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Exploration of Fatigue in Fourth-Year Nursing Students

Kelly Riccardi
University of Windsor

Exploration of Fatigue in Fourth Year Nursing Students

By Kelly Riccardi

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Exploration of Fatigue in Fourth Year Nursing Students

by

Kelly Riccardi

APPROVED BY:

_____

K. Milne
Faculty of Human Kinetics

_____

M. Freeman
Faculty of Nursing

_____

J. Crawley, Advisor
Faculty of Nursing

September 15, 2017

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ABSTRACT

The purpose of this study was to explore fatigue in fourth-year nursing students enrolled at a university in southwestern Ontario. A sample of 134 participants completed a demographic questionnaire and the Occupational Fatigue Exhaustion Recovery (OFER) scale midway through their final semester of school. The study examined the perceptions of fatigue, along with the predicting factors of chronic fatigue, acute fatigue and intershift recovery. Participants experienced moderate-high levels of acute and chronic fatigue, and low-moderate levels of intershift recovery. More than half of participants agreed that work drains their energy everyday, that they never have enough time between shifts to recover their energy and that they dread waking up to another day of work. Fatigue in nursing students needs further study including interventions that address chronic and acute fatigue and promote intershift recovery.

DEDICATION

I dedicate this thesis to my husband, Austin Kennedy, and my parents, Tony and Francine Riccardi, for their constant encouragement during my thesis journey. Austin, you continuously motivate me to reach my goals, you pick me up when I am discouraged, and you offer endless patience and support, even during my most spunky times. You helped me think through moments of writer's block, you always edited without arguing and you provided the upmost confidence in me as I completed this journey. Thank you for standing by me in all that I do!

Mom and dad, thank you for providing me with unconditional love and support, and being my number one enthusiasts. Your positive attitudes and welcoming arms help manage my levels of stress, and maintain my upbeat attitude, which keeps me motivated and focused. You are my foundation, and you never stop motivating me to reach my goals. I am blessed to be able to share my accomplishments with you. Thank you for always allowing me to 'make it happen'!

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

CHAPTER 1

INTRODUCTION

Fatigue is a critical and dangerous issue that seriously impacts individuals working shiftwork, especially registered nurses (RNs) (Weinstein, 2015). For RNs, fatigue impairs the ability to maintain increased levels of alertness when work demands are high, which can lead to life threatening and costly errors. Healthcare organizations require many medical staff, including RNs, to work extended hours, a major contributor to fatigue in the workplace. Falleti and colleagues (2003) compared the effects of sustained wakefulness and effects of fatigue, with raising blood alcohol levels. They determined that when an individual is awake for 24 hours, their cognitive and psychomotor performance deteriorates, complicating even simple tasks, and impairing memory and learning abilities. These declines in performance are equivalent to that of an individual with a blood alcohol level of 0.05% (Falleti et al., 2003) and raises concerns that fatigue interferes with RNs ability to always provide the safest care possible to their patients.

Fatigue is one factor that affects a nurses' ability to provide the best standards of care (Canadian Nurses Association [CNA] and Registered Nurses Association of Ontario [RNAO], 2010). When levels of fatigue rise, a nurse's ability to concentrate declines, negatively affecting patients' safety. Mayo and Duncan (2004) found that one of the top three causes of drug errors reported by nurses is fatigue. Wilkens and Shields (2008) examined data that Statistics Canada collected from nurses throughout all provinces and territories between the years 2005-2006 and found that 22% of nurses who worked

overtime reported a medication error. The Canadian Institute for Health Information (CIHI) used data from the years 2000-2006 to identify the average number of patients exposed to a safety event in Canada. It was found that in 2005, approximately 1 in 10 adults reported receiving the wrong medication or dose (CIHI, 2007).

Fatigue threatens patient safety, and is detrimental to a nurse's health. Nurses who are required to work shiftwork, extended hours, and overtime, lose their ability to fully recover between shifts, which increases the risk of developing chronic illnesses such as coronary artery disease, heart disease, high blood pressure, diabetes and mental health disorders (Simone, 2009; Weinstein, 2015; Yumang-Ross & Burns, 2014).

Nurse fatigue has been a popular topic of research for several years, but there is a gap in our understanding of fatigue in nursing students. This is a concern because of predictions that there will be am increased demand for nurses in the near future and s shortage of nurses by approximately 60,000 by 2022 (CNA, 2009, p.2). In addition to the predicted nursing shortage, research on student nurse fatigue is necessary, as there continues to be a problem with new nurses keeping their positions and staying in the profession (CNA, 2009). Turnover rates of newly graduated nurses are rising, and a major reason for new nurse resignation within the first year of employment is due to work-related fatigue (MacKusick & Minick, 2010). Many new nurses are failing to keep their current positions within the first few years of employment, and questions on whether these nurses are graduating school in an already fatigued state has become a topic of interest. It is vital that nursing students are graduating in a healthy state to help ensure that there is a large supply of new graduates to meet the demands of the predicted nursing shortage.

Fatigue in Nurses

Definitions of Acute Fatigue, Chronic Fatigue and Intershift Recovery

Fatigue is a complex phenomenon with multiple definitions. The CNA (2008) describes fatigue as a "subjective feeling of tiredness, that is physically and mentally penetrative… It ranges from tiredness to exhaustion… [and] interferes with an individuals' physical and cognitive ability to function at their normal capacity" (p.1). The report on nurse fatigue and patient safety, describes fatigue as "an overwhelming, debilitating and sustained sense of exhaustion that decreases one's ability to carry out daily activities, including the ability to work effectively and to function at one's usual level in family or social roles" (CNA & RNAO, 2010, p. 11). One of the key components of fatigue is that despite periods of rest, symptoms associated with fatigue (e.g., tiredness, exhaustion, poor sleep habits) still persist (CNA, 2008; RNAO, 2011). This study will use a combination of both definitions to encompass all components of fatigue:

> "fatigue is a subjective feeling of tiredness that is overwhelming and debilitating which interferes with one's ability to function at their normal capacity."

There are three classifications of fatigue that are the focus of this study, including acute fatigue (AF), chronic fatigue (CF) and intershift recovery (IR). AF most often occurs at the end of a shift, when an individual is unable to recover fully from work demands (Winwood, 2005). He or she is most likely to have depleted energy levels after work activity, resulting in personal unwillingness to engage in self-chosen activities (Winwood, Winefield, Dawson & Lushington, 2005). As a nurse experiences prolonged AF without sufficient recovery, the progression to CF is likely to occur. With CF, an

individual repeatedly experiences declining interest and involvement in activities, coupled with negative emotions, lack of concentration and the physical manifestations of persistent tiredness (Winwood et al., 2005); it is not relieved by rest or task moderation (Winwood, 2005). The CNA and RNAO (2010) state that chronic fatigue is "a global mind-body sensation, perceived without relation to activity or exertion, that has a gradual, insidious onset and a long duration that persists a month or more" (p. 15). In order for the body to cope and adapt to the demands of fatigue, there needs to be an adequate amount of recovery between such demands. This is rationale for studying an individual's recovery from fatigue and is as important as studying factors influencing fatigue (Winwood et al., 2005).

Factors influencing fatigue

There are multiple factors that contribute to increased fatigue in RNs. Most of these factors are present in work environments and they include shiftwork (alternating between a day and night schedule), understaffing, increased workload, overtime work (40 hours or more of work a week), extended shifts (greater than eight hours a day), sleep deprivation, worker stress, increasing expectations from patients and their families and the inability to recover between shifts (CNA, 2008; Han, Trinkoff & Geiger-Brown, 2014; 2014; Keller, 2009; Liu et al., 2016; Yumang-Ross & Burns, 2014).

Nurses required to work shiftwork and alternate between both a day and night schedule have a harder time adapting to their schedules, recovering between shifts, and they are more likely to experience acute levels of fatigue (Han et al., 2014). Lockley et al. (2007) reported that nurses who work longer than eight hours are more likely to have difficulty staying awake while at work, they are more likely to commit a medication

error, and have decreased productivity towards the end of their shift. Nurses working 12 or 13 hour shifts, receive approximately five hours of sleep before returning to work, which increases their risk of experiencing sleep deprivation, therefore contributing to increased levels of fatigue (Keller, 2009). As a nurses' ability to fully recover between shifts decreases, their levels of fatigue rise and they are more likely to experience cognitive, psychomotor and behavioural impairments (Witkoksi & Dickson, 2011).

Consequences of fatigue

Fatigue is nurses is a critical issue, because it negatively impacts both nurse and patient safety (Keller, 2009; Kunert, King & Kolkhorst, 2007; Weinstein, 2015; Zhao, Bogossian & Turner, 2015). Increased levels of fatigue in RNs can lead to increased medical errors, delayed reaction time, decreased performance at work, poorer decision-making skills, disrupted circadian rhythms and decreased job satisfaction in RNs (Keller, 2009; Kunert et al., 2007; Lockley et al., 2007; Weinstein, 2015). Fatigue largely impacts both nurse and patient safety because as levels of fatigue worsen, it clouds a person's ability to think clearly making them unable to gauge their own impairment (Weinstein, 2015). Scott et al. (2007) found that shift workers were more likely to have increased levels of fatigue after work and were at greater risk of motor vehicle accidents while driving home. As nurses try to cope with the negative consequences associated with fatigue, they are more likely to be absent at work, which contributes to nursing staff shortages and unwanted patient outcomes (Keller, 2009).

Significance to Nursing Students

The education program currently in place to become a RN in Canada is the successful completion of a four-year university Bachelor's of Science in Nursing (BScN)

degree. This program requires that student nurses' complete theoretical components, consisting of courses and nursing lab work, and clinical components, including placements in various health-care organizations and within simulated environments. At the site for the current study, fourth year nursing students are required to complete 196 hours of clinical placement in both the fall and winter semesters. They must complete six weeks of hospital placement one semester, and 12 weeks of community placement during the other semester, while enrolled in full-time course work. During their clinical nursing experience, nursing students are assigned preceptors employed in a specific health-care organization. Nursing students follow their preceptor's schedule, which requires the student to be available to work days and nights both during the week and on weekends. Nursing students report higher levels of stress and anxiety compared to other college students, with the highest levels of anxiety noted at the start of clinical rotations (Wedgeworth, 2016). Due to the high turnover rates of newly graduated nurses, exploring fatigue in nursing students can help identify any fatigue related difficulties that nursing students face before graduation, to help smooth the transition into professional practice and improve retention rates in the future.

There have been several research studies done recognizing fatigue as a problem in the nursing profession and the negative effects that fatigue has on nurses (Admi, Tzischinsky, Epstein, Herer & Lavie, 2008; Cochran, 2014; Han et al., 2014; Mandershied, 2008; Martin, 2015; Keller, 2009; Tully, 2004; Yumang-Ross & Burns, 2014); however, limited research is available examining fatigue in nursing students. Some examples of the negative effects that fatigue has on nurses include: decreased alertness and productivity; sleep disorders; increased risk for disease development; and

poor relationships outside of work (Admi et al., 2008; Keller, 2009). A study by Rella, Winwood, and Lushington (2009) used the Occupational Fatigue Exhaustion Recovery (OFER) scale to determine if different levels of acute, chronic fatigue and intershift recovery were reported among Australian nursing students in their first, second and third years of study. The researchers found that third year students were more likely to report greater maladaptive fatigue and poor recovery than first year nursing students (Rella et al., 2009). In fact, many of the nurses who were close to graduating from the nursing program were found to be in a "dangerously fatigued state" (Rella et al., 2009, p. 895). These findings raise important concerns for the future health of these nurses, as they are months away from becoming RNs, and adjusting to a new, highly remanding role (Rella et al., 2008).

A study by Amaducci, Mota, and Pimenta (2010) found that fatigue in nursing students negatively impairs their learning process, quality of life and professional education. They surveyed 189 students at a university in Sao Paolo, Brazil and 83.5% of students complained of moderate and severe fatigue, with the number one reason being exhaustion due to the nursing course requirements. A study by Ferreira and Martino (2012) explored levels of fatigue and sleep patterns in undergraduate nursing students at a university in Brazil. They found that students working night shift or students working a day shift with school in the evening, were more likely to experience sleep deprivation. Seventy percent of the students reported feeling tired two to three days a week while in class (Ferreira & Martino, 2012). They also found that women received less sleep then men because of their responsibilities at home, and their need to work doubling shifts,

which created higher levels of daytime sleepiness and poorer levels of concentration during school.

Due to the current nursing shortage, it is vital to explore fatigue in nursing students because they are preparing to enter into practice and are the future of the profession. As new nurses are transitioning into their professional roles, they are faced with many unfamiliar situations that require them to adapt quickly and efficiently. Nurses often report feelings of frustration when transitioning from nursing school to professional practice as they try and adapt to a role that is continuously evolving (Wedgeworth, 2016). The transition is unpredictable and challenging, and as new nurses worry about obligations like ensuring patient safety and increasing role responsibility, feelings of distress and anxiety worsen (Kaihlanen, Lakanmaa, & Salminen, 2013). Some researchers believe that the challenges student nurses face as they transition are the most difficult they will face in their career (Butler & Hardin-Pierce, 2005). As levels of fatigue and burnout increase from nurses working longer shifts, intent to leave their job and dissatisfaction with their job rises (Stimpfel, Sloane & Aiken, 2012). High levels of turnover rates in newly graduated nurses can be attributed to reality shock (Yu & Kang, 2016) as they adapt to a new, challenging lifestyle and deal with the many factors associated with work-related fatigue.

