 2010).

There is an opportunity for institutions, educators, and clinicians to better understand nursing students' awareness of sleep quality and its contributing factors, so that interventions can be designed to prevent sleep deprivation from occurring. Therefore, the purpose of this pilot study was to examine the perceived level of sleep quality of first year nursing students, as well as identify the non-modifiable variables associated with poor sleep quality for these students. Gaining a better understanding between sleep quality and nursing students will allow educators to implement targeted interventions that can address this issue. Completion of this pilot study allows for future research that can expand on the findings from this study and can inform primary care providers as well.

CHAPTER 2

BACKGROUND

Search Strategy

A comprehensive search of the current literature was completed to obtain and critique the most current and relevant evidence for this topic. A search of the following databases was completed: CINAHL Complete, Proquest Nursing and Allied Health Database, PubMed, and Cochrane Library. The search included a combination of the following keywords in the subject heading: sleep quality, sleep deprivation, students and nursing students. An initial search that was specific to sleep quality and nursing students yielded only 8 results. The search was expanded to include studies focused on students in general (not limited to university aged), and sleep deprivation or sleep quality, in order to obtain a complete understanding of the current literature. This search was limited to peer-reviewed, English language, and articles published between 2012 and 2017, which enabled the researcher to retrieve current, peer-reviewed articles to assess them for quality. The search was also expanded to include any related articles found on the reference lists of relevant articles. The articles considered relevant to the study purpose were included in this review of the literature.

The search results indicate that the majority of the current literature related to sleep quality or sleep deprivation is focused on adolescents ($n = 5$) or college level students ($n = 20$). Many studies, including those studying student nurses, focus on measuring sleep quantity ($n = 18$) rather than sleep quality ($n = 22$). Throughout the literature, sleep is not consistently defined and various terms are used from study to study, including sleep restriction or insufficient sleep ($n = 5$), and sleep deprivation ($n =$

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3), which makes it difficult to synthesize findings and draw conclusions. There is a lack of current evidence specific to the student nursing population and sleep quality ($n = 4$), especially Canadian studies. Therefore, studies of adolescents were included in this literature review because of the lack of literature focusing on college level students and nursing students.

The current literature is from a variety of countries; the majority of the literature is from the United States ($n = 18$). However, only one of the studies reviewed was completed in Canada, which evaluated university students' perspectives of sleep habits and the consequences of sleep deprivation, not sleep quality, and specifically focused on cardiovascular health (Agarwal et al., 2015). Evidence on sleep in Canada is lacking and more studies are needed to fully understand the sleep quality of college level students, specifically nursing students.

Defining Sleep

Sleep is comprised of both quantity and quality (Cirelli, 2016). According to the National Sleep Foundation's most recently updated report, the recommended sleep duration per night for adults aged 18 to 64 is 7 to 9 hours (Hirshkowitz et al., 2015). Similarly, the American Academy of Sleep Medicine and Sleep Research Society recommend that adults sleep 7 or more hours per night for optimal health (Watson et al., 2015). More specifically, the National Sleep Foundation has reported that young adults aged 18 to 25 years require 7 to 9 hours of sleep per night (Hirshkowitz et al., 2015). The National Sleep Foundation does not recommend sacrificing sleep duration for schoolwork or social activities because of all the negative repercussions, including "increased fatigue, decreased psychomotor performance, accidents, poor physical and psychological health,

and low academic performance" (Hirshkowitz et al., 2015, p. 236). Results from the Canadian Health Measures Survey from 2007-2013 show that approximately one-third of Canadians, aged 18 to 64, sleep less than 7 hours per night, and "43% of men and 55% of women aged 18 to 64 reported having difficulty falling asleep or staying asleep 'sometimes/most of the time/all the time'" (Chaput, Wong, & Michaud, 2017, p. 30).

Sleep quantity by itself is inadequate to measure sleep; it is important to also study sleep quality and its relationship with health (CDC, 2017; Cirelli, 2016; Wallace, Boynton, & Lytle, 2017). It is possible to obtain an adequate amount of sleep per night, yet not feel rested due to poor sleep quality or disturbances throughout the night (CDC, 2017). Most recently, a systematic review identified several measurements that compose sleep quality: sleep latency, awakenings, wake after sleep onset, and sleep efficiency (Ohayon et al., 2017). Sleep latency is the length of time, in minutes, it takes to transition from wake to sleep; awakenings is the number of episodes, per night, in which an individual is awake for greater than 5 minutes; wake after sleep onset is the amount of time, in minutes, spent awake after sleep has been initiated and before final awakening and; sleep efficiency as the ratio of total sleep time to time in bed (Ohayon et al., 2017). Good sleep quality was defined as a sleep latency that is less than or equal to 30 minutes, waking up one time or less throughout the night, a wake after sleep onset of less than or equal to 20 minutes, and a sleep efficiency that is greater than or equal to 85% (Ohayon et al., 2017). In young adults, sleep efficiency between 65% and 84% may indicate appropriate sleep quality although this has not been confirmed (Ohayon et al., 2017).

According to the Pittsburgh Sleep Quality Index (PSQI), a self-rated, valid and reliable tool, sleep quality is measured by 7 components: overall self-rated sleep quality,

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sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction (Buysse, Reynolds, Monk, Berman, & Kupfer, 1989). Sleep duration is measured by hours of actual sleep per night; sleep latency is measured by the number of minutes it takes to fall asleep each night combined with how frequent one cannot fall asleep within 30 minutes; daytime dysfunction due to sleepiness is measured by trouble staying awake while driving, eating, or engaging in social activity and difficulty maintaining enthusiasm to complete tasks; habitual sleep efficiency is the ratio of number of hours slept to the number of hours spent in bed; sleep disturbances include waking up during the night, getting up to use the bathroom, coughing or snoring, feeling too hot or cold, having bad dreams, experiencing pain, and having difficulty breathing comfortably; use of sleeping medications is measured by how often they are used; and finally, overall sleep quality is rated by the participant as very good, fairly good, fairly bad, or very bad (Buysse et al., 1989). The systematic review's (Ohayon et al., 2017) measurement of sleep quality (sleep latency and sleep efficiency) is consistent with the PSQI. For the purposes of this study, sleep quality will be measured according to the PSQI definition because the PSQI is a valid and reliable tool that explores more components of sleep quality, including sleep disturbances, the use of sleeping medications and daytime dysfunction.

Sleep Quality

There are both antecedents and consequences associated with sleep quality. Antecedents are any of the preceding factors that can contribute to poor sleep quality. Consequences are any of the outcomes associated with poor sleep quality. The following review of the literature begins with an overview of poor sleep quality in students, then

identifies the antecedents of sleep quality, and concludes with the consequences associated with poor sleep quality.

The literature reports that college and university students suffer from poor sleep quality (Ahrberg et al., 2012; Alimirzae, Azzizadeh Forouzi, Abazari, & Haghdoost, 2014; Al-Kandari et al., 2017; Carter, Chopak-Foss, & Punungwe, 2016; Kenney, Paves, Grimaldi, & LaBrie, 2014; Lemma, Gelaye, Berhane, Worku, & Williams, 2012; Lund et al., 2010; Manzar, Zannat, Kaur, & Hussain, 2015; Wallace et al., 2017; Wang et al., 2016; Ye, Hutton Johnson, Keane, Manasia, & Gregas, 2015). Approximately 28% to 71% of university students report poor sleep quality (Ahrberg et al., 2012; Alimirzae et al., 2014; Kenney et al., 2014; Lemma et al., 2012; Manzar et al., 2015; Wang et al., 2016; Ye et al., 2015).

Not surprisingly, the literature identifies that many nursing students suffer from poor sleep quality (Alimirzae et al., 2014; Benavente et al., 2014; Huang, Yang, Wu, Liu, & Chen, 2014; Menon, Karishma, & Mamatha, 2015; Santos, Martino, Sonati, Faria, & Nascimento, 2016). Poor sleep quality has been reported by 71% to 84% of nursing students (Alimirzae et al., 2014; Benavente et al., 2014; Huang et al., 2014; Santos et al., 2016). Sleep duration is one of the components of sleep quality, and therefore, is an important factor to note. As many as 60% of nursing students have reported sleeping less than 7 hours per night prior to attending clinical placement or class (Benavente et al., 2014; Thomas et al., 2017), which is lower than the recommended sleep duration of 7 to 9 hours (Hirshkowitz et al., 2015). Comparatively, it has been shown that nursing students working the night shift average less than 7 hours of sleep per day: men reported an average of 6 hours 43 minutes and women reported an average of 6 hours 16 minutes

(Ferreira & De Martino, 2012).

University students, including nursing students, engage in poor sleep habits despite being aware of adequate sleep duration (Agarwal et al., 2015; Thomas et al., 2017). Agarwal and colleagues (2015) reported 56% of participants acknowledged they need 8 hours of sleep per night, but only 16% of participants reported sleeping 8 hours per night, which indicates an imbalance between what these students identify as being needed and what is actually happening. In addition, only 35% of participants felt they had an adequate amount of sleep per night (Agarwal et al., 2015). A study of nursing students had similar findings: 87% of participants believed they need 7 or more hours of sleep per night, yet approximately 60% of participants reported sleeping only 5 to 6 hours per night before class or their clinical placement (Thomas et al., 2017).

Nurses are also experiencing poor sleep quality and, consequently, sleep deprivation (Johnson, Jung, Brown, Weaver, & Richards, 2014; Kunzweiler et al., 2016; Weaver et al., 2016). The extent to which both student nurses and nurses are affected by sleep deprivation is alarming; sleep deprivation may extend from college years into working years for some nurses and ultimately can lead to errors and unsafe patient care (Thomas et al., 2017; Weaver et al., 2016). Therefore, it is critical to address poor sleep quality in nursing students because they are at risk of sleep deprivation and making errors that affect the safety of their patients, both as a student and once they have graduated.

Antecedents of poor sleep quality. Minimal research has been completed on factors contributing to sleep quality specific to nursing students; much more literature is related to college or university students in general. Among university students in general, school-related stress and academic workload have been found to be predictors of poor

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sleep quality and an inadequate amount of sleep (Agarwal et al., 2015; Lund et al., 2010; Wang et al., 2016). In a study of medical students, it was found that those students with poor exam scores had higher levels of stress and were more likely to have poor sleep quality (Ahrberg et al., 2012). Poor sleep has been associated with depressive symptoms (Lemma et al., 2012; Wallace et al., 2017), stress (Lemma et al., 2012; Wallace et al., 2017), employment (Wallace et al., 2017), other students' drinking/drug use (Stiles, 2013), social activities (Adams et al., 2017; Robbins & Niederdeppe, 2015), fear of missing out (Adams et al., 2017), technological distractions including cell phones and social media (Adams et al., 2017; Demirci, Akgonul, & Akpinar, 2015; Sahin, Ozdemir, Unsal, & Temiz, 2013; Wu, Tao, Zhang, Zhang, & Tao, 2015), consumption of energy drinks (Faris et al., 2017), interpersonal relationships (Wang et al., 2016), low exercise (Wang et al., 2016; Wu et al., 2015), skipping breakfast (Wang et al., 2016), smoking (Araujo et al., 2014), and napping (Ye et al., 2015). It has been found that college students who nap more than 3 times per week, longer than 2 hours at a time, or later in the evening between the hours of 6 and 9 pm have worse nighttime sleep quality and are at a greater risk of severe sleep deprivation (Ye et al., 2015).

Among nursing students, reported causes of sleep disturbances include waking up too early or throughout the middle of the night, being too cold, and having difficulty falling asleep (Huang et al., 2014). Enrolment in the first academic year of nursing, working while in school, and spending more hours studying have all been found to negatively affect sleep quality in nursing students (Benavente et al., 2014). Additionally, nursing students have reported use of substances to stay awake or aid in sleeping, with approximately 85% reporting consuming caffeine to stay awake and 33% using a sleep

aid (Thomas et al., 2017).

  Consequences of poor sleep quality. There is a link between poor sleep quality and a reduction in learning among university and college students (Ahrberg et al., 2012; Al-Kandari et al., 2017; Ferreira & De Martino, 2012; Perez-Olmos & Ibanez-Pinilla, 2014). Sleep quality has been found to be the strongest predictor of well being among undergraduate college students (Ridner, Newton, Staten, Crawford, & Hall, 2016). Students with poor sleep quality are more likely to report physical illness, higher levels of stress, and the use of medications or recreational drugs to help with staying awake or falling asleep (Lund et al., 2010). Poor quality of sleep in college students is also associated with alcohol-related risks (Kenney et al., 2014), negative affect (Lukowski & Milojevich, 2015; Lund et al., 2010), and psychiatric disorders (Concepcion et al., 2014; Haregu et al., 2015; Rose et al., 2015).