Conceptual Framework

The conceptual framework to be used for this study will be Betty Neuman's System Model (NSM) (Figure 1). This framework is used when examining an individual family or group's ability to attain and maintain a maximum level of total wellness by purposeful interventions (Neuman, 1982). The model represents people who are subject

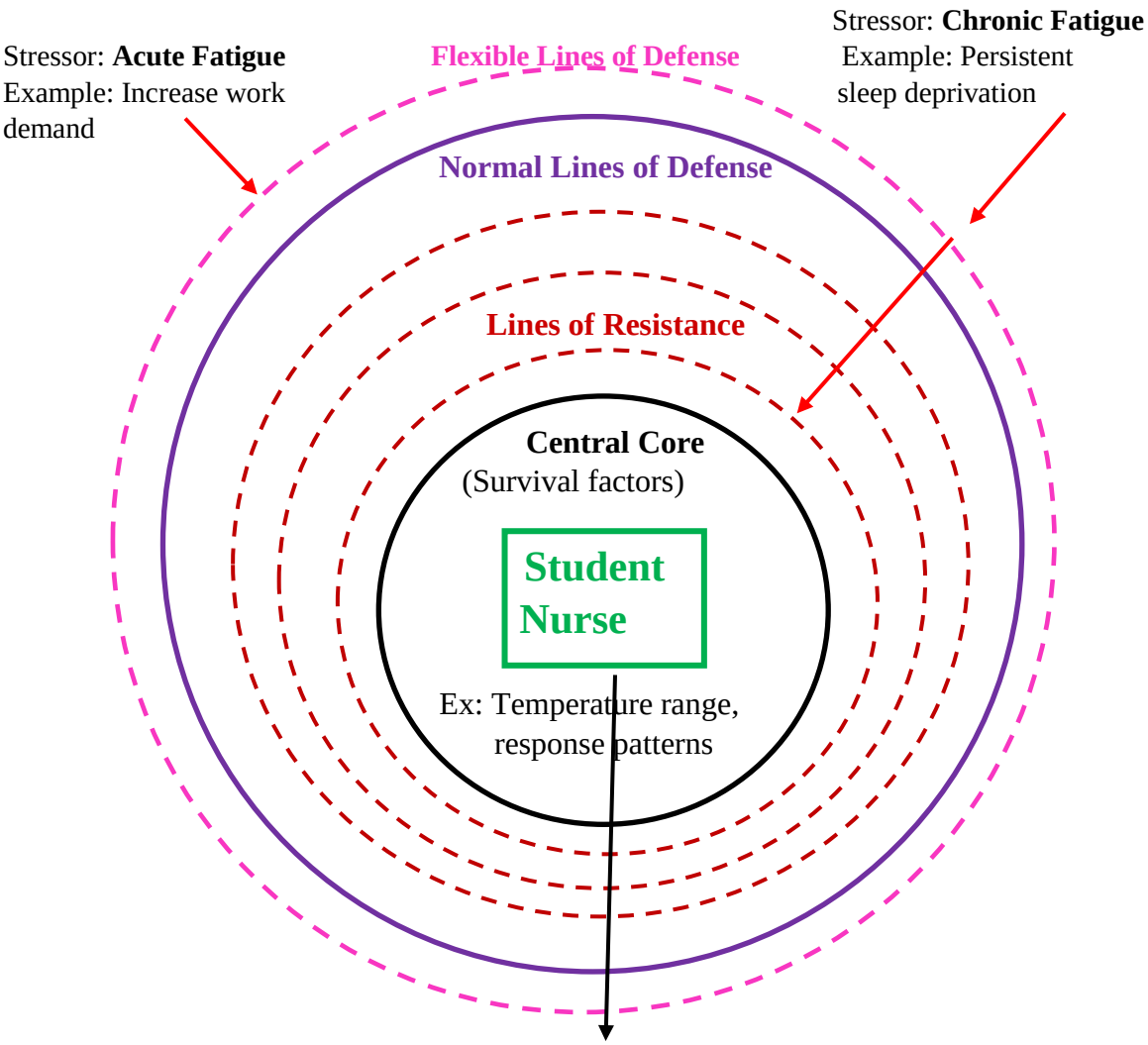
to the impact of stressors. The NSM uses interventions to reduce the impact of stress on an individual, which helps to maintain optimal levels of function. For the purpose of this study, fourth year nursing students are the individuals which the model is being applied. The maximum level of total wellness is achieved when he or she does not experience any of the negative consequences associated with fatigue. In this study, stressors are the factors which impact an individual's level of fatigue and interventions are implemented to reduce the negative impacts that fatigue has on both student nurse and patient safety.

Neuman's model focuses on the total person. The total person has a central core of survival factors that contain characteristics which are unique to each individual, but also common with those around them. The central core (fourth year nursing student) is protected from stressors by the flexible lines of defense. The flexible lines of defense are the first protective layer in the model and are composed of an individual's basic physiological structure. They act as the protective buffer, defending against stressors (factors which influence fatigue) and maintaining a student's baseline level of wellness. The goal is to prevent the stressor from breaking through to the solid line of defense. Increased levels of fatigue, increased work demand, and lack of sleep are all factors that can decrease the effectiveness of this defense (Neuman, 1982).

If the stressor manages to break through the flexible lines of defense then the second barrier, which focuses on maintaining an individual's state of equilibrium, responds. This is referred to as the normal line of defense. The normal lines of defense**,** or solid line of defense, are an individual's steady state, they are unique to each individual and they are developed over time based on a person's coping behaviours, developmental stage, or life patterns. If the stressor manages to reach the normal line of

defense, then the lines of resistance become activated to assist the body in regaining balance in the individual and return them to a state of equilibrium (Neuman, 1982).

Figure 1: Betty Neuman's Systems Model Applied to Fatigue (adapted from Neuman, 1982).



Note. A single arrow represents a factor which influences fatigue that only penetrates the flexible lines of defense. The consecutive double red arrows represent a factor that has enough influence on the individual to penetrate the flexible lines of defense and the normal lines of defense, which activates the lines of resistance (black arrow) to regain a state of equilibrium.

The two main concepts of NSM are stress and an individual's reaction to it. Neuman (1982) defines stress or stressor as "tension-producing stimuli with the potential of causing disequilibrium, situational or maturational crises, in the experience of stress within one's life" (p. 37). It is possible for an individual to be exposed to more than one stressor at any given time. In order for an individual to regain homeostasis they are required to react to these disrupting factors and adapt accordingly. According to NSM, a stressor can occur both internally and externally. For example, an external stressor that a nursing student might experience is working a midnight shift with their preceptor at clinical the night before an early morning class. The student knows that they will be fatigued the next day, which will impact their performance at school, but they feel worried their preceptor will respond negatively if they do not agree to work (internal stressor). As nursing students are faced with multiple factors that influence their levels of fatigue, their ability to cope can become damaged as they vigorously try to maintain a total level of wellness (Neuman, 1982).

Neuman believes that nursing interventions can be implemented if a stressor penetrates the protective barriers to regain a level of wellness (Neuman, 1982). Therefore, if a student nurse is required to work three twelve hour shifts in a row with minimal amounts of recovery between each shift (stressor) then interventions need to be implemented in order to reduce the impact that fatigue will have on themselves or their patients. There are three categories of nursing interventions which are utilized when responding to a stressor. The first category includes primary prevention strategies that identify and protect against the possible risk factors associated with stressors. These strategies help to strengthen the flexible lines of defense by preventing stressors from

occurring and thereby maintaining client stability. For example, a fourth year nursing student may attend a seminar on safe sleep practices in order to increase education levels related to the risks of becoming fatigued from lack of sleep. Secondary prevention measures involve applying the appropriate interventions and treatments to reduce the affect that the stressors may have on the central core (fourth-year nursing student). For example, the nursing student may drink caffeine to help stay awake during a midnight shift to combat the levels of fatigue they are experiencing. Lastly, tertiary prevention strategies are used to retain stability and protect the client system by supporting existing strengths (Neuman, 1982). For example, the break week in the middle of both first and second semester when students have no classes, can be used to rest and help regain equilibrium and a total level of wellness. The findings from this research will inform the three levels of prevention strategies to assist student nurses to deal with fatigue.

As previously stated, the concepts and components of the NSM match the variables of focus in the research being studied. The state of equilibrium and goal of the reconstitution process is student nurse wellness. Nursing students are faced with multiple factors that impact their levels of fatigue and affect the health and safety of themselves and their patients. Some of these factors, or what NSM refers to as stressors, which contribute to their increased levels of fatigue include shiftwork, increased workload, increased demand from work (including school and work responsibilities), lack of ability to recover fully between shifts and sleep deprivation. The second research question, which addresses the predictors of fatigue, will be answered by gathering demographic data from the fourth-year nursing students, to better understand which of these stressors the fourth-year nursing students are experiencing. As these factors affect an individual,

the body's ability to defend the central core decreases. As the core becomes damaged, they (the fourth-year nursing student) are at a greater risk of experiencing disequilibrium, therefore jeopardizing the care they are providing to patients, their performance in school and their own health. Examining whether or not a student is experiencing acute or chronic levels of fatigue, will allow for interventions and programs to be developed, which will aid in maintaining the wellness of students, protecting their health as well as the health of the patients they are providing care to.

Purpose

The factors which contribute to nurse fatigue and the effect fatigue has on RNs has been well documented in the literature, but there is limited literature available examining fatigue in nursing students. However, much of the documented literature is applicable to fourth-year nursing students, as they are at their nearest point of entering the profession and being independent, autonomous RNs. Exploring fatigue in fourth-year nursing students before they graduate and enter into professional practice can help identify difficulties early in their transitional process and hopefully improve retention rates in the future. It has also been recommended to study how students recover from work-related fatigue as most of the recovery occurs between shifts during non-work periods (intershift recovery) (Winwood et al., 2005). Therefore, the purpose of this proposed research study was to explore and compare perceived levels of acute fatigue, chronic fatigue and intershift recovery in fourth year nursing students enrolled in various clinical nursing experiences at a university in Southwestern Ontario.

Research Questions

The purpose of this study was to answer the following research questions:

1. What are the factors associated with acute fatigue in fourth-year nursing students?
2. What are the factors associated with chronic fatigue in fourth-year nursing students?
3. What are the factors associated with intershift recovery in fourth-year nursing students?

It was hypothesized that students in hospital clinical placement would experience higher levels of acute and chronic fatigue, and lower levels of intershift recovery compared to students in community clinical placement. In addition, students who worked additional jobs would have higher levels of acute and chronic fatigue, and lower levels of intershift recovery, compared to those who did not. Finally, students whose clinical consisted mostly of rotating or midnights shifts, would have lower levels of intershift recovery compared to students who worked strictly days.

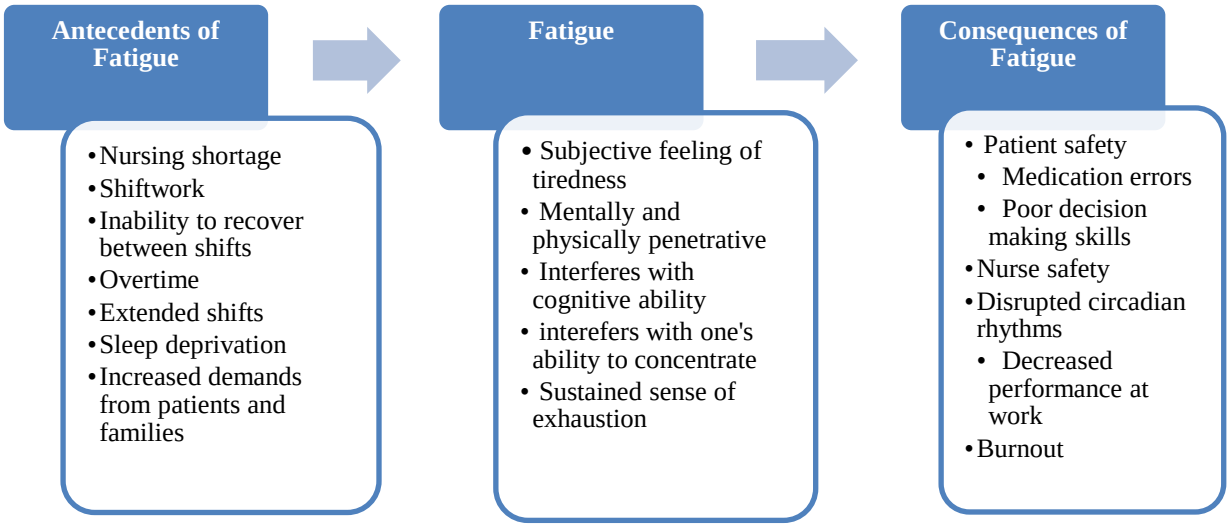
CHAPTER 2

LITERATURE REVIEW

Introduction

Fatigue is a multifaceted concept which has multiple definitions. It consists of antecedents, which contribute to one's feelings of fatigue and consequences, which are the results of a fatigued individual (as seen in Figure 2).

Figure 2: Antecedents, Definitions and Consequences of Fatigue



Note. This figure illustrates factors which contribute to fatigue, definitions of fatigue and consequences of fatigue.

(Sources: Admi et al., 2008; Bae, 2012a; CNA, 2008; CNA & RNAO, 2010; Han et al., 2014; Liu et al., 2016; Keller, 2009; Kunert et al., 2007; RNAO, 2011; Scott, Rogers, Hwang, & Zhang, 2006; Weinstein, 2015; Zhao, Bogossian & Turner, 2015)

Fatigue is a critical issue in healthcare organizations because it effects both nurse and patient safety (CNA & RNAO, 2010). Nurse fatigue has such a critical impact on patient safety that it is being incorporated into the national patient safety agenda by

health-care leaders in order to develop individual, organizational and system-level recommendations (CNA & RNAO, 2010).

Nurse fatigue also plays a major role on the retention and recruitment of nurses (RNAO, 2011). As a large cohort of people are aging in the near future, it is predicted that there will be an increase in the number of expected patients requiring nursing care, but also a decrease in the number of available nurses as many get ready to retire (RNAO, 2011). With older nurses retiring, more attention is being placed on new graduate nurses and it is becoming vital to maintain their health and satisfaction levels (Halfer, 2011). Therefore, it is critical to manage fatigue in employed RNs in order to maintain retention and decrease turnover. This chapter will focus on explaining the numerous factors which influence an individual's level of fatigue (antecedents) as well as the consequences associated with a fatigued individual.

Factors influencing fatigue

Nursing Shortage. Despite the large number of graduating nursing students per year, there continues to be a shortage of nurses throughout Canada. In 2014, the College of Nurses of Ontario (CNO), the self-regulating body that oversees the nursing profession in Ontario, implemented a new rule stating that members were unable to renew their license if they had not practised in the province within the last three years (Grant, 2015). This new rule was a large contributor to the shortage, as 15, 836 nurses left the profession in Ontario that one year (Grant, 2015). According to the Canadian Federation of Nurses Unions (CFNU) almost 40% of RNs are aged 50 and older and 26% of RNs are 55 or older, which creates concern for the future (p. 1, 2015). The CNA (2009) indicated that in 2007 there were 217,000 registered nurses working in Canada, but the country needed

another 110,000 to meet health-care needs. The CNA (2009) predicts that by 2022 the country will be short approximately 60,000 registered nurses. As the population continues to age and nurses are preparing to retire, the demand for nurses is going to continually increase. This nursing demand is causing organizations to direct their focus to nursing students and newly graduating nurses, the future of the profession (Halfer, 2011).

***Shiftwork*.** The requirement to work shiftwork is another major contributing factor to increased fatigue in nurses. Nursing is a profession that requires 24-hour coverage seven days a week because hospitals function around the clock. To make this possible, nurses are required to work shiftwork. According to the National Sleep Foundation (2016) shiftwork is performed outside the typical daytime hours and includes day, evening or night shifts, a rotating schedule and extended shifts. A study by West, Ahern, Byrnes and Kwanten (2007) found that new nurses take approximately 12 months to adapt to a rotating shift schedule and are likely to experience job dissatisfaction, sleep disturbance and increased levels of fatigue during that time. This shift rotation is a major concern, as part of the requirements for the fourth-year nursing student program is to complete six weeks of full-time hospital placement, which can include an alternating and rotating shift schedule. This is only one-eighth the amount of time needed in order to fully adapt.

A study by Admi et al. (2008) examined the impact of shiftwork on quality performance among male and female nurses. They found that shiftwork can impact sleep, well-being, and performance, and nurses who worked shiftwork were more likely to have trouble falling asleep, experience headaches when waking up and complain of

daytime sleepiness, than daytime nurses (Admi et al., 2008). Of the 738 hospital nurses that were surveyed, 27.7% of them were classified as non-adaptive shift nurses (Admi et al., 2008). A non-adaptive shift nurse is one who complains about difficulty falling asleep after any of the shifts 'always' or 'many times' and difficulty staying sleep (Admi et al., 2008, p. 254). When an individual works shiftwork, they can be required to sleep during the day, which increases an individual's risk of developing a sleep disorder, putting them at a higher risk for developing cardiovascular disease (Admi et al., 2008). Another consequence found to be associated with nurses working shiftwork, is an increase in work related injuries including blood or body fluid exposure, musculoskeletal disorders and an increase in motor vehicle crashes (Berger & Hobbs, 2006; Zhao, Bogossian & Turner, 2010).

Inability to recover between shifts. One of the major factors that Winwood (2005) believes can prevent acute-fatigue related symptoms from occurring is the ability to recover between shifts. Dienstbeir (1989) stated that in order to maintain an adaptive response to work demands, one must be able to adequately recover between shifts (Winwood, 2005). If an individual has developed high levels of acute fatigue (end of shift fatigue), and has low levels of recovery between shifts, then he or she is likely to develop chronic fatigue traits (Winwood et al., 2005).

A study by Geiger-Brown et al. (2012) that examined levels of sleepiness in nurses who work consecutive 12-hour shifts, found that nurses did not receive an adequate amount of sleep between shifts, and were therefore unable to recover both physically and cognitively (p. 215). Due to this inability to recover, nurses reported lower levels of neurobehavioural functioning, experiencing delayed reaction time and

poorer cognitive performance (Geiger-Brown et al., 2012). A similar study conducted by Chen, Davis, Daraiseh, Pan, and Davis (2014) examined acute fatigue, chronic fatigue and intershift recovery in 130 hospital nurses who worked 12-hour day shifts in the United States. They found that high levels of chronic fatigue and low levels of intershift recovery positively correlated with nurses who worked 12-hour day shifts (Chen et al., 2014). These researchers also concluded that increased fatigue levels and decreased intershift recovery were major factors that contributed to nurse error and workplace injuries.

Overtime. The current nursing shortage creates major problems in the workforce as organizations try to cope with inadequate staffing due to the lack of nurses available to meet scheduling demands. According to the Canadian Federation of Nurses Union (CFNU) (2015), in order for employers to meet workload demands employees are being required to work overtime. Canada's Labour Force Survey defines full-time nurse work as three 12-hour shifts in a work week (36 hours) with anything over being considered overtime (CFNU, 2015). Although, it is not uncommon for RNs to work four 12-hour shifts in a 7-day period. Many organizations have adopted this schedule pattern and they require that their RNs work two day shifts, then two night shifts with five days off. However, according to Ontario's Ministry of Labour (2016) this is the maximum number of days (when working 12-hour shifts) that an employee can be required to work in a seven-day period (48 hours).

Unfortunately, as organizations experience nursing shortages, administrators are relying on their staff to work voluntary and mandatory overtime in order to help solve their staffing problems (Garrett, 2008; Olds & Clarke, 2010). Research states that as

levels of fatigue increase due to overtime work, RNs are likely to experience an increase in the number of accidents while on the job, reduced duration and quality of sleep, increased stress and sleepiness, high probability in automobile accidents after work and less alertness while performing tasks (Keller, 2009).

In 2014, approximately 26% of Canadian nurses worked weekly overtime, for a total of 19 million hours of overtime in the year, 20% of which was unpaid (CFNU, 2015). A study examining critical care nurses and hours worked on vigilance and patient safety, found that only one nurse of the 502 included in the research, did not work overtime in their 28-day study period (Scott et al., 2006).

A study by Bae (2012a), studied the prevalence of nurse overtime in hospitals and the reasons why these nurses worked overtime. The study included 229 RNs from North Carolina and West Virgina in the United States (US). Results indicated that more than half of the RNs (60%), experienced one form of overtime, with 10% being unpaid overtime (Bae, 2012a, p. 68). According to this study, a majority of nurses chose to work voluntary overtime, despite being fatigued, because they did not want to let their co-workers down (Bae, 2012a). This is highly concerning to the nursing profession because the longer the hours a nurse works, the more likely they are to experience deficits in their performance (Bae, 2012a).

When university students have jobs outside of school in order to support themselves or their families, it creates increased workload levels. These students are responsible for completing hours at their job, are enrolled in school and are required to complete full-time hours at their clinical nursing experience (Rella, Winwood & Lushington, 2009). This becomes important for studying acute and chronic fatigue levels

in nursing students, because all antecedent factors must be examined to get a true understanding of their fatigue.

Extended shifts. In addition to overtime, another way that organizations have attempted to alleviate the problems associated with nursing shortages, is to have nurses work extended shifts (Rogers, Wei-Ting, Scott, Aiken, & Dinges, 2004; Simone, 2009). Rogers et al. (2004) defined extended shifts as any shift lasting over eight hours. The Institute of Medicine (2004) recommends that nurses do not work more than 12 hours in a 24-hour period and no more than 60 hours in a 7-day work period. When a nurse works longer than 12-hour shifts, he or she only receives approximately five hours of sleep between shifts, worsening a nurses' ability to recover between shifts and increasing work-related fatigue (Bae, 2012b; Han et al., 2014).

Many researchers state that nurses who work longer than eight hours are more likely to experience errors, incidents and accidents (Keller, 2009). However, the requirement to work extended shifts continues to increase in order to adjust for insufficient staffing, which is creating worsening levels of stress and fatigue among nurses (Carayon & Gurses, 2008). Rogers et al. (2004) found that 12% of noted absences were related to nurse fatigue and were more common in nurses working twelve-hour shifts compared to eight-hour shifts.

As nurses work longer shifts they are more likely to experience the negative effects associated with fatigue, including disease, psychosocial disorders, sleep disorders and disabilities (Matheson, O'Brien & Reid, 2014; Simone, 2009). In addition to negatively affecting their own health, as a nurse works extended shifts, he or she is more likely to affect the health of their patients as well. Nurses working longer than eight

hours often report more medication errors, difficulty staying awake during their shift, and decreased vigilance and productivity during the last four hours of their shift (Keller, 2009).

Sleep deprivation. Sleep deprivation is an important concern to consider when studying the factors that influence fatigue in nurses, as it has been found to cause psychosocial stress, psychiatric disorders and decreased work effectiveness in nurses (Menon, Karishma, & Mamatha, 2015). A nurses' likelihood of experiencing sleep deprivation unfortunately increases as her or she is required to work extended shifts and shiftwork (Berger & Hobbs, 2006; Geiger-Brown et al., 2012; Narciso et al., 2016). When a nurse is scheduled to work 12 hours, it can often extend past 13 hours, due to the tasks RNs are required to complete before going home (Geiger-Brown et al., 2012). In addition to these tasks, nurses who have long commutes and dependents at home are more likely to be required to stay awake for longer periods during the day, therefore limiting their opportunity to sleep (Berger & Hobbs, 2006; Geiger-Brown et al., 2012). Although each individual requires different amounts of sleep in order to function at their full capacity, research states that when an individual receives less than five or six hours per night, they experience a decline in neurobehavioural performance (e.g. reaction time) (Geiger-Brown, 2012, p. 212). This becomes worrisome as nurses who work 12-hour shifts often work consecutive days (in order to have consecutive days off), therefore limiting the amounts of sleep that they are receiving between shifts, increasing their levels of fatigue and decreasing their work performance (Geiger-Brown, 2012).

Geiger-Brown et al. (2012) conducted a study on 80, full-time (>36 hours/week), female, RNs to examine their levels of sleepiness and fatigue during a block of

consecutive 12-hour shifts. The researchers found that before the first day or night of a 12-hour shift, nurses reported sleeping on average, 5.9 hours and 9.0 hours respectively. However, after the first shift, sleep time significantly decreased for night nurses, as they reported sleeping on average 5.2 hours (Geiger-Brown, 2012). Researchers used the OFER Scale to measure acute and chronic fatigue and intershift recovery, and they found that 36% of nurses had high levels of fatigue on either the acute or chronic subscale. Similar to the study of Geiger-Brown et al. (2012), Narciso et al. (2016) studied levels of sleepiness in nurses who worked night shift and its affect on their psychomotor performance. The researchers found that levels of sleepiness increased throughout the progression of the shift, that they were more likely to experience levels of wakefulness after the shift and also a decrease in their psychomotor performance (Narciso et al., 2016, p. 5). Unfortunately, as nurses experience more frequent episodes of sleep deprivation and their fatigue levels increase, they more frequently experience episodes of inattention and decreased vigilance (Geiger-Brown, 2012; Narciso et al, 2016; Olds & Clarke, 2010).

A study by Menon et al. (2015) examined multiple characteristics of sleep patterns in nursing students and its impact on their academics. They found that students with better sleep quality reported less insomnia and depression and were able to study for longer periods of time (Menon et al., 2015, p. 363). A similar study was conducted by Ferriera and Martino (2012) and they discovered that students were more likely to experience sleep deprivation because they were more likely to stay awake following a night shift in order to satisfy school obligations. Those with poor sleep quality had worse daytime sleepiness levels, which contributed to worse levels of sleep deprivation and decreased performance in school (Ferreira & Martino, 2012; Menon et al., 2015).

Therefore, studying multiple factors that contribute to fourth year nursing student fatigue levels, will provide the researcher with greater clarification and enhanced understanding of the most influential factors.