  In nursing students, exposure to caffeine or sleep aids, another component of sleep quality, increases the risk for developing both acute and chronic illnesses (Thomas et al., 2017). Nursing students with poor sleep quality have been found to be more depressed when compared to their peers (Menon et al., 2015) and are more likely to experience daytime sleepiness (Huang et al., 2014). Sleep difficulties and poor sleep quality have been found to be associated with poorer academic performance of nursing students, including less hours spent studying and lower grades (Kernan & Wheat, 2008; Menon et al., 2015). As many as 74% of nursing students acknowledge that they believe if they obtained more sleep, they would improve academically (Thomas et al., 2017). The association between academic performance and sleep quality presents a huge concern for nursing students, as this is a time when these students are expected to learn

large amounts of new information, that is often complex and requires critical thinking, so that they can provide safe practice.

Sleep Insufficiency, Sleep Deprivation, and Sleep Restriction

Due to the lack of literature specific to sleep quality, this literature review was expanded to include evidence specific to insufficient sleep, sleep deprivation, and sleep restriction in students, in order to capture the full impact poor sleep can have. Sleep insufficiency is defined as "when sleep is insufficient to support adequate alertness, performance, and health, either because of reduced total sleep time (decreased quantity) or fragmentation of sleep by brief arousal (decreased quality)" (Cirelli, 2016, Definitions section, para. 1). Among adolescents, factors associated with worsened or insufficient sleep are headaches and having a computer or gaming device in the bedroom (Ming, Radhakrishnan, Lilia, & Pecor, 2016; Morrissey et al., 2013).

Acute sleep deprivation is defined as "no sleep or a reduction in the usual total sleep time, usually lasting one or two days" (Cirelli, 2016, Definitions section, para. 2). Chronic sleep insufficiency or sleep restriction is defined as a condition when "an individual routinely sleeps less than the amount require for optimal functioning" (Cirelli, 2016, Definitions section, para. 2). While sleep deprivation is not the focus of this study, it is important to include the factors associated with sleep deprivation, as it is so closely related to sleep quality and can be an outcome of poor sleep quality.

Among university students, the most common factors associated with an inadequate sleep quantity are *school work*, *stress*, *studying*, and *homework,* all of which had greater than 10% of participants identifying these in their responses (Agarwal et al., 2015, p. 36). Employment and social activities have been linked to sleep deprivation in

university students (Agarwal et al., 2015). Sleep quantity that is less than normal, being older in age, and being Caucasian are some additional predictors of sleep deprivation in university students (Wallace et al., 2017). Acute sleep restriction in college students has been linked to a decrease in positive affect, which is defined in the study as "the extent to which an individual feels enthusiastic, active, and alert" (Rossa, Smith, Allan, & Sullivan, 2014, p. 289). Acute sleep restriction in college students, when compared to habitual sleep, is also associated with an increase in impulsive and risk-taking behaviour, slower reaction time, decreased alertness, and higher subjective reports of sleepiness (Rossa et al., 2014). Insufficient sleep in college students also increases the risk for accidents (Ferreira & De Martino, 2012), physical aggression towards a significant other, and more intense emotions and a lack of regulation of these emotions (Keller, Blincoe, Gilbert, Haak, & DeWall, 2014). Several studies have focused specifically on medical students and have found that sleep deprivation is linked to reduced attention and concentration, possibly leading to a decline in learning or a potential for unsafe patient care (Perez-Olmos & Ibanez-Pinilla, 2014). Medical students who sleep less than 7 hours per night are more likely to experience higher levels of exhaustion and burnout (Wolf & Rosenstock, 2017).

The American College Health Association (ACHA, 2016) surveyed approximately 44,000 students from 41 post-secondary institutions in Canada for the National College Health Assessment, and reported that 28.4% felt sleep difficulties impacted their academic performance, which was defined as receiving a lower grade on an exam, project, or in a course; not completing or dropping a course; or having a negative impact on their thesis, research, or dissertation work. In addition, this study

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reported that 37.1% of students felt their sleep difficulties were "traumatic or very difficult to handle" over the preceding 12 months (ACHA, 2016, p. 15). Finally, the ACHA (2016) reported 43.5% of participants felt tired or sleepy during the day 3 to 5 days of the week; however, 43.7% felt sleepiness during daytime activities was only "a little problem" and only 15.1% felt it was "a big problem" (p. 16).

Finally, studies of adolescents and medical students have suggested that the degree of sleep deprivation is associated with a higher risk for negative outcomes (Culnan, Holliday, Daly, Aggarwal, & Kloss, 2013; Meldrum & Restivo, 2014; Perez-Olmos & Ibanez-Pinilla, 2014); however, no similar results were found on nursing students. Meldrum and Restivo (2014) reported that adolescents who sleep less than 5 hours per night are at a higher risk for many negative outcomes, such as drunk driving, weapon carrying, fighting, contemplating or attempting suicide, smoking, alcohol use, binge drinking, marijuana use, sexual risk-taking, texting while driving, and obesity, when compared to students who sleep 8 or more hours per night. High school students who sleep less than 5 hours per night are significantly more likely to diet, fast, and purge, in an attempt to control weight, when compared to students who sleep 8 or 9 hours per night (Wheaton, Perry, Chapman, & Croft, 2013). Similarly, in medical students, as sleep deprivation increases, the risk for worse concentration and attention increases (Perez-Olmos & Ibanez-Pinilla, 2014).

Significance of Study

There are many negative short-term and long-term consequences associated with poor sleep quality. Emphasizing awareness of sleep quality in college-level students is essential, thereby improving their well being and overall health (Ridner et al., 2016).

Academic programs have the responsibility to consider the potential negative consequences poor sleep can have on students (Perez-Olmos & Ibanez-Pinilla, 2014). There is a lack of research specific to nursing students and sleep quality, especially in Canadian populations. By gaining a better understanding of nursing students' perceptions of sleep quality, interventions can be designed by educators to help prevent poor sleep quality from leading to both acute and chronic sleep deprivation.

Encouraging awareness and providing education to nursing students on sleep quality not only benefits themselves, but it can also benefit the clients in their care. Nursing students and nurses are responsible for assessing sleep quality in order to obtain a holistic evaluation of the client, and to recognize and respond to poor sleep quality (Aitken et al., 2017). Education on sleep in nursing students will allow them to transfer the knowledge into their practice.

Nursing students are also expected to provide safe care to their patients, beginning in first year and extending into their professional practice. Nurses who suffer from poor sleep quality that results in sleep deprivation are at a higher risk of making an error that may affect patient care (Johnson et al., 2014). Thus, it is vital to address the issue of poor sleep quality at the student level to prevent it from having a negative impact on patient outcomes.

Conceptual Model

The conceptual model that will be used to guide this study is Rosenstock's Health Belief Model (HBM) (Figure 1). The HBM is a psychological model developed to explain and predict health-related behaviour (Stretcher & Rosenstock, 1997). It dates back to the early 1950s, when new public health programs were being initiated, and the

focus was primarily disease prevention, rather than treatment of disease (Rosenstock,

1974). At that time, individuals were not using low-cost, easily accessible, preventative

healthcare services, such as polio and influenza vaccinations, dental screenings, and

tuberculosis screenings (Finfgeld, Wongvatunyu, Conn, Grando, & Russell, 2003;

Rosenstock, 1974). Thus, the HBM was developed to address these practical problems

and was later extended to account for health problems and therapeutic interventions

(Finfgeld et al., 2003; Stretcher & Rosenstock, 1997).

Individual Perceptions	Modifying Factors	Likelihood of Action
Perceived Sleep Quality • Sleep duration • Sleep disturbances • Sleep latency • Day dysfunction due to sleepiness • Sleep efficiency • Use of sleeping medications • Overall sleep quality • Hours of sleep per night needed to feel rested	**Demographic Variables** • Age • Gender • Enrolment status in university (full-time or part-time)	**Perceived Benefits of Good Sleep Quality versus Perceived Barriers to Good Sleep Quality**
	Perceived Threat	**Likelihood of Behavioural Change**
	Cues to Action • Perception of grades improving with more sleep	

Figure 1. Rosenstock's Health Belief Model applied to sleep quality (adapted from

Stretcher & Rosenstock, 1997).

According to Hochbaum (1958), the HBM is based on the concept that "health behaviour is determined by personal beliefs or perceptions about a disease and the strategies available to decrease its occurrence" (as cited in Hayden, 2009, p. 31). The four main components of the HBM are: perceived susceptibility, perceived severity, perceived benefits, and perceived barriers (Hayden, 2009). Health behaviour can be explained using any of these components alone or in combination with each other (Hayden, 2009). Over the years, the model has been expanded to include cues to action, self-efficacy and motivating factors (Hayden, 2009).

The components of the HBM that were used as the framework to guide this study were the individual perceptions (perceived susceptibility and perceived severity) and the modifying factors (demographic variables and cues to action). The individual perceptions contain the seven components of the PSQI and the hours of sleep per night needed to feel rested. The modifying factors included the non-modifiable demographic variables including age, gender, and enrolment status as well as a possible cue to action: a student's belief that their grades will improve if they obtained more sleep. The individual perceptions component of the HBM was adapted in this study's framework to evaluate participants' perceived sleep quality through the completion of the PSQI and its components. The words "perceived" or "perceptions" were used in this study's purpose and research questions, rather than "self-reported," because it pertains to the terminology in the HBM and allows for consistency of wording throughout the study. Finally, since there was no behaviour modification or intervention in this study, the likelihood of action was not evaluated, and therefore, perceived benefits, perceived barriers, and likelihood of behavioural change were not included in the framework to guide this study.

Perceived susceptibility is defined as "an individual's assessment of his or her chances of getting the disease" (Hayden, 2009, p. 35) and perceived severity or seriousness is defined as "an individual's judgement as to the severity of the disease" (Hayden, 2009, p. 35). Perceived threat is the combination of perceived susceptibility and perceived severity (Stretcher & Rosenstock, 1997). Modifying variables are described as "individual characteristics that influence personal perceptions" (Hayden, 2009, p. 33). Cues to action are "events, people, or things that move people to change their behavior" (Hayden, 2009, p. 33) and, therefore, can include prior knowledge about healthy sleep habits from peers, professors, or healthcare providers, as well as an understanding of the factors that interfere with sleep quality.

Current studies have demonstrated the applicability and relevance of the HBM. A recent study used the HBM to predict sleep behaviour in college students (Knowlden & Sharma, 2014). The HBM explained 34% of the variance in sleep behaviour and several of the HBM constructs were found to be significant predictors of sleep behaviour (Knowlden & Sharma, 2014). A positive association was found between perceived severity and sleep, cues to action and sleep, and self-efficacy and sleep, meaning that as each of these increased, sleep behaviour also increased (Knowlden & Sharma, 2014). Students felt the immediate consequences of inadequate sleep, such as poor stress management or inability to concentrate on work, were more important than long-term consequences of inadequate sleep, such as morbidity and mortality (Knowlden & Sharma, 2014). The cues to action to obtain adequate sleep were found to be mental and physical fatigue; self-efficacy included the confidence to create a bedroom environment conducive to sleep, the ability to reduce stress and relax before bedtime, and maintaining

a regular sleep schedule (Knowlden & Sharma, 2014). Lastly, there was a negative

relationship between perceived barriers (e.g., job stress and insufficient time) and sleep

behaviour, indicating that as perceived barriers to sleep increased, sleep behaviour

decreased (Knowlden & Sharma, 2014).

CHAPTER 3

METHODOLOGY

Purpose of the Study

The purposes of this pilot study were to explore the perceived level of sleep quality of first year nursing students and identify the non-modifiable variables associated with poor sleep quality in first year nursing students.

Research Questions

The research questions this study intended to answer were:

(a) What is the perceived level of sleep quality of first year nursing students?

(b) What are the non-modifiable variables associated with poor sleep quality in first year nursing students?

Based on the current literature, it was hypothesized that the majority of first year nursing students will have poor sleep quality because this is a transition period in which students are attempting to adjust and adapt to university life for the first time. This often presents with new responsibilities and challenges, including the pressure and expectations specific to nursing programs to learn vast amounts of information in a short period of time.

Design

This was a descriptive, cross-sectional study. Cross-sectional studies are used to "examine data at one time" (LoBiondo-Wood, Haber, & Singh, 2013, p. 239). A cross-sectional design has both advantages and disadvantages when compared to a longitudinal design. The advantages of a cross-sectional design include: less time and money spent completing the research, results are more accessible because a large amount of data can be collected all at once, and maturation is not a factor (LoBiondo-Wood et al., 2013). A

disadvantage for a cross-sectional design is that temporal relationships cannot be identified (LoBiondo-Wood et al., 2013).

Participants

The target population was first year Bachelor of Science in Nursing (BScN) students enrolled at a university in Southwestern Ontario. There were 127 students enrolled in first year nursing at this university. Nursing students are generally only accepted into their first year of the BScN program as full-time; however, there are special circumstances where this may not occur, and a student may be part-time. The entire population of first year nursing students at the university in Southwestern Ontario were invited to participate in the study.