Increased demands from work and home. One of the many reasons that nurses experience increased demands from work is due to inadequate RN staffing (Garrett, 2008). A hospital unit is considered inadequately staffed if the number of RNs working that shift is less than what the hospital's policy outlines, based on the numbers and complexities of patients currently on the unit. When a unit is not properly staffed, the staffing shortage creates unnecessary workloads for the RNs, which reduces the quality of care they provide to patients and increases the level of fatigue they experience (Garrett, 2008). As fatigue levels rise it can indirectly effect a nurses' personal relationship and family life (Yumang-Ross & Burns, 2014).

A study by Estryn-Béhar and Van der Heijden (2012) performed a secondary data analysis, exploring how 12-hour shifts effected a nurses' work/family balance. The study included data on 25,924 nurses with 88.5% being identified as female. When asked about the responsibility of completing household chores, 23.3% of male nurses responded, compared to 72.7% of female nurses (Estryn-Béhar & Van der Heijden, 2012). They also reported that nurses who work night shifts, or alternating shifts, are more likely to express dissatisfaction in their job, their well-being and personal life, and more likely to express their willingness to leave their current job setting (Estryn-Béhar & Van der Heijden, 2012).

Consequences of fatigue

Patient Safety. The RNAO (2011), a professional association that represents

nurse practitioners, registered nurses, and nursing students in Ontario, indicates that nurse fatigue has negative effects on nurse well-being and largely increases the risk of patient safety. As nurses' experience stress and increased levels of fatigue, patient safety becomes a concern and the possibility of error rises (Keller, 2009; Rogers et al., 2004; Stimpfel et al., 2012). It is found that nurses who work longer than 12.5 hours, are at least 2.5 times as likely to commit patient error (Berger & Hobbs, 2006; Domen, Connelly, & Spence, 2015; Rogers et al., 2004; Scott et al., 2006).

Medication errors are a major concern in the healthcare setting, and directly affects the lives and safety of patients, and are preventable. A study by Admi et al. (2008) indicated that 205 clinical errors and adverse incidences were reported by 201 night shift nurses during their one year of research (p. 254). Research states that most medications errors are caused by nurses, because they are usually the last part of the medication administration process (Hewitt, 2010). A study by Garrett (2008) found that fatigue was associated with slowed reaction time and lapses in attention to detail, which contributed to errors performed by nurses. It is a nurse's responsibility to protect the lives of their patients, and committing a patient error because of nurse fatigue is neglecting this responsibility.

Nurse safety. The CNA and RNAO (2011) state that nurse fatigue is a definite problem which disrupts physical and mental health and is a critical issue. Fatigue has been found to cause multiple problems in registered nurses, some of which include an increase in the number of chronic conditions, psychiatric disorders and sleep disorders (Matheson, O'Brien & Reid, 2014). Unfortunately, nurse fatigue has been shown to contribute to the onset of disease as well as exacerbate the symptoms of an individual's

chronic disease (Yumang-Ross & Burns, 2014). Research states that when nurses work long hours and night shift, they are at an increased risk of developing pregnancy complications and preterm labour (Berger & Hobbs, 2006). Chen, Lin and Hsiao (2010) found that women who work 12-hour night shifts are more likely to be obese, smoke and have high blood pressure. Nurses are also at risk for developing gastrointestinal disorders, metabolic diseases and nutritional disturbances (Yumang-Ross & Ross, 2014). It is evident based on the above literature that there are multiple factors related to nurse fatigue which have a negative impact on a nurse's overall health. Shift work, extended shifts, overtime, sleep deprivation and increased demands from work and home have all been proven to increase fatigue levels in nurses. These factors are important to consider, for their impacts on a nurse's health.

Disrupted circadian rhythms. Disruption in circadian rhythms has been shown to cause increased levels of fatigue in nurses (Kunert et al., 2007). The circadian rhythm is controlled by a portion of the brain called the hypothalamus which is responsible for hormone production. The secretion of these hormones coordinates many body functions, some of which include the sleep-wake cycle, body temperature, thirst and hunger (Berger & Hobbs, 2006; Kunert et al., 2007). As an individual experiences sleep deficit from disrupted circadian rhythms, their ability to recover between shifts decreases which increases levels of fatigue (Kunert et al., 2007). Nurses who work night-shift are more likely to experience the effects of fatigue because they tend to sleep less than day-shift workers and the quality of sleep is often poor (Admi et al., 2008; Kunert et al., 2007). As nurses' experience disrupted circadian rhythms, they are also more likely to have decreased coordination and delayed reaction time (Berger & Hobbs, 2006). When a

nurse experiences these negative consequences related to fatigue, they are jeopardizing the care they provide to patients, and the long-term health impacts their own lives.

Burnout. Finally, it is important to highlight the differences between burnout and fatigue because the two terms are not synonymous and can create confusion when understanding the literature. According to Maslach and Florian (1988) "burnout is syndrome of emotional exhaustion, depersonalization and reduced personal accomplishment encountered in the workplace" (p. 85). Katsifaraki and Tucker (2013) stated that "emotional exhaustion is the core component of burnout" (p. 627). Emotional exhaustion results from being emotionally overstretched while depersonalization is the result of one trying to further protect themselves from psychological strain by becoming detached (Maslach & Leiter, 1988). Burnout is "related to particular types of work with high emotional demands, not just to work in general" and is a "maladaptive response to fatigue" (Winwood et al., 2005, p. 595). The CNA and RNAO (2010) points out that fatigue is an antecedent of being burnt out. A person experiencing fatigue is unable to "sleep off" the feeling of tiredness, as it is both mentally and physically penetrative and results from a long-lasting process of being continuously drained (CNA & RNAO, 2010). As previously mentioned, fatigue is an "overwhelming, debilitating and sustained sense of exhaustion that decreases one's ability to carry out daily activities and the ability to work effectively" (CNA & RNAO, 2010, p. 11). This lack of energy and sense of exhaustion can result in distress or burnout (Han, Trinkoff, & Geiger-Brown, 2014).

CHAPTER 3

METHODOLOGY

Research Design

A comparative, descriptive, cross-sectional research design was used for this study. This design allows the researcher to "examine and describe differences in variables in two or more groups that occur naturally in a setting" (Grove, Burns & Gray, 2013, p. 217). The researcher is able to gain information without manipulating variables or providing any treatments or interventions (Grove et al., 2013). A cross-sectional design involves studying subjects who are in different stages of development, then categorizing the subjects by group and data, based on selected variables collected at a single point in time (Grove et al., 2013, p. 221). This design allowed the researcher to examine perceived levels of fatigue, along with factors that influenced fatigue, in fourth year nursing students enrolled in various clinical nursing experiences.

Sample and Setting

The target population was fourth year collaborative baccalaureate nursing students enrolled at a university in Southwestern Ontario. Nursing students were either enrolled in theory alone or theory in addition to their clinical nursing experience. The clinical nursing experience requires students to complete 196 hours of work, in either a hospital (six weeks) or community (twelve weeks) setting. Exclusion criteria included any student not in their final year of the baccalaureate nursing program, students not enrolled in clinical during data collection, and those who were part-time or were enrolled at a partner site of the collaborative program.

A convenience sampling method was used to recruit subjects to participate in the study. Convenience sampling is a non-probability sampling method that is inexpensive and accessible, which allows researchers to continually enter subjects into the study until the desired sample size is achieved (Grove et al., 2013, p. 363). The researcher used this method by distributing surveys in the classrooms of fourth year nursing students at the Southwestern Ontario university. There were 226 students enrolled in the winter 2017 semester.

According to Polit (2010) an effect size is "a measure of the strength of the relationship between variables in the population" (p. 126). The effect size assists researchers in deciding whether the null hypothesis is true (Grove et al., 2013). For this study, the null hypothesis is to assume that there is no difference in perceived acute and chronic fatigue levels, and intershift recovery among fourth year nursing students. Both the effect size table created by Cohen (1992) as well as a study by Rella et al. (2008) examining fatigue in Australian nursing students were used to determine a conservative effect size for this study. Since the difference between many independent means is being examined in the both research questions, the appropriate small-medium effect size is stated to be 0.25. Using the G-power analysis program (Faul, Erdfelder, Lang & Buchner, 2007), an estimated sample size was created based on an alpha of 0.05, a medium effect size of 0.25 and a power of 0.8. Results yielded that a minimum of 102 students would be needed for data to be sufficiently analyzed.

Ethical Considerations

The researcher obtained permission from the Research Ethics Board (REB) before beginning the data collection process. Once approval was provided by the REB, verbal

consent was obtained from the winter 2017 fourth year nursing professors, to allow the questionnaires to be distributed at the beginning of class, during week seven of the winter semester. An email was sent to students informing them on the purpose of the research, prior to the completion of the survey (Appendix A). Written consent was also obtained from all fourth-year nursing students who wished to participate in the study (Appendix B).

Prior to distributing the questionnaires, all students who agreed to participate were informed that their answers would be anonymous and kept confidential throughout the entire process. The researcher explained to the students that there were low emotional risks and no direct benefits in completing the questionnaires. However, participants were informed that based on the results, interventions would potentially be implemented to reduce the chances of students being effected by acute and chronic fatigue in the future.

All students who were present the day of data collection were entered into a draw to win one of four $50 VISA gift cards. Students were asked to write their name and email address on a separate piece of paper, which they placed into a ballot box, to ensure confidentiality was maintained. Four students were chosen anonymously and gift cards were distributed by the nursing office two weeks after the data collection date.

Once the researcher was finished explaining instructions to the students, she left the classroom to allow a research assistant, who was not involved in the study, to distribute the questionnaires to the class. Once finished, the students placed their completed questionnaire into a brown envelope and sealed them. They placed their completed consents into a separate brown envelope and sealed those. Both sealed envelopes were collected by the same individual who disturbed the questionnaires. The

questionnaires were then transported and locked in a cabinet in the nursing research office at the University of Windsor. The research team were the only individuals who had access to the locked cabinet. Only the researcher and the researcher's committee, directly associated with this researcher, had access to this data for analysis.

Data Collection

Data collection took place during class in the winter 2017 semester, during week seven, at the beginning of class for fourth year nursing students. The rationale for data collection to take place during this week was there were two groups of students who were enrolled in clinical and a theory class, and one group of students enrolled in only theory. The course for the winter semester was a pilot course, and higher levels of preparation were required. The students were required to reflect on how they felt for the first six weeks of the semester, adjusting to clinical and to the new theory course. Students had the following week off clinical and school, where they had the opportunity to regain a sense of equilibrium and state of total wellness.

In order to prevent a limited response rate from the students, an email was sent one-week prior to their class to inform them about the survey (Appendix A). The email included a cover letter developed by the researcher, which mimicked the content that was provided in the written consent. The participants were fully aware of the purpose of the research, how confidentiality would be maintained, the risks and benefits of completing the questionnaire, as well as a description of the incentive being provided by the researcher. According to Dillman (1991), in order to improve response rates, the researcher should offer participants an incentive for completing the questionnaire, which will increase their levels of satisfaction, thereby increasing their odds of completing the

questionnaire. All students in the class were able to enter their name into the draw to win one of the four $50 VISA gift cards.

Students were asked to complete the questionnaires at the beginning of their class, which took approximately 15-20 minutes. The two instruments that were provided to the students were a demographic questionnaire, developed by the researcher, to help identify personal characteristics about the subjects and also the Occupational Fatigue Exhaustion Recovery (OFER) scale.

Instruments

Demographic Questionnaire. The demographic questionnaire that was used in the study can be found in Appendix C. The demographic data that was collected in the questionnaire included age, gender, and living arrangements. In addition to the above demographic variables, other factors that were collected in the questionnaire included type of clinical nursing experience (hospital-based or community-based and speciality/agency type), shift length (in hours), number of clinical nursing experience days per week, type of shift (days, afternoons, midnights or rotating), additional employment (yes/no), number of hours worked at an outside job per week, average number of hours of sleep per night and between consecutive shifts, hours spent on extra-curricular activities, average numbers of hours spent on school requirements per week, and average number of hours spent preparing for the NCLEX.

OFER Scale. Permission was obtained by the author to use the OFER Scale for this study (Appendix D). It is comprised of 15 questions and is a self-report questionnaire (Winwood, 2005) (Appendix E). It has three subscales which measure acute fatigue, chronic fatigue and inter-shift recovery (Winwood et al., 2005; Winwood et

al., 2006). Each of the 15 questions uses a 7-point Likert scale (from 0 = "Strongly disagree" to 6 = "Strongly agree"), in order to "yield a measurement of sufficient sensitivity for responding to a series of statements about acute fatigue, chronic exhaustion and recover" (Winwood et al., 2005, p. 596). Winwood et al., (2005) decided to use a 0-6 scale to "expedite the computation of subscale scores as a comparable quotient between 0 and 100 by the formula [sum (scale score)/(n items in scale x 6)] x 100" (p. 596). Questions 1-5 are used to measure chronic fatigue, 6-10 acute fatigue and 11-15 inter-shift recovery in the OFER scale (Winwood et al., 2005). To properly assess acute fatigue and recovery, items 9, 10, 11, 13 and 15 needed to be recoded and reversely scored, due to their negatively response items (Winwood et al., 2005). For example, those who scored 0 are recoded to 6, those who scored 1 are recoded to 5, those who scored 2 are recoded to a 4, and so on. For this study, the term 'work' in the OFER scale represents school, family and employment obligations for the fourth-year nursing student. It is important to include all three variables as one entity because they all play a major impact in an individuals' level of fatigue.

The OFER has been validated in several populations, including nurses, and is gender-bias free (Winwood et al., 2005; Winwood et al., 2006). Winwood et al. (2006) report Cronbach's alpha coefficients for the internal reliability of each subscale. Cronbach's alpha coefficients are used for calculating internal consistency for interval or ratio data and can range from "0.00 indicating no internal consistency or reliability, to 1.00, indicating perfect internal reliability" (Grove et al., 2013, p. 391). A scale with 0.8 or greater internal reliability coefficients is considered strong for group level comparisons (Grove et al., 2013 & Polit, 2010). The OFER reports Cronbach's alpha for each

subscale, with 0.84 representing acute fatigue (OFER-AF), 0.86 representing chronic fatigue (OFER-CF) and 0.84 recovery between shifts (OFER-IR).

In addition to satisfactory Cronbach's alpha scores, the OFER scale was also tested for inter-reactions between the OFER subscales (Winwood et al., 2006, p. 384). The authors used the Goodness of Fit Index (GFI), the Root Mean Square Error of Approximation (RMSEA), the Comparative Fit Index (CFI) and the Tucket-Lewis Index (TLI). Values of 0.90 or higher were acceptable for all tests except RMSEA, which is satisfied with scores up to 0.80 (Winwood et al., 2006, p. 384). The original scale was comprised of 22 questions, but was further revised to only include 15 questions to improve the model fit. The final analysis included the following values, TLI 0.96, GFI 0.95, CFI 0.97, and RMSEA 0.05 (Winwood et al., 2006, p. 384). The correlations between the three dependent variables were examined in the current study, to determine the relationship between each subscale. All three values were significant, and were less than 0.85, indicating that the subscales are relatable, but they do not excessively overlap.

The OFER scale is a warning sign for an individual, or work group; to identify if an unsustainable work and recovery balance exists (Winwood, 2005). There are two versions available of the OFER scale, trait and state. The trait version of the scale was used for the study, and the students were instructed to answer the questions reflecting on their experiences in the first six weeks of the winter semester. The version of the OFER scale that was used is also the 'shift-work' version of the scale, because nursing is an occupation that requires individuals to work throughout the 24-hour cycle (Winwood, 2005).

Data Screening

The researcher used the Statistical Package for the Social Sciences (SPSS) *Version 23* software to analyze data. However, before data could be analyzed, it needed to be properly screened for errors (Grove et al., 2013). Data was first screened to examine for missingness, and the researcher was able to judge whether the questionnaire could be used for analysis or if it was unable to be used due to the extent of missing data. Screening for missing data is an important issue, because if not properly handled it can lead to improper conclusions about populations (El-Masri & Fox-Wasylyshyn, 2005). Once the pattern of missing data was identified, the researcher was able to determine whether it was more appropriate to use either deletion or imputation techniques (El-Masri & Fox-Wasylyshyn, 2005). Due to extent of missing data, seven questionnaires were removed from the study.

After data was screened for any errors, the mean OFER Scale scores were inputted into SPSS to check for normally distributed data. The researcher screened the data to determine if any values fell outside the appropriate range of values (Grove et al., 2013). Data was checked for the presence of any skewness or kurtosis in the distribution of the curve, to help ensure that the validity of the data was not altered (Grove et al., 2013). All three dependent variables were normally distributed, with absent skewness and kurtosis.

Data Analysis

Results from the OFER Scale were analyzed based on the equations provided by Winwood (2005). These include: OFER-CF=sum (item 1-5 scores)/30 x 100, OFER-AF=sum (item 6-10 scores)/30 x 100, and OFER-IR=sum (item 11-15 scores)/30 x 100.

Each of these subscales produced a value between 0-100, indicating the higher the score the 'more' of the subscale construct (Winwood, 2005, p. 11). Winwood (2005) recommends using quartiles of scale score distribution for comparative purposes, 0-25 low, 26-50 is low-moderate, 51-75 is moderate-high, and 76-100 is high.

Univariate analyses were conducted as a preliminary analysis on the demographic variables as well as the variables from the OFER scale using SPSS. This allowed the researcher to determine descriptive statistics (e.g. means, percentages, frequencies) and examine the frequency distribution of each of the variables. Descriptive statistics aid the researcher by summarizing, comparing and characterizing the data (Polit, 2010).

Second, the demographic data was analyzed by SPSS using independent sample t-tests and Pearson moment correlations to determine which factors were significant. These significant factors were later plugged into the multiple regression analysis to determine if a relationship existed between the independent variables against the dependent variable (Grove et al., 2013). Before multiple regression analysis was performed, the researcher examined all independent variables to assess for multicollinearity. Multicollinearity was not present, which confirmed that the independent variables were not closely related (Grove et al., 2013). There were no bivariate correlations of 0.65 or greater, therefore no independent variables had to be combined as one entry (Grove et al., 2013). Finally, in order to appropriately answer the research questions, data was entered against all three levels of fatigue. Once the multiple regression analysis was complete, the researcher was able to determine which variables had the largest impact on the dependent variable. The analysis findings as well as implications for future research are discussed in the following two chapters.

CHAPTER 4

FINDINGS

There were 206 students registered in the course at the time the survey was conducted. There were 141 (68.4%) students present that completed questionnaires. A total of seven surveys were removed prior to analysis, three for incomplete data and four who did not meet inclusion criteria. The final sample was 134 (65.0%) participants.

Data Screening

Data was first analyzed for missingness, and appropriately managed with both imputation and deletion techniques. According to Roth (1994), it is only appropriate to use listwise deletion if less than 5% of the data are missing, because the sample size can be maintained, which prevents the possibility of diminishing power. In this study, three questionnaires were removed from analysis, due to more than fifty percent of missing data. Case mean substitution method was used to manage missing data on the cases which had answers missing from the OFER scale. According to El-Masri and Fox-Wasylyshyn (2005) case mean substitution is appropriate to use for psychometric measures, because it is assumed that the items in the scale are closely related to the scores of remaining items (p. 166). In addition to case mean substitution, sample mean substitution was used to manage missing data on the continuous variables in which answers were missing. There were three surveys which required the case mean substitution technique, and one surveys which required sample mean substitution. All data was analyzed using Statistical Package for the Social Sciences (SPSS) version 23.0 for Windows.

Demographic Characteristics and Fatigue Scores

Demographics. Sample characteristics and fatigue scores are displayed in Table 1. The mean age was 23.1 years (range 21-44) and eighty percent were female (*n* = 109). The majority (*n* = 127; 94.8%) reported living with others and only seven (5.2%) reported living alone. Approximately half (*n* = 76; 55.1%) were enrolled in hospital placements. Of the 134 participants enrolled in clinical, more than half worked a rotating schedule (*n* = 72; 53.7%), which included a combination of days, afternoons and midnights, while the rest of students reported working a strictly days schedule (*n* = 62; 46.3%). Almost sixty-percent of students (*n* = 78) reported working less than 12 hours and approximately forty percent (*n* = 56) reported working 12 hours or more. Over half of the participants (*n* = 79) reporting having clinical one to two days, while 41% (*n* = 55) reported having clinical three days a week or more.

Participants were asked to report how many hours of sleep they received before clinical and how many hours of sleep they received in between clinical shifts. These two variables were analyzed and categorized as receiving eight hours or less of sleep at night and nine hours or more of sleep at night. The majority (*n* = 126; 94.0%) reported that they received eight hours or less of sleep both before a clinical shift and as well as in between clinical shifts (*n* = 120; 89.5%). Only six percent (*n* = 8) reported receiving greater than nine hours of sleep before clinical as well as in between clinical shifts.

Participants reported spending approximately 10.4 hours (*Mdn* = 8, SD ± 7) a week on schoolwork (course work and clinical preparation). Two-thirds (*n* =89; 66.4%) reported that they had begun preparing for the NCLEX-RN examination. In addition to weekly clinical requirements and schoolwork responsibilities, nearly two-thirds of

participants (*n* = 88; 65.7%), reported having a job, and worked on average 10.4 hours each week (*Mdn* = 10, SD ± 9.9). Along with having an additional job, almost fifty-percent (*n* = 60) reported being involved in extracurricular activities each week.

Fatigue Scores. Winwood (2005) recommends using quartiles of scale score distribution to interpret levels of fatigue; 0-25 is low, 26-50 is low-moderate, 51-75 is moderate-high and 76-100 is high. Female participants experienced higher levels of chronic [*M (SD)* = 55.7(22.3)] and acute fatigue [*M (SD)* = 66.14(17.44)] than males, and lower levels of intershift recovery [*M (SD)* = 43.61(17.75)]. Results indicated that the higher levels of acute fatigue and lower levels of intershift recovery were statistically significant. Age was dichotomized into 21-23 years of age and 24 years of age and older. Participants aged 24-years and older reported higher levels of chronic fatigue [*M (SD)* = 58.06 (20.34)], compared to those aged 21 to 23 years old [*M (SD)* = 55.34(22.68)]. Individuals who lived with others had higher levels of chronic fatigue [*M (SD)* = 55.7(21.7)] compared to individuals who lived alone [*M (SD)* = 51.4(26.9)]. However, those who lived alone had higher levels of acute fatigue [*M (SD)* = 72.86(16.82)] and lower levels of intershift recovery [*M (SD)* = 40.48(21.47)].

Fatigue levels for hospital and community placements were compared. There was no significant difference in levels of chronic and acute fatigue between hospital and community placements. Both reported moderately high levels of chronic and acute fatigue. Both also reported moderately high levels of intershift recovery, but there was a significant difference between the two groups; students in hospital placement reported lower intershift recovery [*M (SD)* = 43.24(14.58)], compared to those in community placement [*M (SD)* = 48.81(21.33)]. Of interest, participants who worked longer than 12-

hours experienced higher levels of acute fatigue [*M (SD)* = 66.55(16.79)] and lower levels of intershift recovery [*M (SD)* = 41.13 (15.29)] compared to those who worked less hours.

Participants reported working either a strictly days clinical schedule or a rotating clinical schedule. A rotating schedule included a combination of day, afternoon and midnight shifts. Participants reported moderately high levels of acute and chronic fatigue, but there was no significant difference between the two groups. However, there was a significant difference in levels of intershift recovery. Individuals who had a rotating clinical schedule had lower levels of intershift recovery [*M (SD)* = 42.78(14.26)] compared to those who were required to work only days at clinical [*M (SD)* = 49.00(21.09)].

Participants were grouped into two categories to assess the number of clinical days that they had per week: one to two days, and three days or more. Results indicate similar findings between both groups, as both reported moderately high levels of acute and chronic fatigue and moderately low levels of intershift recovery. Although insignificant, individuals who had clinical more than three days a week had higher levels of acute [*M (SD)* = 66.18(17.69)] and chronic fatigue [*M (SD)* = 55 (41.0)], and lower levels of intershift recovery [*M (SD)* = 44.36 (14.10)].

Students' sleep patterns were analyzed by assessing hours of sleep received before a clinical shift and hours of sleep received in between clinical shifts. Results indicate that students who receive less than eight hours of sleep before clinical had moderately high levels of acute [*M (SD)* = 64.84 (18.15)] and chronic fatigue [*M (SD)* = 55.91 (22.06)]. Comparably, students who received more than nine hours of sleep had

moderately low levels of acute [*M (SD)* = 56.67 (19.52)] and chronic fatigue [*M (SD)* = 48.33(18.35)]. Similarly, students who received less than eight hours of sleep in between clinical shifts had moderate-high levels of acute fatigue [*M (SD)* = 64.86 (17.63)], and students who received more than nine hours reported moderate-low levels acute fatigue [*M (SD)* = 56.25 (20.96)]. Finally, levels of intershift recovery was lower for students who received less sleep in between clinical shifts [*M (SD)* = 44.83 (17.90)].

Participants were asked to report involvement with responsibilities outside of clinical. There was a significant difference in levels of chronic fatigue and inter shift recovery between those who had a job and those who did not. Both reported moderately high levels of chronic fatigue, but levels were higher in students with a job [*M (SD)* = 53.37 (19.77)]. Additionally, both had moderately low levels of intershift recovery, but those with a job reported a worse time recovering [*M (SD)* = 43.99 (15.96)]. Results were similar for those who had extracurricular activities and were also preparing for the NCLEX-RN examination, compared to those who were not. Finally, hours spent on homework was dichotomized to ten hours or less of homework per week, and greater than eleven hours. Those who spent more than eleven hours a week on homework had significantly higher levels of chronic fatigue [*M (SD)* = 60.38 (22.43)] compared to those who spent less time on homework [*M (SD)* = 53.60 (21.79)].