Inclusion and exclusion criteria. The inclusion criterion was students enrolled in their first year of the baccalaureate nursing program. The exclusion criteria were enrolment at one of the partner campuses and enrolment in any other year of study other than the first.

Sample size. The maximum number of participants that could have been recruited was 127. Sample size is not relevant as this is a pilot, descriptive study. Most importantly, researchers must ensure that their sample is representative of the population (Biau, Kerneis, & Porcher, 2008; Grove, Burns, & Gray, 2013; Haber & Singh, 2013). A representative sample is more important than sample size; sample size in itself does not guarantee a representative sample (Haber & Singh, 2013).

Data Collection

Data collection was completed by using the university's web-based survey tool, Qualtrics, and included an online survey with demographic questions and the PSQI. An

email recruitment letter (Appendix A) was sent out to all first year nursing students by email to notify them of the study, which included a link to access the study directly. The survey remained open for a total of 3 weeks and the recruitment email was sent out once each week, for a total of 3 times.

The researcher received permission by email from the Dean of Nursing to send out the email recruitment letter through the department of nursing. This permitted the researcher to distribute the survey to the first year students in their second term, between weeks 12 to 14 of the semester. This was determined to be a significant time frame for data collection, as the scale to collect data measures sleep quality during the previous month. This time frame was also established as the students are still in their first year of school (their transition period) and it has been found in the literature that university students report as the semester progresses, sleep quality worsens (Brown, Buboltz Jr., & Soper, 2006). Brown et al. (2006) have reported that 70% of students experience poor sleep quality at the beginning of the semester, which increases to 82% experiencing poor sleep quality at 8 weeks, using the PSQI scale scoring.

Demographics. The demographic portion of the survey obtained information that is non-modifiable and pertinent to the study's aim, and has been informed by the review of the literature (Appendix B). The demographic data that was collected includes age and gender. The demographic questions on the survey were adapted based on the Canadian Community Health Survey from 2016 (Statistics Canada, 2018).

Individual perceptions and cues to action. Two additional questions were added to the survey to explore and gain a better understanding of the participants' individual perceptions and cues to action related to sleep quality (Appendix C). The first

question examined the self-reported number of hours of sleep per night needed to feel rested (individual perceptions) and the second question examined whether the participant believes that obtaining more sleep will improve their grades (cues to action).

Pittsburgh Sleep Quality Index scale. Sleep quality was measured using the PSQI (Appendix D), which was developed by Dr. Daniel J. Buysse and first published in 1989. Permission was granted from Dr. Buysse to use the PSQI for this study (Appendix E). The PSQI is a self-rated, valid and reliable tool that measures sleep quality and disturbances that may affect sleep quality in adults during the previous month, and requires approximately 5 to 10 minutes for completion (Buysse et al., 1989). The PSQI is self-administered, consists of 19 individual, self-rated items that make up 7 component scores that each have a possible range of 0 to 3 points, which are summed to give a global PSQI score that can range from 0-21; the higher the total score, the poorer the sleep quality (Buysse et al., 1989). The PSQI also consists of 5 questions that are rated by a roommate or bed partner (Buysse et al., 1989); however, these questions are not included in the scoring and therefore will not be included in the questionnaire that is going to be administered to the students. The 7 components of the PSQI are: sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction. The PSQI has a scoring test-retest reliability correlation coefficient of 0.85 ($p < 0.001$) and an overall reliability coefficient (Cronbach's alpha) of 0.83; when distinguishing between poor sleepers and good sleepers, a score of greater than 5 on the PSQI has been shown to have a diagnostic sensitivity of 89.6% and specificity of 86.5% (Buysse et al., 1989).

The PSQI scale has since been validated in numerous populations and conditions:

the elderly, post-traumatic stress disorder, primary insomnia, cancer, traumatic brain injury, chronic obstructive pulmonary disease, obstructive sleep apnea, pregnancy, and fibromyalgia (American Thoracic Society, 2016). The PSQI scale has also been used many times to study sleep quality in the college or university student population (Ahrberg et al., 2012; Alimirzae et al., 2014; Benavente et al., 2014; Brown et al., 2006; Huang et al., 2014; Kenney, LaBrie, Hummer, & Pham, 2012; Lund et al., 2010; Manzar et al., 2015; Menon et al., 2015; Silva, Chaves, Duarte, Amaral, & Ferreira, 2016; Wallace et al., 2017; Ye et al., 2015).

A recent systematic review and meta-analysis conducted by Mollayeva et al. (2016) found that the PSQI is "the most commonly used generic sleep measure in clinical and research settings" (p. 66) and that it is "currently the only standardized clinical instrument that covers a broad range of indicators relevant to sleep quality" (p. 70). Mollayeva et al. (2016) found that 9 studies included in the systematic review reported a Cronbach's alpha of 0.70 to 0.83, which led to the conclusion that the PSQI has a "positive rating for within- and between-group comparisons" (p. 66). Mollayeva et al. (2016) concluded that based on their findings from this systematic review, the PSQI is reliable and valid.

Ethical Considerations

The University of Windsor's Research Ethics Board (REB) approved this study. The potential participants received the email to invite them to participate in the study. If the potential participants clicked on the link, they were directed to the Letter of Information (Appendix F) first, which explained the study purpose, procedure, compensation, potential risks and benefits, confidentiality, withdrawal, feedback of

results, subsequent use of data, rights of research subjects, and prompts to ask questions. Participants could access the survey using their own personal device (e.g., computer or mobile device), which helped to ensure that participation was voluntary and reduced the risk of coercion to participate. Participants were informed that there were no known physical, psychological, emotional, financial or social risks or discomforts associated with this study and that if they participated, they may gain awareness of their own personal sleep quality and factors that disturb their sleep. They were advised they might also feel satisfaction from their participation in this study as they are helping to advance scientific knowledge about sleep quality, which may lead to future interventions to address this issue. Participants were informed that choosing to participate or not participate would have no effect on their grades and that they could withdraw at any time during the completion of the survey by closing the browser window, which had no consequences. The potential participants were assured that all information collected would remain confidential and that participants could not be linked to the data. Participants were informed that if they have any questions about the research they could contact the researcher by email or the researcher's advisor by email or phone. The potential participants were also advised if they have any questions about their rights as a research participant, they could contact Research Ethics at the university by phone or email. Finally, participants were advised that when disseminating the results, data would be presented as aggregate data to ensure privacy and confidentiality. Studies that involve questionnaires with minimal risk allow for written consent to be waived, and completion of the survey to serve as implied consent (Grove et al., 2013), therefore, completion of this survey was indication of the participants' informed, voluntary, and implied consent

to participate.

Potential participants were advised of the incentive to participate in the study, a chance to win one of four $50 Visa gift cards, in appreciation for their time and participation. All study participants had the option to provide their name and university email address following completion of the survey for a chance to be entered into the draw. The identifying data was stored separately from the survey data and could not be linked to the survey data in any way. The winners were notified by email to pick up their gift card at the university's nursing office one week after the survey was closed.

Data was only accessible by the researcher and the researcher's advisor for the purpose of analyzing the data. Data was protected from unauthorized access: the secure server and personal computer were both password-protected. Data will be kept for five years and will be deleted from all servers at that time.

Data Analysis

Prior to analysis, the data was explored for accuracy of entries, missing data, and statistical assumptions (Grove et al., 2013). There were no missing data points in the data set. The data was organized and stored using both Statistical Package for the Social Sciences (SPSS) version 25 and Microsoft Access. The researcher initially used the PSQI Scoring Database (a Microsoft Access database) provided by Dr. Buysse through the University of Pittsburgh (Appendix G) to calculate the scores (ranging 0-3) for sleep duration, sleep disturbance, sleep latency, daytime dysfunction due to sleepiness, sleep efficiency, overall sleep quality, and needs medications to sleep. This database was also used to calculate the total PSQI score (ranging 0-21). These scores were then uploaded into SPSS. The researcher used SPSS to complete all other statistical analyses, including

frequencies and descriptive statistics, which allowed the researcher to organize the data in

a visually meaningful way to better understand the characteristics of the sample and to

provide a description of the study variables (Sullivan-Bolyai, Bova, & Singh, 2013).

Finally, SPSS was utilized to perform nonparametric correlation analysis, Spearman's

rank, between the seven components of the PSQI (sleep duration, sleep disturbances,

sleep efficiency, sleep latency, needs medication to sleep, overall sleep quality, and

daytime dysfunction due to sleepiness). Statistical significance was set at $p \leq 0.05$. The

statistical analyses completed were replicated based on a similar recent study of sleep

quality in undergraduate students (Carter et al., 2016).

CHAPTER 4

RESULTS

Survey Response

There were 127 students enrolled in first year nursing at the time of the study. Thirty-two (25.2%) students participated in this study.

Demographic Characteristics and Sleep Quality Scores

Demographics. At the time of the study, there were 109 females, 16 males, and 2 students who did not report their gender enrolled in the first year of the nursing program. The mean age of the participants was 18.5 years (range 18-20) and 84 percent were female ($n = 27$). All students who participated were enrolled as full-time. The sample in this study is considered to be a representative sample of the total population, based on similarities between the demographic information obtained from the University and the sample. The population of first year nursing students at this University consists of approximately 86% females, and 13% males, with the remaining 1% unreported. The sample used in this study similarly has 84% female participants and 16% male participants. Additionally, the average age of the population is 18.6 years, and the average age of the sample is 18.5 years. Due to the similarities between the sample and population, based on demographics, the sample is considered to be a representative one of the overall population of first year nursing students at this Southwestern University. However, the sample may not be representative of the overall population by other characteristics that were not measured, but could impact findings (e.g., family income).

Sleep quality scores. Table 1 displays the frequencies of the PSQI total scores. The mean PSQI score for the sample was 8.34 (range $4 - 12$; $SD \pm 2.27$) and the median

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and mode were both 9. Approximately 84% ($n = 27$) of participants had total PSQI

scores of greater than 5, which is associated with poor sleep quality.

Table 1

Frequencies of PSQI scores

Score	$N = 32$ (%)
4	2 (6.3)
5	3 (9.4)
6	2 (6.3)
7	3 (9.4)
8	5 (15.6)
9	8 (25.0)
10	2 (6.3)
11	5 (15.6)
12	2 (6.3)

Note. (%) were rounded to one decimal place. $N =$ number of participants.

Table 2 displays the frequencies of selected sleep measures, including hours

needed to feel rested, usual sleep duration, and overall sleep quality. Participants were

also asked to rate their sleep quality overall on a scale of very bad, fairly bad, fairly good,

and very good. More than 50% of participants rated their sleep quality as fairly good ($n =$

18), despite total scores indicating only approximately 16% of participants ($n = 5$)

actually having "good" sleep quality based on the PSQI total scores. The majority of

participants reported needing between 7-9 hours of sleep per night to feel rested ($n = 25$;

78%).

Table 2

Frequencies of Selected Sleep Measures

Variable	N = 32 (%)
Hours needed to feel rested	
0-4 hours	1 (3.1)
5-6 hours	5 (15.6)
7-8 hours	13 (40.6)
8-9 hours	12 (37.5)
Greater than 9 hours	1 (3.1)
Usual sleep duration	
0-4 hours	3 (9.4)
5-5.9 hours	5 (15.6)
6-6.9 hours	16 (50)
7-7.9 hours	5 (15.6)
8-8.9 hours	3 (9.4)
Overall sleep quality	
Very good	0 (0)
Fairly good	18 (56.3)
Fairly bad	12 (37.5)
Very bad	2 (6.2)

Note. (%) were rounded to one decimal place. *N* = number of participants.

Table 3 shows the means and standard deviations of selected sleep measures. The average bed time was approximately 12:41 am (range 10 pm–3 am; *SD* ± 1.21). The average number of minutes to fall asleep each night was 33.4 minutes (range 5-90 minutes; *SD* ± 23.706). Approximately 30% of participants (*n* = 9) reported a sleep latency of 45 minutes or more. The average waking up time was approximately 7:37 am (range 6 am-10:30 am; *SD* ± 1.137). Approximately 75% of participants (*n* = 24) sleep less than 7 hours per night, with 44% of participants sleeping only 6 hours. The average sleep duration was 6.08 hours (range 4-8 hours; *SD* ± 1.048), and no participants reported sleeping 8.5 hours or more per night. More than 80% of participants felt that if they obtained more sleep their grades would improve (*n* = 26).

Table 3

Means and Standard Deviations of Selected Sleep Measures

Sleep Measure	$M \pm SD$
Bedtime	12:41 am ± 1.21
Minutes to fall asleep	33.4 minutes ± 23.71
Waking up time	7:37 am ± 1.14
Sleep duration	6.08 hours ± 1.05

Note. *M* = mean and *SD* = standard deviation.

The participants were asked to select how often they experienced several sleep disturbances based on a scale ranging from not at all during the past month, less than once a week, once or twice a week, or three or more times a week (Table 4). The most common sleep disturbances reported by the participants, based on how frequently they occurred, were being unable to get to sleep within 30 minutes, waking up in the middle of the night or early morning, feeling too hot, and other reasons the participants were able to describe, which included: "stress", "anxiety", "mind running", "mental distractions", "cramps", "loudness", and "restless leg syndrome". A third of the participants (*n* = 10) indicated stress, anxiety, or mind running, and 6 participants reported this occurred three times per week or more. Approximately 16% (*n* = 5) of participants indicated noise, with about 10% (*n* = 3) specifically indicating a noisy roommate.

Table 4

Frequencies of Sleep Disturbances

How often have you had trouble sleeping because…	*N* = 32 (%)
Cannot get to sleep within 30 minutes	
Not during the past month	2 (6.3)
Less than once a week	8 (25)
Once or twice a week	12 (37.5)
Three or more times a week	10 (31.3)
Wake up in the middle of the night or early morning	
Not during the past month	4 (12.5)
Less than once a week	9 (28.1)
Once or twice a week	13 (40.6)
Three or more times a week	6 (18.8)
Have to get up to use the bathroom	
Not during the past month	16 (50)
Less than once a week	8 (25)
Once or twice a week	6 (18.8)
Three or more times a week	2 (6.3)
Cannot breathe comfortably	
Not during the past month	27 (84.4)
Less than once a week	2 (6.3)
Once or twice a week	3 (9.4)
Three or more times a week	0 (0)
Cough or snore loudly	
Not during the past month	29 (90.6)
Less than once a week	2 (6.3)
Once or twice a week	1 (3.1)
Three or more times a week	0 (0)
Feel too cold	
Not during the past month	12 (37.5)
Less than once a week	15 (46.9)
Once or twice a week	4 (12.5)
Three or more times a week	1 (3.1)
Feel too hot	
Not during the past month	8 (25)
Less than once a week	14 (43.8)
Once or twice a week	9 (28.1)
Three or more times a week	1 (3.1)

Had bad dreams	
Not during the past month	15 (46.9)
Less than once a week	14 (43.8)
Once or twice a week	3 (9.4)
Three or more times a week	0 (0)
Have pain	
Not during the past month	26 (81.3)
Less than once a week	6 (18.8)
Once or twice a week	0 (0)
Three or more times a week	0 (0)
Other reasons[a]	
Not during the past month	0 (0)
Less than once a week	1 (5.9)
Once or twice a week	8 (47.1)
Three or more times a week	8 (47.1)

Note. (%) were rounded to one decimal place. N = number of participants.
[a]Other reasons are the responses to an open-ended question in the survey, and responses included stress, anxiety, mind running, mental distractions, cramps, loudness, and restless leg syndrome.

Table 5 displays the frequencies of the remaining sleep quality components including using a medicine to aid in sleep, trouble staying awake during social activities, and having a problem getting the enthusiasm to accomplish tasks. Approximately 22% of participants reported taking a medicine to aid in sleep at least once per week and 19% of participants had trouble staying awake while driving, eating meals, or engaging in social activity at least once per week. More than 80% of participants reported a problem getting the enthusiasm to get things done more than once a week, and approximately 50% of participants had this problem three or more times a week.

Table 5

Frequencies of Selected Sleep Quality Components

How often have you…	$N = 32$ (%)
Taken medicine to aid in sleep?	
Not during the past month	19 (59.4)
Less than once a week	6 (18.8)
Once or twice a week	6 (18.8)
Three or more times a week	1 (3.1)
Had trouble staying awake while driving, eating meals, or engaging in social activity?	
Not during the past month	10 (31.3)
Less than once a week	16 (50)
Once or twice a week	5 (15.6)
Three or more times a week	1 (3.1)
Had a problem getting the enthusiasm to get things done?	
Not during the past month	1 (3.1)
Less than once a week	5 (15.6)
Once or twice a week	11 (34.4)
Three or more times a week	15 (46.9)

Note. (%) were rounded to one decimal place. N = number of participants.

Correlation Analyses

The seven components of the PSQI and the two non-modifiable variables (age and gender) were assessed for significant correlations. Three significant correlations were found between the variables: sleep disturbance and needs medication to sleep, r_s = .412, p = .019; sleep latency and overall sleep quality, r_s = .500, p = .004; and age and sleep efficiency, r_s = -.403, p = .022 (Table 6). A coefficient of ±1, indicates a perfect positive or negative correlation. According to Bluman (2009), all of these correlation values are considered to be moderate in strength, as they fall in the range of .4 to .6 (as cited in Sullivan-Bolyai et al., 2013).

Table 6

Correlations of PSQI Components and Non-Modifiable Variables

Component of PSQI	Sleep duration	Sleep disturbance	Sleep latency	Sleep efficiency	Needs medication to sleep	Daytime dysfunction	Overall sleep quality	Gender	Age
Sleep duration	1.000	-.096	.267	.081	-.220	.079	.070	.000	-.269
Sleep disturbance	-.096	1.000	.166	-.062	.412*	.011	-.053	-.163	.096
Sleep latency	.267	.166	1.000	.044	.234	-.208	.500**	.279	.021
Sleep efficiency	.081	-.062	.044	1.000	.103	-.015	-.089	-.217	-.403*
Needs medication to sleep	-.220	.412*	.234	.103	1.000	-.211	.013	.058	-.056
Daytime dysfunction	.079	.011	-.208	-.015	-.211	1.000	.086	.143	.156
Overall sleep quality	.070	-.053	.500**	-.089	.013	.086	1.000	.280	.243
Gender	.000	-.163	.279	-.217	.058	.143	.280	1.000	.012
Age	-.269	.096	.021	-.403*	-.056	.156	.243	.012	1.000

Note. * $p \leq .05$ and ** $p \leq .01$.

CHAPTER 5

DISCUSSION

The results indicate that the majority (84%) of these first year nursing students are experiencing poor sleep quality. This finding is consistent with the findings of other studies that examined sleep quality in nursing students, which concluded that anywhere from 71% to 84% of nursing students had poor quality of sleep (Alimirzae et al., 2014; Benavente et al., 2014; Huang et al., 2014; Santos et al., 2016). However, more than half of the participants self-rated their sleep quality as "fairly good", which shows a disconnection between how the participants perceive their sleep quality to be and how their sleep quality actually is, according to the PSQI scores. This is similar to another recent study that also found an overestimation of good sleep quality when compared to the global PSQI scores (Carter et al., 2016). These findings are also similar to the findings of the National College Health Assessment report of approximately 44,000 Canadian college students, which found that more than 60% of students felt tired or sleepy during the day more than 3 days per week, yet only about 20% felt this was a big problem (ACHA, 2016), which similarly shows a disconnect between their sleep perceptions and actual sleep behaviours. This overestimation could be a result of poor recall or students feeling a need to answer a certain way that is believed to be the 'right' response (Arora, Broglia, Pushpakumar, Lodhi, & Taheri, 2013; Carter et al., 2016). However, this overestimation may not be due to social desirability bias, and may actually be more likely related to a lack of knowledge on what constitutes good sleep quality. With regards to sleep, social desirability is often the opposite; people tend to express their

lack of sleep. Additionally, this overestimation of good sleep quality may be related to a disregard for the lack of time spent awake in bed (Arora et al., 2016).

Most participants (approximately 78%) acknowledged needing 7 to 9 hours of sleep to feel rested, which is in alignment with the National Sleep Foundation's recommendation of 7 to 9 hours for young adults (Hirshkowitz et al., 2015). This finding is consistent with the results from the study by Thomas and colleagues (2017), which reported that 85% of nursing students needed 7 or more hours of sleep per night to feel rested. Despite this, the average sleep duration in this study was only approximately 6 hours per night, which is less than the National Sleep Foundation's recommendation for young adults (Hirshkowitz et al., 2015). In this study, three quarters of nursing students reported sleeping less than 7 hours per night on average. This finding is higher than the findings of previous studies of nursing students, which found that approximately 60% of nursing students slept less than 7 hours per night prior to their classes or clinical placements (Benavente et al., 2014; Thomas et al., 2017). The differences in these findings may be because this study included only first year nursing students, whereas the study by Benavente et al. (2014) included nursing students from all four years and the study by Thomas et al. (2017) included nursing students who were mainly seniors. Also, the timing of the survey completion may contribute to the differences in these findings. This study was completed at the end of the semester, between weeks 12 to 14. Similarly, the study by Benavente at al. (2014) was completed around this same time period, during March to April of 2012; however, the study by Thomas et al. (2017) does not specify the exact time period, other than it was over the course of six weeks.

The high incidences of poor quality of sleep and low sleep duration in nursing students is especially concerning as prior research among college students has shown a link to poor health outcomes, such as depression, mood changes, or other mental health diseases (Keller et al., 2014; Lund et al., 2010; Menon et al., 2015; Rossa et al., 2014), increase in risk-taking behaviour (Rossa et al., 2014), daytime sleepiness (Huang et al., 2014; Rossa et al., 2014), burnout (Wolf & Rosenstock, 2017), and other acute and chronic illnesses (Thomas et al., 2017). These students with poor sleep quality or low sleep duration may also be at risk for poor learning outcomes, such as reduced concentration, less hours spent studying, lower grades, or a decline in learning (Ahrberg et al., 2012; Ferreira & De Martino, 2012; Kernan & Wheat, 2008; Menon et al., 2015; Perez-Olmos & Ibanez-Pinilla, 2014). Finally, there is a risk that these nursing students experiencing poor sleep quality may continue to experience it in their professional years, which can lead to errors and unsafe care (Thomas et al., 2017; Weaver et al., 2016).

Four out of five nursing students felt that if they obtained more sleep, their grades would improve. This is comparable to the findings of another recent study, which reported that 74% of nursing students believed they would improve academically with more sleep (Thomas et al., 2017). The participants in these studies are acknowledging that the lack of sleep is impacting their academic abilities. Research has shown a relationship between poor sleep quality and a reduction in learning, less hours spent studying, and lower grades among university students, including those in nursing (Ahrberg et al., 2012; Al-Kandari et al., 2017; Ferreira & De Martino, 2012; Kernan & Wheat, 2008; Menon et al., 2015; Perez-Olmos & Ibanez-Pinilla, 2014). Therefore

educators and academic programming should take these findings into account to improve sleep quality and learning, thus reducing the potential for unsafe patient care.

In addition, more than 80% of participants reported a problem with a lack of enthusiasm to get things done more than once a week, and approximately half of the participants experienced this three or more times a week. This lack of enthusiasm may contribute to less time spent doing homework, studying, and participating in social activities, all of which are important for one's well being.

The relationships between the seven components of the PSQI that comprise sleep quality were examined. A positive correlation was found between sleep disturbance and needs medication to sleep, which indicates that as the number of sleep disturbances increases, the use of medications (prescribed or over the counter) to assist with sleep, also increases. The most common sleep disturbances reported by the participants in this study included feeling too hot while sleeping, not being able to fall asleep within 30 minutes, waking up in the middle of the night or early morning, and other reasons, which included stress, anxiety, and loudness, particularly from a roommate. The majority of students who identified stress as a sleep disturbance reported that it occurred three or more times per week. Some other sleep disturbances that were reported, but were slightly less frequent per week, were feeling too cold and having bad dreams.

Another positive correlation was found between sleep latency and overall sleep quality, which indicates that as sleep latency increases, or the number of minutes it takes to fall asleep increases, perceived sleep quality worsens. This finding is similar to Carter et al. (2016), who also reported a significant relationship between overall sleep latency and sleep quality, although it was a weaker relationship ($r_s = .289$, $p \le .05$). In order for

sleep quality to be considered good, sleep latency should be less than or equal to 30 minutes (Ohayon et al., 2017). A sleep latency of 45 minutes or more indicates poor sleep quality (Ohayon et al., 2017). In this study, approximately a third of participants reported a sleep latency of 45 minutes or longer and 10% reported a sleep latency of 90 minutes. About 70% of participants answered that they could not get to sleep within 30 minutes more than once per week, and 31% reported they could not get to sleep within 30 minutes three or more times per week. This is consistent with the findings in the study by Carter et al. (2016), which reported approximately 25% of undergraduate students had trouble falling asleep within 30 minutes three or more times per week.

A negative correlation was found between age and sleep efficiency, which indicates that as age increases, sleep efficiency (the ratio of number of hours slept to the number of hours spent in bed) decreases. Statistically this is considered to be a significant correlation. However, the range of ages of the sample was 18 to 20 years, which is not a wide range of ages and therefore, this correlation may not be theoretically relevant. The other possibility is that this correlation is significant, and young adults between the ages of 18 and 20 may be very different, due to life experiences and how they handle stress.