Table 1

Demographic Data & Relationship to Fatigue Scores

Variable	Total *n* (%)	Chronic Fatigue *M (SD)*	Acute Fatigue *M (SD)*	Intershift Recovery *M (SD)*
Gender			*!	*!
Male	25 (18.7)	54.5 (20.4)	56.67 (20.00)	54.13 (16.25)
Female	109 (81.3)	55.7 (22.3)	66.14 (17.44)	43.61 (17.75)
Age	134 (23.1)	*	*	
21-23	103 (76.9)	55.34 (22.68)	65.79 (17.90)	45.18 (17.47)
> 24	31 (23.1)	58.06 (20.34)	60.74 (19.05)	45.81 (19.68)
Living Arrangement				
Alone	7 (5.2)	51.4 (26.9)	72.86 (16.82)	40.48 (21.47)
With others	127 (94.8)	55.7 (21.7)	63.87 (18.28)	45.89 (17.74)
Type of Clinical				*!
Hospital	76 (56.7)	55.53 (21.32)	65.43 (16.97)	43.24 (14.58)
Community	58 (43.3)	55.36 (22.78)	62.86 (19.93)	48.81 (21.33)
Type of Clinical Shift				*!
Days	62 (46.3)	55.56 (23.96)	62.78 (19.66)	49.00 (21.09)
Rotating	72 (53.7)	53.37 (20.12)	65.65 (17.03)	42.78 (14.26)
Shift Length			*	*!
< 12 hours	78 (58.2)	55.53 (22.69)	62.72 (19.21)	48.90 (19.03)
≥ 12 hours	56 (41.8)	55.36 (20.89)	66.55 (16.79)	41.13 (15.29)
Number of Clinical Days				
1-2 days	79 (59.0)	54.94 (22.64)	63.03 (18.65)	46.49 (20.22)
≥ 3 days	55 (41.0)	56.18 (20.92)	66.18 (17.69)	44.36 (14.10)
Hours of Sleep Before Clinical				
≤ 8 hours	126 (94.0)	55.91 (22.06)	64.84 (18.15)	45.67 (17.70)
> 9 hours	8 (6.0)	48.33 (18.35)	56.67 (19.52)	44.58 (22.03)
Hours of Sleep Between Clinical			*	
≤ 8 hours	120 (89.5)	55.68 (21.68)	64.86 (17.63)	44.83 (17.90)
> 9 hours	8 (6.0)	55.75 (22.78)	56.25 (20.96)	53.33 (15.22)
Clinical not consecutive	6 (4.5)	53.34 (28.13)	65.00 (27.14)	50.55 (20.70)
Additional Job		*!		*
Yes	88 (65.7)	53.37 (19.77)	64.15 (17.98)	43.99 (15.96)
No	46 (34.3)	50.00 (24.63)	64.71 (20.63)	48.62 (20.90)
Extracurricular Activities			*	
Yes	60 (44.8)	56.56 (21.58)	62.17 (19.41)	47.39 (17.26)
No	74 (55.2)	54.54 (21.21)	66.16 (17.17)	44.12 (18.40)
NCLEX-RN Exam Prep				
Yes	89 (66.4)	55.82 (21.28)	64.20 (17.31)	45.19 (17.57)
No	45 (33.6)	52.73 (22.99)	64.62 (20.22)	46.44 (18.71)
Homework Hours	134 (10.4)	*!		*
≤ 10 hours	90 (67.2)	53.60 (21.79)	64.53 (18.29)	45.21 (17.82)
> 11 hours	44 (32.8)	60.38 (22.43)	64.92 (18.46)	45.61 (18.56)

Note. n = number of participants, *M*= mean, *SD*= standard deviation, *= significant variable to be entered into the model based on a $p<0.25$, != statistically significant variable with $p<0.05$, Fatigue scores: 0-25 low; 26-50 low-moderate; 51-75 moderate high and 76-100 high (Winwood 2005).

Distribution of Fatigue Scores

Table 2 displays the frequencies for each level of fatigue, based on the quartiles of distribution. One-fifth of students (*n* = 30, 22.4%) were experiencing high levels of chronic fatigue. Almost one-third of students (*n* = 38, 28.4%) were experiencing high levels of acute fatigue and more than half of students were experiencing low-moderate levels of intershift recovery (*n* = 53, 71%).

Table 2

Distribution of Fatigue

Scores by Quartile	Chronic Fatigue *n* (%)	Acute Fatigue *n* (%)	Intershift Recovery *n* (%)
Low (0-25)	14 (10.4)	3 (2.2)	18 (13.4)
Low-Moderate (26-50)	41 (30.6)	29 (21.6)	71 (53)
Moderate-High (51-75)	49 (36.6)	64 (47.8)	35 (26.1)
High (76-100)	30 (22.4)	38 (28.4)	10 (7.5)

Note. *n* = number of participants.

Responses to Fatigue Questions

The OFER scale is comprised of three subscales, acute fatigue (AF), chronic fatigue (CF) and intershift recovery (IR). The scale is a total of 15 questions, 5 questions per subscale, which was developed to measure and distinguish between acute fatigue states and chronic fatigue traits (Winwood et al., 2006, p. 382). The first five questions represent CF, the second five AF and the last five IR. Table 3 depicts the frequencies based on the students' responses to the specific questions on the OFER scale, which are separated into the three subscales.

Participants responses to the questions on chronic fatigue slightly agreed (*Mdn* = 4) that they felt "at the end of their rope with work", that they "dread waking up" to another day of work, and that most of the time they felt like they were just "living to

work." Participants were neutral (neither agreed or disagreed) (*Mdn* = 3) in response to I "they often wonder how long I can keep going at my work" and "too much is expected of me in my work."

Table 3

Responses to Fatigue Questions

OFER Question	*Mdn*	*M (SD)*
Chronic Fatigue		
Q1. I often feel I'm at the 'at the end of my rope' with work	4	3.4 (1.7)
Q2. I often dread waking up to another day of work	4	3.5 (1.6)
Q3. I often wonder how long I can keep going at my work	3	3.1 (1.5)
Q4. I feel that most of the time I'm just 'living to work	4	3.5 (1.8)
Q5. Too much is expected of me in my work	3	3.2 (1.6)
Acute Fatigue		
Q6. After a work shift I have little energy left	4	4.2 (1.4)
Q7. I usually feel exhausted when I get home from work	5	4.4 (1.5)
Q8. My work drains my energy completely every day	4	3.6 (1.6)
Q9. I usually have lots of energy to give my family or friends	3	2.8 (1.4)
Q10. I usually have plenty of energy left for my hobbies and other activities after I finish work	2	2.1 (1.2)
Intershift Recovery		
Q11. I never have enough time between shifts to recover my energy completely	4	3.5 (1.5)
Q12. Even if I'm tired from my shift, I'm usually refreshed by the start of my next shift	2	2.7 (1.4)
Q13. I rarely recover my strength fully between shifts	3	2.9 (1.4)
Q14. Recovering from work fatigue between shifts isn't a problem for me	2	2.6 (1.4)
Q15. I'm often still feeling fatigued from one shift by the time I start the next one	4	3.3 (1.3)

Note. *Mdn* = median, *M*= mean, *SD*= standard deviation. OFER is a 7-point Likert scale, 0=strongly disagree, 1=disagree, 2=slightly disagree, 3=neither agree or disagree, 4=slightly agree, 5=agree, 6=strongly agree.

In describing their levels of acute fatigue, participants slightly agreed (*Mdn* = 4) that "after a work shift I have little energy left" and that work "drains my energy completely everyday." In addition, participants agreed (*Mdn* = 5) that they "felt exhausted when I get home from work", but they were neutral (*Mdn* = 3) with the response that they "have lots of energy to give family and friends." Finally, participants

slightly disagreed (*Mdn* = 2) that "I usually have plenty of energy left for my hobbies and other activities after I finish work."

Participants responses to questions on intershift recovery slightly agreed (*Mdn* = 4) that "I never have enough time between shifts to recover completely" and that they are "often still feeling fatigued from one shift by the time I start the next one." It was discovered that participants were neutral (*Mdn* = 3) with the statement "I rarely recovery my strength fully between shifts." Finally, participants slightly disagreed (*Mdn* = 2) with the responses, "even if I'm tired from my shift, I'm usually refreshed by the start of my next shift" and "recovering from work fatigue between shifts isn't a problem for me."

Overall Fatigue Scores

Table 4 illustrates overall fatigue scores. Each of the subscales produce a value between 0-100, the higher the score, the 'more' of the subscale construct that person experiences (Winwood, 2005, p. 11). Chronic and acute fatigue scores were calculated by using the following equations, OFER-CF=sum (item 1-5scores)/30 x 100 and OFER-AF=sum (item 6-10 scores)/30 x 100 (Winwood, 2005). However, since the intershift recovery subscale is comprised of three negatively keyed items and two positively keyed items, items 11, 13 and 15 were recalculated before entering them into the formula, OFER-IR=sum (item 11-15 scores)/30 x 100 (Winwood, 2005, p. 13). Based on the quartiles of distribution, students were experiencing moderate-high levels of acute fatigue [*M (SD)* = 64.58 (18.23)], and chronic fatigue [*M (SD)* = 55.97(22.11)], and low-moderate levels of intershift recovery [*M (SD)* = 45.32(17.93)].

Table 4

Overall Fatigue Scores

Variable	*Mdn*	*M (SD)*	Range
Acute Fatigue	66.67	64.58 (18.23)	13.33-100
Chronic Fatigue	56.67	55.97 (22.11)	3.33-96.67
Intershift Recovery	43.30	45.32 (17.93)	3.33-90.00

Note. Mdn =median, *M*=mean, *SD*=standard deviation. Fatigue scores: 0-25 low; 26-50 low-moderate; 51-75 moderate high and 76-100 high (Winwood 2005)

Predictors of Fatigue

Before stepwise multiple regression analysis was performed, the researcher used independent sample t-tests and Pearson moment correlations to determine which independent variables were significant to create a parsimonious model. Stepwise multiple regression was then used to determine if any of the significant demographic variables predicted the dependent variables (Polit, 2010). The results indicated that each dependent variable had separate independent variable predictors. The criteria for variables to be entered into the equation was $F = 0.050$, and variables to be removed was $F = 0.100$. The variables were also assessed for multicollinearity, to ensure that no independent variables were too highly correlated (Polit, 2010). Based on the correlations table developed by SPSS, there were no correlations that were higher than 0.65 between two independent variables, and therefore no concern for multicollinearity. In addition to the correlation values, the researcher examined the tolerance value for each dependent variable predictor. For multicollinearity to be absent, it is expected that the values are as close to 1.00, and if the values are .00, then the predictor variables are believed to be perfectly intercorrelated (Polit, 2010, p. 245). For the three tests that were performed, tolerance values for chronic fatigue, acute fatigue and intershift recovery were as follows, .994, .967, 1.00, indicating no concern for multicollinearity. The three dependent

variables were also assessed for normal distribution. All three variables had acceptable histograms, with *z* score values within ± 3.29, indicating no concern that normal distribution was violated. Table 5 is the model summary for chronic fatigue, acute fatigue and intershift recovery.

Chronic fatigue. The results from the preliminary tests indicated that, age, having an additional job, and hours spent on schoolwork were significant variables, and were therefore entered in to the model. Based on the results, having an additional job is the only significant predictor to chronic fatigue. The *adjusted* R^2 demonstrates that having an additional job explains 3.1% of chronic fatigue. It is recognized that those students who do not have additional jobs experience less levels of chronic fatigue compared to those students with additional jobs.

All other variables were insignificant and showed no improvement to the model.

Acute fatigue. The results from the preliminary tests indicated that gender, living arrangement, shift length, hours of sleep received before clinical and whether the participant had extracurricular activities were significant variables, and entered into the model. Based on the results, gender was the only significant predictor to acute fatigue. The *adjusted* R^2 demonstrates that gender explains 3.6% of acute fatigue, with females experiencing higher levels of acute fatigues than males. All other variables were insignificant and showed no improvement to the model.

Intershift recovery. Finally, gender, type of clinical, type of clinical shift, shift length, having an additional job and schoolwork hours were all significant variables in the preliminary analysis. Based on the results, gender, shift length and hours spent on schoolwork were the predictors of intershift recovery. The *adjusted* R^2 demonstrates that

all three variables explain 10.2% of intershift recovery. It is demonstrated that females experience a decrease in intershift recovery compared to males (B = -11.2, p = 0.025). Those who work 12 hours or longer experience a decrease in intershift recovery compared to those who work less than 12 hours (B = -8.225, p = 0.025) , and for every unit increase in hours spent on schoolwork, is a decrease in one's ability to experience intershift recovery (B = -.454, p = 0.025).

Table 5

Multiple Regression Statistics for Chronic & Acute Fatigue & Intershift Recovery

Variable	*B*	*SE*	*β*	*t*	R^2	*Adjusted* R^2	*p*
Chronic Fatigue					.038	.031	.023
Additional Job	-9.091	3.961	-.196	-2.295			
Acute Fatigue					.043	.036	.016
Gender	9.726	3.970	.209	2.450			
Intershift Recovery					.122	.102	.025
Gender	-11.2	3.819	-.244	-2.933			
Shift Length	-8.225	3.091	-.227	-2.661			
Hours spent on schoolwork	-.454	.200	-.195	-2.270			

Note. Significance level of *p <0.05, *B*= unstandardized coefficient, *SE*= standard error, *β*= beta; *t* = test statistic; R^2 = the proportion of variance in the dependent variable explained by a group of independent variables, *Adjusted* R^2 = a more accurate estimate of relationships in the population (Polit, 2010, p. 397).