Application to Rosenstock's Health Belief Model

The conceptual model that was used to guide this study was Rosenstock's Health Belief Model (HBM). The HBM was selected because it is used to explain and predict health-related behaviour (Stretcher & Rosenstock, 1997). The individual perceptions, perceived susceptibility and perceived severity, and the modifying factors, demographic variables and cues to action, were the components of the HBM that were used to guide

this study. This study ultimately explored nursing students' perceptions of sleep quality

by measuring the seven components of the PSQI, the global PSQI scores, and the number

of hours of sleep per night needed to feel rested. Students with poor sleep quality,

measured by the PSQI, may perceive this to be a threat to their health, which may lead to

behavioural change. The modifying factors that can lead to a perceived threat were also

explored. None of the non-modifiable demographic variables (age and gender) were

found to be associated with the PSQI components. However, the majority of the

participants believed that if they obtained more sleep their grades would improve, which

is a possible cue to action that could lead to lack of sleep being seen as a perceived threat,

which may lead to a behavioural change.

Finally, the likelihood of action was not evaluated because there was no

behaviour modification or intervention in this study. Therefore, the perceived benefits,

perceived barriers, and likelihood of behavioural change are components of the HBM that

were not included in the framework that guided this study. However, it is recommended

that future studies include these components to explore and evaluate interventions that

lead to behaviour change, preventing and reducing poor quality of sleep in nursing

students.

Implications

Implications for education. Since poor sleep quality was found to be a problem

for nursing students in this study, interventions are required to mitigate this. Many

studies call for interventions to properly educate university and college students on sleep

problems, the predictors and consequences of inadequate sleep, and proper sleep hygiene

(Agarwal et al., 2015; Ahrberg et al., 2012; Al-Kandari et al., 2017; Asaoka et al., 2014;

Huang et al., 2014; Thomas et al., 2017; Wallace et al., 2017). Sleep hygiene is defined

as "a variety of different practices and habits that are necessary to have good nighttime

sleep quality and full daytime alertness" (National Sleep Foundation, 2018, What is Sleep

Hygiene section, para. 1). Educators must consider that poor sleeping habits may be

related to a general lack of knowledge about sleep health among college students, rather

than deviant lifestyle choices (Brown et al., 2006). It is also imperative to educate

students and healthcare providers on the importance of quality of sleep, not just quantity.

Promoting sleep quality is essential, thereby improving well being and overall health

(Ridner et al., 2016). Through this education, students may continue proper sleep hygiene

practices beyond university and throughout their careers (Thomas et al., 2017).

Academic programming should also consider sleep deprivation and the potential negative

consequences it can have on students (Perez-Olmos & Ibanez-Pinilla, 2014).

Specifically, the results of this study indicate a necessity for screening of sleep quality in

faculties of nursing. Using the PSQI, and its associated software, as a screening tool

allows for quick calculation of the total PSQI score and the components. This can

provide educators with more information about whether or not students are struggling

with poor sleep quality, which allows for education and interventions to be implemented.

There have been some interventions that have been effective to improve sleep

quality in college students, including sleep education interventions (Douglass-Burton &

Dobrosielski, 2014; Hershner & O'Brien, 2018; Kloss et al., 2016). College students

enrolled in a 15-week sleep education course reported a significant increase in sleep

duration per night, higher scores on a sleep knowledge quiz, and a significant increase in

the perception that they were getting enough sleep from 30% before initiation of the

course to 51% upon course completion (Douglass-Burton & Dobrosielski, 2014). College students who completed a personalized online sleep education intervention had a significant improvement in sleep quality and depression scores, had a more regular sleep schedule, stopped using electronics at an earlier time, and were less likely to have insufficient sleep before an examination (Hershner & O'Brien, 2018). Another sleep education program for college students that was comprised of two 90-minute workshops was effective to increase sleep hygiene knowledge, reduce unhealthy beliefs about sleep, and reduce sleep latency time (Kloss et al., 2016).

Another important area for future research is to identify the barriers to good sleep quality, and the strategies to remove these barriers, for both students and healthcare providers. In this study, sleep disturbances such as anxiety, stress, having a loud roommate or hearing other noise while trying to sleep, and being too hot were all identified as barriers to good sleep quality. In addition, there was a relationship between sleep disturbances and using medication to sleep. Therefore, students need to be educated on the importance of anxiety and stress reduction, as well as coping skills, especially for first year students who are transitioning into university. Universities should have resources available for students that focus on anxiety and stress reduction, and these should be made well known and easily accessible to students. Education about sleep aid medications, both over-the-counter and prescription, should be provided to students so they are aware of the benefits and risks of them. Finally, many students complained of noise or a loud roommate affecting their quality of sleep, which is similar to the findings of previous studies that found that living in a dormitory is associated with poor sleep quality (Adams et al, 2017; Lashkaripour et al., 2012; Lund et al., 2010). This

is an important barrier to sleep quality for educators and universities to address, as first year students often live in student housing or dormitories with a roommate. Rules regarding noise levels should be established and enforced in each dormitory. Universities and resident assistants should also encourage open communication between roommates about noise expectations at the beginning of the year.

Finally, college students believe that managing their time effectively can contribute to healthier sleep behaviours (Robbins & Niederdeppe, 2015). Thus, nurse educators should provide students with time management resources and practices to help guide students. This can be built into orientation or can be added into the curriculum to ensure all students have access to these resources. This is especially important for students entering their first year of university, as this transition period from high school into university presents them with many new opportunities and challenges. Students may sacrifice sleep for homework or social events. Therefore, time management is vital for success, as many nursing students will be balancing living on their own for the first time, schoolwork, clinical placements, part-time employment, new social opportunities, and less adult supervision.

Implications for practice. It is not only the responsibility of nursing educators, but also the responsibility of employers to educate nursing students and practicing nurses on the dangers of sleep deprivation, use of medications to aid with sleep, and long or consecutive work and clinical placement hours (Thomas et al., 2017). The Canadian Nurses Association and the Registered Nurses' Association of Ontario (2010) recommend that nursing staff and management receive education on "recognizing and managing fatigue in self and others, to include understanding the science of sleep, the

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risks associated with fatigue and approaches to circadian rhythm disturbances" (p. 3). An environment that promotes good sleep quality and sleep habits can help to ensure the safety of the nursing staff as well as the clients. Poor sleep quality and sleep deprivation have the potential to lead to errors and unsafe patient care (Thomas et al., 2017; Weaver et al., 2016), which is why education and a working environment that support good sleep habits are necessities. This includes ensuring there is enough time between clinical placements or working shifts for the nursing student or nurse to obtain enough sleep. This also means planning clinical placements around in-class requirements, such as classes and tests.

Providing nursing students and nurses with education on sleep quality, not only benefits them, but it can also benefit the clients in their care. Nurses and nursing students should assess sleep quality in order to obtain a holistic evaluation of the client. Currently, healthcare providers often do not address sleep quality; other health risk factors such as obesity, alcohol use, exercise, and smoking are at the forefront of healthcare (Perry et al., 2013). Educating nursing students about the importance of sleep quality on health and the contributing factors will allow them to transfer the knowledge into their practice. Nurses and student nurses can then better assess sleep quality and provide interventions to clients to support improved sleep quality (Aitken et al., 2017).

Implications for research. Future research in this area is essential to better understand sleep quality in nursing students. Future research should seek to understand the predictors and risk factors of sleep quality in order to better understand the underlying factors and to provide strategies to prevent poor sleep quality from occurring. This study examined only non-modifiable variables, age and gender. Future studies should explore

modifiable factors and their relationship to sleep quality, such as employment, relationship status, income, living arrangement, exercise, hours spent doing school work, hours spent on social media, and napping.

This study showed a positive correlation between sleep latency and quality of sleep. Therefore, focusing on the predictors of increased sleep latency can be beneficial to reduce the length of time it takes nursing students to fall asleep, therefore, improving overall sleep quality. This may include exploring the use of technology (e.g., computers, smart phones, and television) before bed, as well as examining exercise habits and how they contribute to sleep latency and sleep quality.

This study also showed that 22% of participants reported taking a medicine to aid in sleep at least once per week, which is extremely concerning. However, the PSQI does not differentiate between over-the-counter medications and prescription medications. It is important for future research to examine the use of medications and differentiate between the types that are being used to aid in sleep and how frequently to gain a greater understanding of the potential adverse effects these students may be experiencing. This includes research on prescription medications, over-the-counter sleep aids, and use of alcohol or marijuana to aid in sleep. This also should include use of stimulants like coffee, energy drinks, or prescription medications that are used to remain awake.

Another consideration for future research is a research design that involves a pre-test and post-test, rather than a cross-sectional design. This would allow the researchers to compare the participants' sleep quality scores from the beginning to the end of the semester or at certain points throughout the semester to observe for any changes. Researchers could also explore different interventions using the pre-test and post-test

design. Additionally, the results showed that the majority of participants felt if they obtained more sleep their grades would improve. Future research can explore this belief by examining the association between academic performance and sleep quality over time, specifically if sleep quality improves, do grades improve as well.

Researchers should consider adding interviews to combine with the completion of the PSQI questionnaire. Interviews with participants would allow for a more complete understanding of certain topics, such as living in residence or with a roommate, stress, social expectations, and if students truly understand the difference between sleep quantity and sleep quality.

Future research should incorporate the use of a valid and reliable questionnaire that measures stress, in combination with the PSQI. Many participants in this study identified stress as one of the factors that disturbed their sleep. When measuring stress, it is important to use a valid and reliable scale that is composed of several items, rather than a single question, because the answer to a single question about stress will not adequately assess the complex theoretical underpinnings of the concept (Griffiths & Rafferty, 2015). This type of research will enable researchers to explore the relationship between stress and sleep quality.

Finally, future research should focus on expanding beyond first year nursing students to obtain more robust results. This may involve longitudinal research over nursing students' four years of study, to evaluate changes over time in the same participants. Additionally, expanding beyond nursing students to compare nursing students to other students in other university programs would be beneficial to gain a understanding if the experience of nursing students is unique. Lastly, research including

the students enrolled at the partner campuses at this university would allow for more comparisons within the nursing student population.

Limitations

There are several limitations to this study and future research in this area can mitigate these limitations. This study used self-report to measure sleep quality, which is a limitation as it relies on the participant to be accurate and honest when answering the survey questions. Participants may have felt the need to answer questions with the "right" answer or they may have recalled their sleep habits inaccurately. Future research can be strengthened if the participants are required to keep a sleep diary over the study period that is updated daily, to ensure more accurate results and reduce the risk of recall bias. Physiological data collection methods of monitoring sleep can strengthen future research in the area, as the advantages include their "objectivity, precision, and sensitivity" (Sullivan-Bolyai et al., 2013, p. 291). Such methods may include using polysomnography or actigraphy. Comparing the findings of objective and subjective sleep measures can also provide a greater understanding of the topic.

Participation in this study was voluntary, and it is possible that those students who did participate may feel strongly about the topic or more interested in learning about the topic than those who did not participate.

Another limitation is that this study was cross-sectional. The main limitation of a cross-sectional study is that it is difficult to establish causal relationships (LoBiondo-Wood et al., 2013; Sedgwick, 2014; Setia, 2016). This study was done between weeks 12 to 14 of the second term of first year, which is at the end of the semester just before examinations begin, and therefore, may explain the results. It would be ideal for future

research to be completed with longitudinal data collection that is analyzed for changes

over time to understand if different points throughout the semester have any effect on

sleep quality. This may also include following nursing students throughout the four years

of study to assess for changes in sleep quality over that period of time, rather than simply

throughout the semester. This could also include a cross-sectional study that evaluates

sleep quality in nursing students in each of the four years and comparing the findings.

Finally, despite the small sample size ($n = 32$) of this pilot study, the researcher

remains confident in the findings, as they are similar to the findings of other past larger

studies. The sample obtained in this study is considered representative to the total

population based on demographics, which allows for greater confidence in the findings.

However, transferability is limited because of the very small, focused population.

Participating nursing students are from a single school, which limits the generalizability

of the results. Future research may include nursing students at the partner campuses, or

nursing students from other universities in Ontario. Lastly, future research may include

students from other faculties and other years other than the first, to allow for more

comparison and analysis.

Conclusion

Good quality of sleep is imperative for optimal health and well being in students.

To date, limited research has been completed on the sleep quality of nursing students,

especially Canadian research. This study explored the perceptions of sleep quality of first

year nursing students transitioning into university. The findings of this study are similar

to the findings of other studies that focused on sleep quality in nursing students; the

majority of nursing students are experiencing poor quality of sleep. Poor quality of sleep

in nursing students can have negative impacts on health, learning, and the patients that are cared for in clinical practice. Thus, it is critical for educators, academic programing, healthcare providers, and institutions to address poor sleep quality in nursing students and nurses. Future research on the topic of sleep quality is required to gain a greater understanding of the predictors and consequences of sleep quality in nursing students. Lastly, more research is needed to evaluate interventions to prevent and reduce poor quality of sleep in nursing students and nurses in clinical practice.

REFERENCES

Adams, S. K., Williford, D. N., Vaccaro, A., Kisler, T. S., Francis, A., & Newman, B. (2017). The young and the restless: Socializing trumps sleep, fear of missing out, and technological distractions in first-year college students. *International Journal of Adolescence and Youth, 22*(3), 337-348. doi:10.1080/02673843.2016.1181557

Agarwal, A., Eryuzlu, L., & Chawla, K. (2015). Sleep deprivation: Student perceptions and its relationship to cardiovascular disease. *University of Toronto Medical Journal*, *92*(2), 34-38.

Ahrberg, K., Dresler, M., Niedermaier, S., Steiger, A., & Genzel, L. (2012). The interaction between sleep quality and academic performance. *Journal of Psychiatric Research, 46*(12), 1618-1622. doi:10.1016/j.jpsychires.2012.09.008

Aitken, L. M., Elliott, R., Mitchell, M., Davis, C., Macfarlane, B., Ullman, A., … McKinley, S. (2017). Sleep assessment by patients and nurses in the intensive care: An exploratory descriptive study. *Australian Critical Care, 30*(2), 59-66. http://dx.doi.org/10.1016/j.aucc.2016.04.001

Alimirzae, R., Azzizadeh Forouzi, A., Abazari, F., & Haghdoost, A. (2014). Prevalence of quality of sleeping and its determinants among students of Kerman Razi School of Nursing and Midwifery. *Asian Journal of Nursing Education and Research, 4*(1), 76-80.

Al-Kandari, S., Alsalem, A., Al-Mutairi, S., Al-Lumai, D., Dawoud, A., & Moussa, M. (2017). Association between sleep hygiene awareness and practice with sleep quality among Kuwait University students. *Sleep Health, 3*(5), 342-347. doi:10.1016/j.slep.2017.06.004

American Academy of Sleep Medicine. (2015). *Health advisory: Adult sleep duration*.

Retrieved from https://aasm.org/advocacy/position-statements/

American College Health Association. (2016). *American College Health Association-*

National college health assessment II: Canadian reference group executive

summary spring 2016. Retrieved from https://uwaterloo.ca/institutional-analysis-

planning/sites/ca.institutional-analysis-planning/files/uploads/files/ncha-

ii_spring_2016_canadian_reference_group_executive_summary.pdf

American Thoracic Society. (2016). *Pittsburgh sleep quality index*. Retrieved from

http://www.thoracic.org/members/assemblies/assemblies/srn/questionaires/psqi.p

hp

Araujo, M. F., Freitas, R. W., Lima, A. C., Pereira, D. C., Zanetti, M. L., Damasceno, M.

M. (2014). Health indicators associated with poor sleep quality among university

students. *Revista da Escola de Enfermagem da USP, 48*(6), 1085-1092.

doi:10.1590/S0080-623420140000700017

Arora, T., Broglia, E., Pushpakumar, D., Lodhi, T., & Taheri, S. (2013). An investigation

into the strength of the association and agreement levels between subjective and

objective sleep duration in adolescents. *PLOS One, 8*(8), e72406.

Asaoka, S., Komada, Y., Aritake, S., Morita, Y., Fukuda, K., & Inoue, Y. (2014). Effect

of delayed sleep phase during university life on the daytime functioning in work

life after graduation. *Sleep Medicine, 15*(9), 1155-1158.

doi:10.1016/j.sleep.2014.05.017

Benavente, S. B., da Silva, R. M., Higashi, A. B., Guido, L. D., & Costa, A. L. (2014).

Influence of stress factors and socio-demographic characteristics on the sleep

quality of nursing students. *Revista da Escola de Enfermagem da USP, 48*(3), 512-518. doi:10.1590/S0080-623420140000300018

Biau, D. J., Kerneis, S., & Porcher, R. (2008). Statistics in brief: The importance of sample size in the planning and interpretation of medical research. *Clinical Orthopaedics and Related Research, 466*(9), 2282-2288. doi: 10.1007/s11999-008-0346-9

Brown, F. C., Buboltz Jr., W. C., & Soper, B. (2006). Development and evaluation of the sleep treatment and education program for students (STEPS). *Journal of American College Health, 54*(4), 231-237. doi:10.3200/JACH.54.4.231-237

Buysse, D. J., Reynolds, C. F., Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Research, 28*, 193-213. https://www.cna-aiic.ca/en/nursing-practice/evidence-based-practice/patient-safety/nurse-fatigue-and-patient-safety

Canadian Nurses Association & Registered Nurses' Association of Ontario. (2010). *Nurse fatigue and patient safety: Research report*. Retrieved from https://www.cna-aiic.ca/en/nursing-practice/evidence-based-practice/patient-safety/nurse-fatigue-and-patient-safety

Carter, B., Chopak-Foss, J., & Punungwe, F. B. (2016). An analysis of the sleep quality of undergraduate students. *College Student Journal, 50*(3), 315-322.

Centers for Disease Control and Prevention. (2017). *How much sleep do I need?* Retrieved from https://www.cdc.gov/sleep/about_sleep/how_much_sleep.html

Chaput, J.-P., Wong, S. L., & Michaud, I. (2017). Duration and quality of sleep among Canadians aged 18 to 79. *Health Reports, 28*(9), 28-33. Statistics Canada,

Catalogue no. 82-003-X

Cirelli, C. (2016). Insufficient sleep: Definition, epidemiology, and adverse outcomes. In

    R. Benca & A. F. Eichler (Eds.), *UpToDate*. Retrieved from

    https://www.uptodate.com/contents/insufficient-sleep-definition-epidemiology-

    and-adverse-outcomes

Concepcion, T., Barbosa, C., Velez, J. C., Pepper, M., Andrade, A., Gelaye, B., …

    Williams, M. A. (2014). Daytime sleepiness, poor sleep quality, eveningness

    chronotype, and common mental disorders among Chilean college students.

    Journal of American College Health, 62(7), 441-448.

    doi:10.1080/07448481.2014.917652

Culnan, E., Holliday, S. B., Daly, B. P., Aggarwal, R., & Kloss, J. D. (2013). Insufficient

    sleep and weight status in high school students: Should we be focusing on the

    extremes? *Children's Health Care*, *42*(2), 99-115.

    doi:10.1080/02739615.2013.786551

Demirci, K., Akgonul, M., & Akpinar, A. (2015). Relationship of smartphone use

    severity with sleep quality, depression, and anxiety in university students. *Journal*

    of Beavhioral Addications, 4(2), 85-92. doi:10.1556/2006.4.2015.010

Douglass-Burton, T., & Dobrosielski, D. A. (2014). Changes in sleep knowledge and

    sleep behavior of college students after completing a sleep education course.

    Respiratory Care, 59(10), 67.

Faris, M. A. E., Jahrami, H., Al-Hilali, M. M., Chehyber, N. J., Ali, S. O., Shahda, S. D.,

    Obaid, R. S. (2017). Energy drink consumption is associated with reduced sleep

    quality among college students: A cross-sectional study. *Nutrition & Dietetics,*

74(3), 268-274. doi:10.1111/1747-0080.12289

Ferreira, L. R., & De Martino, M. M. (2012). Sleep patterns and fatigue of nursing

students who work. *Revista da Escola de Enfermagem da USP, 46*(5), 1176-1181.

Ferrie, J., Kumari, M., Salo, P., Singh-Manoux, A., & Kivimäki, M. (2011). Sleep

epidemiology – A rapidly growing field. *International Journal of*

Epidemiology, 40(6), 1431-1437. doi:10.1093/ije/dyr203

Finfgeld, D., Wongvatunyu, S., Conn, V., Grando, V., & Russell, C. (2003). Health belief

model and reversal theory: A comparative analysis. *Journal of Advanced Nursing*,

43(3), 288-297. doi:10.1046/j.1365-2648.2003.02712.x

Garbarino, S., Durando, P., Guglielmi, O., Dini, G., Bersi, F., Fornarino, S., . . .

Magnavita, N. (2016). Sleep apnea, sleep debt and daytime sleepiness are

independently associated with road accidents. A cross-sectional study on truck

drivers. *PLoS One, 11*(11), E0166262.

Griffiths, P., & Rafferty, A. M. (2015). Outcome measures. In K. Gerrish & J. Lathlean

(Eds.), *The research process in nursing* (7th ed., pp. 455-468). Chichester, West

Sussex: Wiley Blackwell.

Grove, S. K., Burns, N., & Gray, J. R. (2013). *The practice of nursing research:*

Appraisal, synthesis, and generation of evidence (7th ed.). St. Louis, MO:

Saunders.

Hägg, S., Torén, K., & Lindberg, E. (2015). Role of sleep disturbances in occupational

accidents among women. *Scandinavian Journal of Work, Environment &*

Health, 41(4), 368-376.

Haber, J., & Singh, M. (2013). Sampling. In C. Cameron & M. D. Singh (Eds.), *Nursing*

research in Canada: Methods, critical appraisal, and utilization (3rd ed., pp. 258-286). Toronto, ON: Elsevier Canada.

Haregu, A., Gelaye, B., Pensuksan, W. C., Lohsoonthorn, V., Lertmaharit, S., Rattananupong, T., … Williams, M. A. (2015). Circadian rhythm characteristics, poor sleep quality, daytime sleepiness and common psychiatric disorders among Thai students. *Asia-Pacific Psychiatry, 7*(2), 182-189. doi:10.1111/appy.12127

Hayden, J. (2009). *Introduction to health behavior theory*. Sudbury, MA: Jones and Bartlett Publishers.

Hershner, S., & Chervin, R. D. (2014). Causes and consequences of sleepiness among college students. *Nature and Science of Sleep, 6*, 73-84. doi:http://dx.doi.org/10.2147/NSS.S62907

Hershner, S., & O'Brien, L. M. (2018). The impact of a randomized sleep education intervention for college students. *Journal of Clinical Sleep Medicine, 14*(3), 337-347. doi:10.5664/jcsm.6974

Hirshkowitz, M., Whiton, K., Albert, S. M., Alessi, C., Bruni, O., Doncarlos, L., … Catesby Ware, J. (2015). National Sleep Foundation's updated sleep duration recommendations: Final report. *Sleep Health, 1*(4), 233-243. doi:10.1016/j.sleh.2015.10.004

Huang, C.-F., Yang, L.-Y., Wu, L.-M., Liu, Y., & Chen, H.-M. (2014). Determinants of daytime sleepiness in first-year nursing students: A questionnaire survey. *Nurse Education Today, 34*, 1048-1053. doi:http://dx.doi.org/10.1016/j.nedt.2013.11.005

Johnson, A., Jung, L., Brown, K., Weaver, M., & Richards, K. (2014). Sleep

deprivation and error in nurses who work the night shift. *The Journal of Nursing Administration, 44*(1), 17-22. doi:10.1097/NNA.0000000000000016

Kalsi, J., Tervo, T., Bachour, A., & Partinen, M. (2018). Sleep versus non−sleep-related fatal road accidents. *Sleep Medicine, 51*, 148-152. doi:10.1016/j.sleep.2018.04.017

Keller, P. S., Blincoe, S., Gilbert, L. R., Haak, E. A., & DeWall, C. N. (2014). Sleep deprivation and dating aggression perpetration in female college students: The moderating roles of trait aggression, victimization by partner, and alcohol use. *Journal of Aggression, Maltreatment & Trauma*, *23*(4), 351-368. doi:10.1080/10926771.2014.896838

Kenney, S. R., LaBrie, J. W., Hummer, J. F., & Pham, A. T. (2012). Global sleep quality as a moderator of alcohol consumption and consequences in college students. *Addictive Behaviors, 37*(4), 501-512. doi:10.1016/j.addbeh.2012.01.006

Kernan, W., & Wheat, M. (2008). Nursing students' perceptions of the academic impact of various health issues. *Nurse Educator, 33*(5), 215-219. doi:10.1097/01.NNE.0000312224.05579.b2

Kloss, J. D., Nash, C. O., Walsh, C. M., Culnan, E., Horsey, S., & Sexton-Radek, K. (2014). A "Sleep 101" program for college students improves sleep hygiene knowledge and reduces maladaptive beliefs about sleep. *Behavioral Medicine, 42*(1), 48-56. doi:10.1080/08964289.2014.969186

Knowlden, A. P., & Sharma, M. (2014). Health belief structural equation model predicting sleep behavior of employed college students. *Family & Community*

Health, 37(4), 271-278. doi:10.1097/FCH.0000000000000043

Knowlden, A. P., Sharma, M., & Bernard, A. L. (2012). A theory of planned behavior

research model for predicting the sleep intentions and behaviors of undergraduate

college students. *The Journal of Primary Prevention, 33*(1), 19-31.

doi:10.1007/s10935-012-0263-2

Kunzweiler, K., Voigt, K., Kugler, J., Hirsch, K., Bergmann, A., & Riemenschneider, H.

(2016). Factors influencing sleep quality among nursing staff: Results of a cross

sectional study. *Applied Nursing Research, 32*, 241-244.

doi:10.1016/j.apnr.2016.08.007

Lashkaripour, K., Bakhshani, N. M., & Mafi, S. (2012). Sleep quality assessment of

medicine students and physician (medical) assistants. *Interdisciplinary Journal of

Contemporary Research in Business, 4*(8), 443-450.