CHAPTER 5
DISCUSSION

Nurse fatigue is a serious threat to both nurse and patient safety (Han et al., 2014, p. 409). Nurses who work while fatigued have been shown to have significant deficits in their performance and reaction time, cause more patient errors, and experience more individual negative health effects (Bae, 2012; Geiger-Brown et al., 2012). Studies have found that overtime, extended work shifts, increased patient workload, shiftwork, inability to recover between shifts and sleep deprivation were all significant causes of fatigue (Admi et al., 2008; Bae, 2012a; Chen et al., 2014; CNA, 2009; Garett, 2008; Geiger-Brown et al, 2012; Olds & Clarke, 2010; Simone, 2009; West et al., 2007; Winwood, 2005). Several researchers have studied the affect that fatigue has on nurses, but there is limited research available on the affect fatigue has on nursing students. This study examined fatigue levels and predictors of acute fatigue, chronic fatigue and intershift recovery.

This section discusses responses provided from the participants and how they relate to current literature. The relationship between the studied variables and Betty Neuman's System Model is also discussed, as well as the identified gaps, limitations and implications for future nursing research.

Levels of Chronic Fatigue, Acute Fatigue and Intershift Recovery

Winwood (2005) stated that the OFER scale can be used an as an 'early warning system' to help individuals recognize if a problem exists in their balance of work and recovery (p.3). He warns that results may indicate that their current work and non-work practices are incompatible with continued health and well-being (p. 5). Therefore, it is

important to focus on the responses to the questions, which draw serious attention to the concerning levels of fatigue that fourth-year nursing students were experiencing and the effect it had on their learning process. Participants reported moderate-high levels of chronic and acute fatigue and low-moderate levels of intershift recovery. The three subscales must be examined separately, because each contains different factors which influence levels of fatigue.

Chronic fatigue. Chronic fatigue is the first subscale assessed in the OFER scale, representing questions one through five. It captures the mental, physical and emotional components associated with fatigue (Winwood et al., 2006, p. 382). In this study, one-fifth of students were experiencing high levels of chronic fatigue. The majority reported that they dread waking up to another day of work and that they often wondered how long they could keep going at their work. These responses are critical when considering the future profession of nursing. If students are questioning their ability to continue in nursing school, it is assumed that these feelings will only worsen, when faced with the many challenges associated with nursing.

Cho, Lee, Mark and Yun (2012) examined turnover rates in first jobs of newly graduated nurses in South Korea and of the 351 chosen study participants, 45% quit their first job (p. 66). Similarly, Halfer (2011) examined the turnover rates in 191 nurses, with one to three years of nursing experience, and one year later 12% had left their organization (p. 472). Han et al. (2014) discovered that nurses who reported higher levels of acute and chronic fatigue, reported higher levels of job dissatisfaction, which has been correlated with increased intent to leave. Liu et al. (2016) discovered that the most significant predictor for intent to leave among new nurses is work-related fatigue.

The nursing students in this study were weeks away from graduating, to begin studying for their registration examination, and start working as soon as possible. With the negative effects of the nursing shortage being well documented in the literature; it is crucial that students graduate from their programs determined to stay in the profession. It is recommended that actions are taken throughout all years of nursing school. Educating students on self-care, fatigue, and work life balances, along with preparing students for the cognitive, physical and psychosocial demands they will face, will improve their ability to cope with the challenges of nursing (CNA & RNAO, 2010).

Acute fatigue. Acute fatigue is assessed in the second-third of the OFER scale, and reflects an individuals' willingness, or ability, to engage in non-work activities (Winwood et al., 2006, p 382). The majority reported that they have little energy left after a work shift, that work drains their energy completely every day and that they usually feel exhausted when they get home from work. Almost one-third of participants reported high levels of acute fatigue. If students are exhausted when returning home from clinical, this can negatively impact their academic success, sleep habits, hobbies, and physical and mental well-being.

Rella et al. (2008) used the OFER scale to evaluate levels of fatigue in Australian nursing students. Results indicated that as nursing students progressed through their program, their levels of maladaptive fatigue worsened. Nursing students in this study were halfway through the term, but with no interventions in place to improve student nurse fatigue, it is assumed that they were graduating in an already fatigued state. In addition, after graduation, students begin to prepare for their registration exam. Most will seek work that requires applications, interviews and orientations. These additional

stressors raise the question of how can students recover from the demands of the baccalaureate program and effectively prepare for the difficulties they will face in the profession.

Intershift recovery. Intershift recovery is the final subscale measured in the OFER scale. It assesses how well an individual perceives they have recovered from acute work-related fatigue, before the start of their next shift (Winwood et al., 2006, p. 382). The lack of ability to recover between work shifts is detrimental to a nurses' health and plays a very important role in decreasing the risk of developing chronic fatigue (Winwood et al., 2005). More than half of the fourth-year nursing students in this study reported having a hard time recovering between shifts. Participants agreed that they never have enough time between shifts to recover their energy completely and they were often still fatigued by the time they started their next shift.

One reason which contributes to increased fatigue and decreased ability to recover is lack of sleep received between shifts. It is well documented in the literature that lack of sleep is harmful to an individuals' health (Matheson, O'Brien & Reid, 2014; Scott et al., 2007). There are several reasons why an individual may not receive an adequate amount of sleep; working extended shifts, working consecutive shifts and working shift work all contribute to sleep deprivation (Geiger-Brown et al., 2012). Sleep deprivation has been discovered to cause decreased reaction time and alertness in nurses (Geiger-Brown et al., 2012), which affects the care being provided to patients. Research examining the negative effects of sleep deprivation in nursing students is limited, therefore it is recommended that future research be completed in this area. It is important for the student and the patient, to ensure the patient receives safe care, and is free from

harm. It is also recommended that students be educated on effective ways to experience successful sleep. For example, purchasing dark blinds to aid in daytime sleeping for those who are working midnights. If students are unable to regain equilibrium and restore their energy completely, they are more likely to experience the negative effects of fatigue while in clinical, therefore jeopardizing the care they provide, and ultimately patient safety (CNA & RNAO, 2010.

Factors Which Influence Fatigue

In the literature review in Chapter 2, seven antecedents were found to have a significant effect on increasing levels of fatigue in RNs. Since this study involved nursing students (not RNs), only the variables that applied to the study population were examined. Therefore, nursing shortage and overtime were excluded. Outside responsibilities were examined to proxy for over time hours.

Two of the three hypotheses proved to be true. Students in hospital clinical placement had lower levels of intershift recovery than those in clinical placement, however there was no difference in levels of acute or chronic fatigue. Students who worked rotating shifts had lower levels of intershift recovery compared to those who worked strictly days, and students who had an additional job had a more difficult time recovering.

Significant factors

The results from the current study show that gender, having and additional job, hours spent on schoolwork and shift length are significant factors in predicting fatigue.

Gender. Gender played a significant role in predicting acute fatigue along with intershift recovery. Although the OFER scale is free of gender bias (Winwood et al.,

2005; Winwood et al., 2006), females in the current study showed significantly different levels of fatigue compared to males. Females' experienced higher levels of acute fatigue compared to males and also had a poorer time recovering between shifts. Although it is unclear why females and males experienced different levels of fatigue, a few assumptions can be discussed.

Bensing, Hulsman and Schreurs (1999) examined gender differences in fatigue and discovered that men and women display both subjective and objective differences in fatigue. Similar to the results from the current study, they discovered that men and women who complained about fatigue appeared to be younger with higher education. These findings correlate to the current study, as the mean age was 23, and the population was in their final semester of nursing school. Women expressed fatigue more often than men, with the highest rates in females who worked and cared for young children (Bensing et al., 1999). In this study, eight females reported that they lived with children, compared to four males who lived with children. In addition, Ferreira and Martino (2012) examined fatigue in nursing students, and discovered that men reported receiving more sleep per night than women. Lack of sleep is known contributing factor of fatigue, but levels of sleep was not compared between males and females in this study. Therefore, research examining gender differences in fatigue levels is limited, and it is recommended that more research be completed in this area to determine what influences male and female levels of fatigue.

Additional job and hours spent on schoolwork. In addition to gender, having a job, as well as hours spent on schoolwork were significant predictors of the study. Participants were asked to report whether they worked in addition to attending school.

The CNA and RNAO (2010) states that "fatigue is largely due to the relentless heavy workloads of nurses", which is why it is important to consider all of the contributing factors to fatigue (p. 1). Although students are not required to work overtime at their clinical placement, the hours they spend studying, preparing for school, and working, presumably equal more than 40 hours per week. Students in the current study could be at the same negative risks as RNs who work overtime.

Shift length. Shift length was discovered to be a significant factor in predicting fatigue. Although the original concept of nurses working longer shifts was an attempt to retain nurses (Rollins, 2015), results from this study, and other studies, indicate that longer work shifts can be hazardous to the nurse and the patient (Bae 2012b; Han et al., 2014; Keller, 2009).

Liu et al. (2016) studied fatigue and intent to leave in new nurses and found that those who worked longer than 10 hours experienced higher levels of acute and chronic fatigue, and lower levels of intershift recovery compared to those who worked less than 10 hours (p. 70). Similarly, Stimpfel et al. (2012) studied shift length and nurses' intent to leave and discovered that nurses who worked longer than 8-9-hour shifts were two and a half times more likely to be dissatisfied with their job (p. 2504). Participants in this study who worked 8-hour shifts demonstrated higher levels of intershift recovery, compared to those who worked 12-hours or more. It is important to consider these findings when evaluating nursing students level of fatigue, because it is imperative for them to graduate the program in a healthy state. Students graduating with reduced levels of fatigue will have greater opportunity to successfully adapt to new environments,

therefore decreasing turnover rates, and improving the problems organizations are facing from nursing shortages.

Other Findings of Interest

Clinical placement. As previously stated, participants who worked longer shifts had higher levels of fatigue compared to those who worked less. Therefore, it was assumed that students in hospital clinicals would experience higher levels of fatigue, since they are more often required to work longer shifts than students in community clinicals. However, based on the results, there was no significant difference between hospital and community placements.

Shiftwork. The participants in this study were asked to report which type of shift they were required to work for clinical. Based on the results, more than half of participants reported working rotating shifts, while less than half reported working strictly days. Rotating shifts in this study were defined as working a combination of days, afternoons and midnights. In addition to clinical placement, to the researcher's surprise, shiftwork was not a significant factor in predicting the three levels of fatigue in this study.

However, there are several studies which show that shiftwork plays a significant role in increasing levels of fatigue in nurses. Han et al. (2014) studied the effects of fatigue on hospital nurses working 12-hour shifts, and found that nurses who worked rotating shifts reported higher levels of acute fatigue compared to those who worked a consistent schedule. Dara, Tan, Taezoon and Tiek Whai (2016) explored shiftwork and fatigue in nurses and found that those who had the highest fatigue score were the nurses whose schedule consisted of working consecutive midnight shifts, followed by one day

recovery, then an afternoon shift (p. 6). This is often referred to as doubling back, or midnight-afternoon, where the nurse does not have sufficient time to recover from one shift (midnights) before starting their next shift the following day (afternoons). Although these studies examined nurses, and not nursing students, it is important to consider the effects that doubling back can have on the student nurse. By decreasing the amount of time a student has to recover between shifts, inadvertently increases their risk of developing sleep deprivation, therefore increasing their risk for developing fatigue. Not only is this detrimental to the individual, but increased levels of fatigue can also cause severe harm to the patient being cared for (Admi, 2008; Berger & Hobbs, 2006; CNA & RNAO, 2010; Garrett, 2008).

Sleep deprivation. Students who received less than eight hours of sleep at night reported higher levels of acute and chronic fatigue compared to students who received more than nine hours of sleep. However, contrary to what other studies have found, these results were insignificant in affecting levels of fatigue in nursing students. Geiger-Brown et al. (2012) discovered that nurses who work consecutive 12-hour shifts, receive inadequate amounts of sleep between shifts, worsening their levels of fatigue. They noted that most of the nurses in their study received less than 6 hours of sleep between shifts (p. 215). Owens (2007) discovered that individuals approximately lose one to four hours of sleep each night, for three nights, while rotating to a new shift. Grandner, Hale, More and Patel (2010) discovered that short sleep can be attributed to cardiovascular disease, cancer, diabetes and hypertension. It is imperative that nursing students have adequate amounts of time between shifts to recover, to allow for a healthy transition from a night to day schedule, to prevent sleep deprivation from occurring.

The CNA and RNAO (2010) discuss the importance of adequate rest periods to allow for individuals to have healthy sleep hygiene. The CNA and RNAO (2010) recommend establishing work schedules that allow for eight hours of uninterrupted sleep (p. 44). It is important that student nurses "understand the science of sleep, the risks associated with fatigue and circadian rhythms disturbances" (p. 3). Teaching student nurses the signs and symptoms of sleep deprivation, along with how to properly manage sleep deprivation, will limit the consequences they experience from fatigue (CNA & RNAO, 2010).