Lemma, S., Gelaye, B., Berhane, Y., Worku, A., & Williams, M. A. (2012). Sleep quality

and its psychological correlates among university students in Ethiopia: A cross-

sectional study. *BMC Psychiatry, 12*, 237. http://doi.org/10.1186/1471-244X-12-

237

LoBiondo-Wood, G., Haber, J., & Singh, M. D. (2013). Nonexperimental designs. In C.

Cameron & M. D. Singh (Eds.), *Nursing research in Canada: Methods, critical

appraisal, and utilization* (3rd ed., pp. 234-252). Toronto, ON: Elsevier Canada.

Lukowski, A. F., & Milojevich, H. M. (2015). Sleep quality and temperament among

university students: Differential associations with nighttime sleep duration and

sleep disruptions. *Behavioral Sleep Medicine, 13*(3), 217-230.

doi:10.1080/15402002.2013.855214

Lund, H. G., Reider, B. D., Whiting, A. B., & Prichard, J. R. (2010). Sleep patterns and

    predictors of disturbed sleep in a large population of college students. *Journal of*

    Adolescent Health, 46, 124-132. doi:10.1016/j.jadohealth.2009.06.016

Manzar, M.D., Zannat, W., Kaur, M., & Hussain, M. E. (2015). Sleep in university

    students across years of university education and gender influences. *International*

    Journal of Adolescent Medicine and Health, 27(3), 341-348. doi: 10.1515/ijamh-

    2014-0037

Marhefka, J. K. (2011). Sleep deprivation: Consequences for students. *Journal of*

    *Psychosocial Nursing and Mental Health Services, 49(*9), 20-25.

    doi:10.3928/02793695-20110802-02

Meldrum, R. C., & Restivo, E. (2014). The behavioral and health consequences of sleep

    deprivation among U.S. high school students: Relative deprivation matters.

    Preventive Medicine, 63, 24-28. doi:10.1016/j.ypmed.2014.03.006

Menon, B., Karishma, H. P., & Mamatha, I. V. (2015). Sleep quality and health

    complaints among nursing students. *Annals of Indian Academy of Neurology,*

    18(3), 363-364. doi:10.4103/0972-2327.157252

Ming, X., Radhakrishnan, V., Lilia, K., & Pecor, K. (2016). Gender, headaches, and sleep

    health in high school students. *Journal of Women's Health, 25*(9), 930-935.

    doi:10.1089/jwh.2015.5681

Mollayeva, T., Thurairajah, P., Burton, K., Mollayeva, S., Shapiro, C. M., & Colantonio,

    A. (2016). The Pittsburgh Sleep Quality Index as a screening tool for sleep

    dysfunction in clinical and non-clinical samples: A systematic review and meta-

    analysis. *Sleep Medicine Reviews, 25*, 52-73. doi:10.1016/j.smrv.2015.01.009

Morrissey, B., Malakellis, M., Whelan, J., Millar, L., Swinburn, B., Allender, S., &
Strugnell, C. (2016). Sleep duration and risk of obesity among a sample of
Victorian school children. *BMC Public Health*, *16*(1), 1-8. doi:10.1186/s12889-
016-2913-4

National Heart, Lung, and Blood Institute. (2017). *Why is sleep important?* Retrieved
from https://www.nhlbi.nih.gov/health/health-topics/topics/sdd/why

National Sleep Foundation. (2014). *NSF's key messages/talking points*. Retrieved from
https://sleepfoundation.org/sites/default/files/Drowsy%20Driving-
Key%20Messages%20and%20Talking%20Points.pdf

National Sleep Foundation. (2018). *Sleep hygiene*. Retrieved from
https://sleepfoundation.org/sleep-topics/sleep-hygiene

Ogunsemi, O. O., Afe, T. O., & Almohandes, H. (2017). Quality of sleep and well-being
of health workers in Najran, Saudi Arabia. *Indian Journal of Psychiatry, 59*(3),
347-351.
http://dx.doi.org.ezproxy.uwindsor.ca/10.4103/psychiatry.IndianJPsychiatry_241_
16

Ohayon, M., Wickwire, E. M., Hirshkowitz, M., Albert, S. M., Avidan, A., Daly, F. J., …
Vitiello, M. V. (2017). National Sleep Foundation's sleep quality
recommendations: First report. *Sleep Health: Journal of the National Sleep
Foundation, 3*(1), 6-19. doi:10.1016/j.sleh.2016.11.006

Perez-Olmos, I., & Ibanez-Pinilla, M. (2014). Night shifts, sleep deprivation, and
attention performance in medical students. *International Journal of Medical
Education, 5*, 56-62. doi:10.5116/ijme.531a.f2c9

Perry, G. S., Patil, S. P., & Presley-Cantrell, L. R. (2013). Raising awareness of sleep as a healthy behavior. *Preventing Chronic Disease, 10*. doi:http://dx.doi.org/10.5888/pcd10.130081

Ridner, S. L., Newton, K. S., Staten, R. R., Crawford, T. N., & Hall, L. A. (2016). Predictors of well-being among college students. *Journal of American College Health, 64*(2), 116-124. doi: 10.1080/07448481.2015.1085057

Robbins, R., & Niederdeppe, J. (2015). Using the integrative model of behavioral prediction to identify promising message strategies to promote healthy sleep behavior among college students. *Health Communication*, *30*(1), 26-38. doi:10.1080/10410236.2013.835215

Rose, D., Gelaye, B., Sanchez, S., Castaneda, B., Sanchez, E., Yanez, N. D., Williams, M. A. (2015). Morningness/eveningness chronotype, poor sleep quality, and daytime sleepiness in relation to common mental disorders among Peruvian college students. *Psychology, Health & Medicine, 20*(3), 345-352. doi:10.1080/13548506.2014.951367

Rosenstock, I.M. (1974). Historical origins of the health belief model. *Health Education & Behaviour, 2*(4), 328-335. doi:10.1177/109019817400200403

Rossa, K. R., Smith, S. S., Allan, A. C., & Sullivan, K. A. (2014). The effects of sleep restriction on executive inhibitory control and affect in young adults. *Journal of Adolescent Health, 55*(2), 287-292. doi:10.1016/j.jadohealth.2013.12.034

Sahin, S., Ozdemir, K., Unsal, A., & Temiz, N. (2013). Evaluation of mobile phone addiction level and sleep quality in university students. *Pakistan Journal of Medical Sciences, 29*(4), 913-918.

Santos, T. C., Martino, M. M., Sonati, J. G., Faria, A. L., & Nascimento, E. F. (2016).

    Sleep quality and chronotype of nursing students. *Acta Paulista de Enfermagem,*

    29(6), 658-663. http://dx.doi.org.ezproxy.uwindsor.ca/10.1590/1982-

    0194201600092

Sedgwick, P. (2014). Cross sectional studies: Advantages and disadvantages. *BMJ, 348.*

    doi:10.1136/bmj.g2276

Setia, M. S. (2016). Methodology series module 3: Cross-sectional studies. *Indian*

    Journal of Dermatology, 61(3), 261-264. doi:10.4103/0019-5154.182410

Silva, M., Chaves, C., Duarte, J., Amaral, O., & Ferreira, M. (2016). Sleep quality

    determinants among nursing students. *Procedia – Social and Behavioral Sciences,*

    217, 999-1007. doi:10.1016/j.sbspro.2016.02.090

Statistics Canada. (2018). *Canadian community health survey (CCHS) - 2016*. Retrieved

    from

    http://www23.statcan.gc.ca/imdb/p3Instr.pl?Function=assembleInstr&a=1&&lan

    g=en&Item_Id=260675

Stiles, M. (2013). Secondhand effects of substance use for rural college students. *Journal*

    of Human Behavior in the Social Environment, *23*(4), 529-535.

    doi:10.1080/10911359.2013.765819

Stretcher, V., & Rosenstock, I. M. (1997). The Health Belief Model. In K. Glanz, F. M.

    Lewis, & B. K. Rimer (Eds.), *Health behavior and health education: Theory,*

    research and practice (2nd ed.). San Francisco, CA: Jossey-Bass.

Sullivan-Bolyai, S., Bova, C., & Singh, M. D. (2013). Data-collection methods. In C.

    Cameron & M. D. Singh (Eds.), *Nursing research in Canada: Methods, critical*

appraisal, and utilization (3rd ed., pp. 287-305). Toronto, ON: Elsevier Canada.

Sullivan-Bolyai, S., Bova, C., & Singh, M. D. (2013). Quantitative data analysis. In C. Cameron & M. D. Singh (Eds.), *Nursing research in Canada: Methods, critical appraisal, and utilization* (3rd ed., pp. 346-382). Toronto, ON: Elsevier Canada.

Thomas, C. M., McIntosh, C. E., Lamar, R. A., & Allen, R. L. (2017). Sleep deprivation in nursing students: The negative impact for quality and safety. *Journal of Nursing Education & Practice*, *7*(5), 87-93. doi:10.5430/jnep.v7n5p87

Wallace, D. D., Boynton, M. H., & Lytle, L. A. (2017). Multilevel analysis exploring the links between stress, depression, and sleep problems among two-year college students. *Journal of American College Health*, *65*(3), 187-196. doi:10.1080/07448481.2016.1269111

Wang, L., Qin, P., Zhao, Y., Duan, S., Zhang, Q., Liu, Y., … Sun, J. (2016). Prevalence and risk factors of poor sleep quality among Inner Mongolia Medical University students: A cross-sectional survey. *Psychiatry Research, 244*, 243-248. doi:10.1016/j.psychres.2016.04.011

Watson, N. F., Badr, M., S., Belenky, G., Bliwise, D. L., Buxton, O. M., Buysse, D., … Tasali, E. (2015). Joint consensus statement of the American Academy of Sleep Medicine and Sleep Research Society on the recommended amount of sleep for a healthy adult: Methodology and discussion. *Sleep, 38*(8), 1161-1183. http://dx.doi.org/10.5665/sleep.4886

Weaver, A. L., Stutzman, S. E., Supnet, C., & Olson, D. M. (2016). Sleep quality, but not quantity, is associated with self-perceived minor error rates among emergency department nurses. *International Emergency Nursing, 25*, 48-52.

doi:http://dx.doi.org.ezproxy.uwindsor.ca/10.1016/j.ienj.2015.08.003

Wheaton, A. G., Perry, G. S., Chapman, D. P., & Croft, J. B. (2013). Self-reported sleep duration and weight-control strategies among US high school students. *Sleep*, *36*(8), 1139-1145. doi:10.5665/sleep.2872

Wolf, M. R., & Rosenstock, J. B. (2017). Inadequate sleep and exercise associated with burnout and depression among medical students. *Academic Psychiatry*, *41*(2), 174-179. doi:10.1007/s40596-016-0526-y

Wu, X., Tao, S., Zhang, Y., Zhang, S., & Tao, F. (2015). Low physical activity and high screen time can increase the risks of mental health problems and poor sleep quality among Chinese college students. *PLoS One, 10*(3), e0119607. doi:10.1371/journal.pone.0119607

Ye, L., Hutton Johnson, S., Keane, K., Manasia, M., & Gregas, M. (2015). Napping in college students and its relationship with nighttime sleep. *Journal of American College Health*, *63*(2), 88-97. doi:10.1080/07448481.2014.983926

APPENDICES

Appendix A

Email Invitation to Participate in Survey

To all first year nursing students,

You are invited to tell us about your perceptions of your sleep quality as a first year nursing student in the Student Nurses' Perceptions of Sleep Quality study! This research study is conducted by Nicole Wall, under the supervision of Dr. Christine Thrasher, from the Faculty of Nursing.

Submit your online survey and you can enter into a draw to win 1 of 4 $50 VISA gift cards.

Take the Student Nurses Perceptions of Sleep Quality Survey:
https://uwindsor.ca1.qualtrics.com/jfe/form/SV_eUTJwXj4sJGpAwt

This survey will take approximately 10 minutes to complete and is available until
_____.

Survey participation is entirely voluntary; your decision of whether or not to participate will not affect your academic standing.

Data will be kept confidential and participants cannot be linked to the data. You may decline to answer any questions you don't want to answer and still remain in the study and be eligible for the gift card draw.

For more information about this study, please see the Letter of Information for Consent to Participate In Research, by clicking the link above.

Thank you in advance for your participation,
Nicole Wall,
BScN, MScN student

This study has been reviewed and cleared by the University of Windsor Research Ethics Board. You can choose whether to be in this study or not. If you have any questions regarding your rights as a research participant, contact the Research Ethics Coordinator, at ethics@uwindsor.ca, 519-253-3000 ext. 3948. If you want to know more information about this study, please contact Nicole Wall at walln@uwindsor.ca

Appendix B

Sleep Quality Demographics Questions

1. How old are you? _____

2. In the space below, please indicate with which gender you most identify.

_____

3. Is this your first year of university?

    □ No

    □ Yes

4. Are you enrolled as…?

    □ A full-time student

    □ A part-time student

Appendix C

Individual Perceptions and Cues to Action Questions

1. On average, how many hours of sleep per night do you need to feel rested?

    ☐   0 to 4 hours

    ☐   5 to 6 hours

    ☐   7 to 8 hours

    ☐   8 to 9 hours

    ☐   Greater than 9 hours

2. If you obtained more sleep, do you think your grades would improve?

    ☐   No

    ☐   Yes

Appendix D

Pittsburgh Sleep Quality Index

1. During the past month, what time have you usually gone to bed at night?

   BED TIME _____

2. During the past month, how long (in minutes) has it usually taken you to fall asleep each night?

   NUMBER OF MINUTES _____

3. During the past month, what time have you usually gotten up in the morning?

   GETTING UP TIME _____

4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spent in bed.)

   HOURS OF SLEEP PER NIGHT _____

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

   a) Cannot get to sleep within 30 minutes

   Not during the   Less than   Once or twice   Three or more
   past month_____   once a week_____   a week_____   times a week_____

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

   Not during the   Less than   Once or twice   Three or more
   past month_____   once a week_____   a week_____   times a week_____

   c) Have to get up to use the bathroom

   Not during the   Less than   Once or twice   Three or more
   past month_____   once a week_____   a week_____   times a week_____

   d) Cannot breathe comfortably

   Not during the   Less than   Once or twice   Three or more
   past month_____   once a week_____   a week_____   times a week_____

e) Cough or snore loudly

Not during the   Less than   Once or twice   Three or more
past month_____   once a week_____   a week_____   times a week_____

f) Feel too cold

Not during the   Less than   Once or twice   Three or more
past month_____   once a week_____   a week_____   times a week_____

g) Feel too hot

Not during the   Less than   Once or twice   Three or more
past month_____   once a week_____   a week_____   times a week_____

h) Had bad dreams

Not during the   Less than   Once or twice   Three or more
past month_____   once a week_____   a week_____   times a week_____

i) Have pain

Not during the   Less than   Once or twice   Three or more
past month_____   once a week_____   a week_____   times a week_____

j) Other reason(s), please describe _____

_____

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

Not during the   Less than   Once or twice   Three or more
past month_____   once a week_____   a week_____   times a week_____

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

Very good   _____

Fairly good _____

Fairly bad   _____

Very bad   _____

7. During the past month, how often have you taken medicine to help you sleep (prescribed or "over the counter")?

Not during the   Less than   Once or twice   Three or more
past month_____   once a week_____   a week_____   times a week_____

8. During the past month, how often have you had trouble staying awake while
   driving, eating meals, or engaging in social activity?
   Not during the   Less than   Once or twice   Three or more
   past month_____   once a week_____   a week_____   times a week_____

9. During the past month, how much of a problem has it been for you to keep up
   enough enthusiasm to get things done?
   Not during the   Less than   Once or twice   Three or more
   past month_____   once a week_____   a week_____   times a week_____

Appendix E

Permission to use PSQI from Dr. Daniel Buysse

Your form has a new entry.

Here are the results.

Date:	2017-01-23
Name	Nicole Wall
Email Address:	walln@uwindsor.ca
Organization / Institution:	University of Windsor
Name / Brief description of project:	I am a graduate student currently enrolled in the Master of Science in Nursing program at the University of Windsor. I am looking to study (for my thesis) the perceived levels of sleep deprivation in second year nursing students who are enrolled in various clinical placements, full-time, for a month. This will be a cross-sectional, descriptive study. I will also explore the predictors of sleep deprivation in these nursing students by gathering demographic data. I would greatly appreciate your permission to use the PSQI scale in my study to measure their perceived levels of sleep quality and deprivation. If you have any questions or concerns, please do not hesitate to email me.
Funding Source	Not Funded

Other Funding Source (if applicable):	N/A
Additional Comments	Thank you for your consideration.

Sent on behalf of Dr. Buysse

Dear Nicole,

You have my permission to use the PSQI for your research study. You can find the instrument, scoring instructions, the original article, links to available translations, and other useful information at www.sleep.pitt.edu under the Research/Instruments tab. Please ensure that the PSQI is accurately reproduced in any on-line version (including copyright information). We request that you do cite the 1989 paper in any publications that result.

Note that Question 10 is not used in scoring the PSQI. This question is for informational purposes only, and may be omitted during data collection per requirements of the particular study.

This copyright in this form is owned by the University of Pittsburgh and may be reprinted without charge only for non-commercial research and educational purposes. You may not make changes or modifications of this form without prior written permission from the University of Pittsburgh. If you would like to use this instrument for commercial purposes or for commercially sponsored research, please contact the Office of Technology Management at the University of Pittsburgh at 412-648-2206 for licensing information.

Good luck with your research

Sincerely,

Daniel J. Buysse, M.D.
Professor of Psychiatry and Clinical and Translational Science
University of Pittsburgh School of Medicine

Appendix F

Letter of Information for Consent to Participate in Research

Title of Study: Student Nurses' Perception of Sleep Quality

You are asked to participate in a research study conducted by Nicole Wall, under the supervision of Dr. Christine Thrasher at the University of Windsor. The results of this study will contribute to a Master of Science in Nursing thesis. There are no sponsoring agencies or organizations. If you have any questions or concerns about the research, please feel to contact Nicole Wall at walln@uwindsor.ca or Dr. Christine Thrasher at thrash4@uwindsor.ca or 519-253-3000 extension 2266.

PURPOSE OF THE STUDY

The purposes of this study are to examine the perceived levels of sleep quality of first year nursing students, as well as identify the factors associated with poor sleep quality for these students.

PROCEDURES

If you volunteer to participate in this study, you will be asked to complete an online survey that will take approximately 10 minutes to complete. The survey will address your perceptions of your personal sleep quality over the last month, and demographic questions are included.

POTENTIAL RISKS AND DISCOMFORTS

There are no known physical, psychological, emotional, financial or social risks or discomforts associated with this study.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

The research may allow participants to gain awareness of their own personal sleep quality and factors that are disturbing their sleep. Participants may feel satisfaction from their participation in this study as they are helping to advance scientific knowledge about sleep quality in nursing students, which can lead to future interventions that address this issue, which may benefit others.

COMPENSATION FOR PARTICIPATION

Upon completion of the survey, participants will be offered a chance to enter into a draw to win 1 of 4, $50 Visa gift cards. The identifying data will be stored separately from the survey data and will not be linked to each other.

CONFIDENTIALITY
Any information that is obtained in connection with this study and that can be identified with you will remain confidential and will be disclosed only with your permission. All data will be confidential, stored in a secure environment, and destroyed after five years.

Participants cannot be linked to the data. When disseminating the results, data will be presented as group information to ensure participants' privacy and confidentiality.

You will be asked to enter your name and university e-mail address if you wish to be entered into the draw for the gift cards. If you do provide your name and e-mail address, this information will be stored separately from the survey data and cannot be linked to your survey data in any way.

The data will be stored on password protected computer accounts and will only be accessible to the research team for the purpose of analyzing the data.

PARTICIPATION AND WITHDRAWAL

You can choose whether to be in this study or not. If you volunteer to be in this study, you may withdraw at any time during the completion of the survey by closing the browser window. There are no consequences for withdrawing your data. You may refuse to answer any questions you don't want to answer and still remain in the study. The investigator may withdraw you from this research if circumstances arise which warrant doing so. Once you have submitted your survey, withdrawal is not possible as there is no way to identify your data specifically (as there is no identifying information collected in the survey to connect you to the data).

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE PARTICIPANTS

A report of the results will be posted on the University of Windsor REB website under research findings.
Web address: www.uwindsor.ca/reb
Date when results are available: Fall 2018

SUBSEQUENT USE OF DATA

These data may be used in subsequent studies, in publications and in presentations.

RIGHTS OF RESEARCH PARTICIPANTS

If you have questions regarding your rights as a research participant, contact: Research Ethics Coordinator, University of Windsor, Windsor, Ontario N9B 3P4; Telephone: 519-253-3000, ext. 3948; e-mail: ethics@uwindsor.ca

Completion of the survey is indication of your consent to participate.
You may print a copy of this letter for your records.

I understand the information provided for the study **Student Nurses' Perception of Sleep Quality** as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study.

Appendix G

PSQI Scoring

The range of values for questions 5 through 10 are all 0 to 3. Questions 1 through 9 are not allowed to be missing except as noted below. If these questions are missing then any scores calculated using missing questions are also missing. Thus it is important to make sure that all questions 1 through 9 have been answered.

In the event that a range is given for an answer (for example, '30 to 60' is written as the answer to Q2, minutes to fall asleep), split the difference and enter 45.

On May 20, 2005, on the instruction of Dr. Daniel J. Buysse, the scoring of the PSQI was changed to set the score for Q5J to 0 if either the comment or the value was missing. This may reduce the DISTB score by 1 point and the PSQI Total Score by 1 point.

PSQIDURAT   **DURATION OF SLEEP**
IF Q4 $\geq$ 7, THEN set value to 0
IF Q4 < 7 and $\geq$ 6, THEN set value to 1
IF Q4 < 6 and $\geq$ 5, THEN set value to 2
IF Q4 < 5, THEN set value to 3
Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQIDISTB   **SLEEP DISTURBANCE**
IF Q5b + Q5c + Q5d + Q5e + Q5f + Q5g + Q5h + Q5i + Q5j (IF Q5JCOM is null or Q5j is null, set the value of Q5j to 0) = 0, THEN set value to 0
IF Q5b + Q5c + Q5d + Q5e + Q5f + Q5g + Q5h + Q5i + Q5j (IF Q5JCOM is null or Q5j is null, set the value of Q5j to 0) $\geq$ 1 and $\leq$ 9, THEN set value to 1

IF Q5b + Q5c + Q5d + Q5e + Q5f + Q5g + Q5h + Q5i + Q5j (IF Q5JCOM is null or Q5j is null, set the value of Q5j to 0) > 9 and $\leq$ 18, THEN set value to 2

IF Q5b + Q5c + Q5d + Q5e + Q5f + Q5g + Q5h + Q5i + Q5j (IF Q5JCOM is null or Q5j is null, set the value of Q5j to 0) > 18, THEN set value to 3

Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQILATEN   **SLEEP LATENCY**
First, recode Q2 into Q2new thusly:
IF Q2 $\geq$ 0 and $\leq$ 15, THEN set value of Q2new to 0
IF Q2 > 15 and $\leq$ 30, THEN set value of Q2new to 1
IF Q2 > 30 and $\leq$ 60, THEN set value of Q2new to 2
IF Q2 > 60, THEN set value of Q2new to 3

Next
IF Q5a + Q2new = 0, THEN set value to 0
IF Q5a + Q2new > 1 and < 2, THEN set value to 1
IF Q5a + Q2new > 3 and < 4, THEN set value to 2
IF Q5a + Q2new > 5 and < 6, THEN set value to 3
Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQIDAYDYS   **DAY DYSFUNCTION DUE TO SLEEPINESS**
IF Q8 + Q9 = 0, THEN set value to 0
IF Q8 + Q9 > 1 and < 2, THEN set value to 1
IF Q8 + Q9 > 3 and < 4, THEN set value to 2
IF Q8 + Q9 > 5 and < 6, THEN set value to 3
Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQIHSE   **SLEEP EFFICIENCY**
Diffsec = Difference in seconds between day and time of day Q1
and day Q3
Diffhour = Absolute value of diffsec / 3600
 newtib =IF diffhour > 24, then newtib = diffhour – 24
          IF diffhour < 24, THEN newtib = diffhour
(NOTE, THE ABOVE JUST CALCULATES THE HOURS
BETWEEN GNT (Q1) AND GMT (Q3))
tmphse = (Q4 / newtib) * 100

IF tmphse > 85, THEN set value to 0
IF tmphse < 85 and > 75, THEN set value to 1
IF tmphse < 75 and > 65, THEN set value to 2
IF tmphse < 65, THEN set value to 3
Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQISLPQUAL   **OVERALL SLEEP QUALITY**
Q6
Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQIMEDS   **NEED MEDS TO SLEEP**
Q7
Minimum Score = 0 (better); Maximum Score = 3 (worse)

PSQI   **TOTAL**
DURAT + DISTB + LATEN + DAYDYS + HSE + SLPQUAL +
MEDS
Minimum Score = 0 (better); Maximum Score = 21 (worse)
Interpretation: TOTAL < 5 associated with good sleep quality
                TOTAL > 5 associated with poor sleep quality

VITA AUCTORIS

NAME:	Nicole Wall
PLACE OF BIRTH:	Windsor, ON
YEAR OF BIRTH:	1988
EDUCATION:	Catholic Central High School, Windsor, ON, 2006
	University of Windsor, B.Sc.N, Windsor, ON, 2012
	University of Windsor, M.Sc.N, Windsor, ON, 2018