Application to Betty Neuman's System Model

The conceptual framework that was used for this study was the Betty Neuman's System Model (NSM) (Figure 1). The NSM was selected because it represents people who are subject to the impact of stressors (Neuman, 1982). In this study, stressors where considered all factors which influence fatigue. The factors that were studied include gender, age, clinical type (hospital or community), number of clinical days, clinical shift type (days, midnights, rotating), amount of sleep received before and between clinical shifts, if participants had additional jobs, were preparing for the NCLEX, participated in extracurricular activities and the number of hours they spent on schoolwork.

NSM was applied to the fourth-year nursing student, who was considered the central core of the model. The flexible lines of defense are the outermost layer of the model (Neuman, 1982), and work to protect the nursing student from experiencing the negative consequences associated with fatigue, by becoming activated and prevent the stressors from penetrating to the central core. An example of how a fourth-year nursing

student would prevent this from happening would be to choose to go to bed early, in order to receive an adequate amount of sleep and prevent levels of fatigue in the morning.

The second line of defense, which responds if the stressor penetrates through the flexible lines of defense, is referred to as the normal line of defense (Neuman, 1982). This defense is an individual's steady state, which has been developed over time, based on their ability to cope with previous stressors (Neuman, 1982). It is the responsibility of the normal lines of defense to react and allow the students to adapt and regain equilibrium. An example of how this can be accomplished is to limit the amount of activities and tasks that are scheduled after work, so that the student is able to rest and regain a state of wellness.

The NSM focuses on using interventions to reduce the impact that stressors have on an individual, to help maintain their optimal levels of function (Neuman, 1982). There are three levels of interventions that can be applied, including primary, secondary and tertiary prevention strategies (Neuman, 1982). For this study, no interventions were studied and no interventions were applied to help reduce the negative effects that students experience when fatigued. Therefore, it is recommended that future studies include the three levels of interventions, to monitor the student's ability to cope and adapt to fatigue, so solutions can be developed based on which stressors affect the student the most.

Implications and recommendations

Implications for students and faculty. Based on the findings from the current study, fourth-year nursing students are experiencing moderately-high levels of acute and chronic fatigue, and low-moderate levels of intershift recovery. Therefore, it is recommended that nursing faculty provide education on the demands of the program at

orientation for entry-level nurses, to prepare them for the challenges they will face in the future. The CNA and RNAO (2010) recommend that faculty educate students in recognizing and managing fatigue. It is imperative that education on managing fatigue be completed early in the baccalaureate program, to prevent students from graduating the program in a dangerously fatigued state. Educating students on the negative effects of working multiple shifts in the row, receiving inadequate amounts of sleep and working extended shifts may prevent maladaptive fatigue in the future (Witkoski & Vaughan-Dickson, 2010). In addition, it is encouraged that nurses do not work more than two-night shifts per week, in order to provide adequate rest in between shifts, therefore reducing levels of acute and chronic fatigue (Dara et al., 2016). It is important that faculty advocate for student nurses to have safe work schedules, to prevent the midnight-afternoon rotation, which can inhibit a nurses' ability to fully recover between shifts (Dara et al., 2016).

The CNA and RNAO (2010) recommend incorporating student fatigue into the curriculum, to provide information on how fatigue can impact course work and lifestyle. Developing policies related to the type of shifts students can work, along with the number of hours worked per week, may be a successful way in ensuring that high levels of student fatigue is prevented (CNA & RNAO, 2010). It is also recommended that policies be developed to ensure students are receiving adequate amounts of breaks and rest periods while in clinical (CNA & RNAO, 2010). It is important that student nurses be taught health promotion strategies, which will allow them to manager their fatigue in the clinical setting (CNA & RNAO, 2010).

It is recommended that nurse educators prepare students for the emotional and physical challenges that they may encounter as nurses, and teach them successful ways to cope with these experiences (Dwyer & Hunter-Revell, 2015). With the assistance from clinical instructors and professors, student nurses should be educated on the importance of maintaining a balanced life (CNA & RNAO, 2010), to help ensure these students refrain from experiencing negative coping consequences associated with fatigue. Preparing students for the emotional and physical challenges they will face as nurses, will improve their ability to prevent, recognize and manage fatigue, which will enhance their future career in nursing (CNA & RNAO, 2010).

Recommendations. Based on the results from this study, it is highly recommended that future research be done in student nurse fatigue. The current study indicates that fourth-year nursing students are experiencing moderately-high levels of fatigue midway through their final semester of school. Although participants were not re-evaluated at the end of the semester, it is hypothesized by the researcher that these students would likely be graduating in an already fatigued state. It is therefore recommended that future research be done longitudinally, examining the participant throughout the year, to determine if there are different factors which affect levels of fatigue, and if levels of fatigue vary.

In addition, it is recommended that research be done examining gender as a predictor of fatigue, and which factors may contribute to these results. Interviews and focus groups could examine in greater depth, the meaning of fatigue, and ways that nursing students experience fatigue. It is also recommended that researchers examine interventions that would aid students' ability to cope with fatigue. Based on those results,

future programs and services can be provided to students to ensure that they do not experience the negative consequences associated with fatigue.

There are several studies which examine how fatigue negatively effects nurse and patient safety (Keller, 2009; Matheson, O'Brien & Reid, 2014; Rogers et al., 2004; Stimpfel et al., 2012; Yumang-Ross & Burns, 2014). However, the researcher was unable to find any studies which examined the negative effects that fatigue has on nursing students. Therefore, it is also recommended that research be completed on the consequences of fatigue in nursing students. Nursing student fatigue levels could also be assessed as a contributing factor when a medication error occurs.

Winwood et al. (2006) recommended that fatigue be measured objectively. Winwood et al. (2006) suggested measuring absenteeism rates, along with stress hormonal levels, to confirm the accuracy of results from the OFER scale. Examining cortisol and nor-adrenaline levels can add further objective validation to the OFER scale (Winwood et al., 2005, p. 604). Findings from current and future studies are imperative to the health of the student, as well as the health of the patient. By determining if problems exist with fatigue, programs will be able to develop and implement interventions to help maintain safety of all.

Limitations

There are limitations to this study that need to be addressed. Due to resource and time constraints, the study was a cross-sectional design, examining one class of students, at one university, at one point during the semester. Data was collected on a Friday afternoon, in the middle of the semester, and therefore levels of fatigue may have been different if assessed at the beginning or end of the semester. Levels of fatigue that

students expressed were only a snap shot of information. Also, any student who was not present in class the day of data collection was unable to complete the questionnaire and were not included in the study.

Since the study examined fourth-year nursing students at one location, the results may not be generalizable to other years of students or students from other organizations. Also, these students were enrolled in a pilot theory course, which may have affected levels of fatigue, due to the degree of requirement for the course and changes from previous course offerings. Finally, only students enrolled in clinical were studied, eliminating differential results from students who were only enrolled in the theory course.

Conclusion

Fatigue is a critical and dangerous issue that seriously impacts both nurse and patient safety. There have been several studies to report these significant findings on registered nurses, but there is limited data available examining the impact that fatigue has on nursing students. This study was one of few to examine fatigue in nursing students, and confirmed that fatigue is present at moderately-high levels in fourth-year nursing students. These results are worrisome, as several authors have discovered that fatigue is a major contributor to high turnover rates and low retention rates in newly graduated nurses. Therefore, it is imperative to complete future research in this topic to develop and implement successful interventions to reduce the negative effects that fatigue has on nursing students. Future interventions will hopefully decrease the rates of future nurse fatigue, by developing successful health promotion strategies to reduce the negative effect of poor recovery in nursing students.

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Appendix A

First email invitation to participate in survey

You are asked to participate in a research study conducted by Kelly Riccardi under the supervision of Dr. Jamie Crawley and Dr. Michelle Freeman from the Faulty of Nursing. This research has been cleared by the University of Windsor Research Ethics Board.

The purpose of the research study is to explore perceived levels of fatigue and factors which influence fatigue in fourth year nursing students. If you volunteer to participate in this study, we would ask you to complete a survey, which will take approximately 10-15 minutes to complete in total, at the beginning of your Transitions into Practice class on February 17, 2017.

All students present in class, regardless if you decide to complete the survey, will be invited to enter into a draw for one of four $50 VISA gift cards. The e-mail you enter for the draw **will not** be tied to the data that you provide on the survey. The survey data will be anonymous and will be collected separately from the ballot you use for the survey.

No personal identification information will be asked on the data collection tools. All data collection tools will be coded with a study group label and participant number only.

Your participation in this survey is entirely voluntary and all of your responses will be kept confidential. You will be presented with a letter of consent before you begin the survey which will describe your rights as a participant in the study.

Thank you!
Kelly Riccardi

Appendix B

CONSENT TO PARTICIPATE IN RESEARCH

Title of Study: **Exploration of Perceived Levels of Fatigue in Fourth Year Nursing Students**

You are asked to participate in a research study conducted by Kelly Riccardi under the supervision of Dr. Jamie Crawley and Dr. Michelle Freeman from the Faulty of Nursing. If you have any questions or concerns about this research, please feel free to contact Kelly Riccardi at riccardk@uwindsor.ca or Dr. Jamie Crawley at jcrawley@uwindsor.ca or 519-235-3000 ext 4816. The results from this study will form the basis of an honours thesis research project.

PURPOSE OF THE STUDY

The purpose of the research study is to explore perceived levels of fatigue and demographic characteristics in fourth year nursing students.

PROCEDURES

If you volunteer to participate in this study, you will be asked to complete a survey. The survey will include questions about you, your preferred work location, the importance of certain job factors to you and how confident you are in achieving these factors in your first job in nursing. The survey takes approximately 10-15 minutes to complete.

POTENTIAL RISKS AND DISCOMFORTS

There is low psychological and social risk identified in the study as students may feel discomfort answering certain questions along with the dual-role risk identified with the researcher and the students. You may leave any answers blank that you do not feel comfortable answering. The researcher will not be present during data collection.

POTENTIAL BENEFITS TO PARTICIPANTS AND/OR TO SOCIETY

The benefits that you may gain from participating in the research study is improved awareness of one's level of fatigue. In addition, indirect benefits include contributing to nursing research to understand fatigue in fourth year nursing students in order to implement potential future interventions to promote optimal health in the nursing program

COMPENSATION

Participants will not receive payment for this study. However, all students present on the data of data collection will be entered into a draw to receive 1 of 4, 50$ VISA gift cards. Those entered will be done so in a confidential manner, with names and email addresses entered onto a several pieces of paper and placed into a ballot box by the participant.

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.

No personal identification information will be asked on the data collection tools. All data collection tools will be coded with a study group label and participant number only

The signed consent forms will be kept separate from the survey and only the researchers involved will have access to the data that you provide. You will place your consent into a brown envelope and seal it, and then the questionnaire will be placed into a separate envelope and sealed as well. You will hand your sealed envelopes to the Outstanding Scholar, the same individual who delivered the consents, questionnaires and envelopes, and they will be transported and locked in a cabinet in the nursing research office at the University of Windsor. The research team will be the only individuals who have access to the locked cabinet. Only the researcher and the researcher's committee, directly associated with this researcher, will have access to this data for the purpose of analysis.

Information from this study may be published at a later date, but only the group information will be discussed. Data will be retained for a period of 5 years, after the publication, in a secure place, after which will be disclosed of in a secure manner, e.g. shredded, and electronically deleted.

Information from this study may be published at a later date, but only the group information will be discussed.

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 your questionnaire at any time before they are collected. Once they

are collected they are anonymized and the researcher will be unable to identify your questionnaire since no personal identification information is asked. There will be no consequences for withdrawing your data. You may also 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 warrant in doing so.

FEEDBACK OF THE RESULTS OF THIS STUDY TO THE SUBJECTS

A summary of the study findings will be posted on the University of Windsor website under research findings.
Web address: www.uwindsor.ca/reb
Date when results are available: July 2017

SUBSEQUENT USE OF DATA

This data may be used in subsequent studies, in publications and in presentation

RIGHTS OF RESEARCH SUBJECTS

You may withdraw your consent at any time and discontinue participation without penalty. 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

SIGNATURE OF RESEARCH SUBJECT/LEGAL REPRESENTATIVE

I understand the information provided for the study **Exploration of Perceived Levels of Fatigue in Fourth Year Nursing Students** as described herein. My questions have been answered to my satisfaction, and I agree to participate in this study. I have been given a copy of this form.

_____
Name of Participant

_____ _____
Signature of Subject Date

SIGNATURE OF INVESTIGATOR

These are the terms under which I will conduct research.

_____ _____
Signature of Investigator Date

Appendix C

Questionnaire

1. What year were you born: _____

2. What is your gender:
   - ☐ Male
   - ☐ Female
   - ☐ Other (specify): _____

3. What is your living arrangement:
   - ☐ Alone
   - ☐ With Others (select all that apply)
     - ☐ Children, how many:_____
     - ☐ Spouse/Partner
     - ☐ Parents
     - ☐ Roommates
     - ☐ Other (Specify):_____

4. Are you currently enrolled in a clinical nursing experience?
   - ☐ Yes
   - ☐ No

   If yes, is it:
   - ☐ Community-Based

   Please state the agency:_____

   - ☐ Hospital-Based

   Please state the specialty: _____

5. What is your shift length in hours:
   - ☐ 8 hours
   - ☐ 12 hours
   - ☐ Other (Specify): _____

6. What type of shift/shifts are your required to work:
   - ☐ Days

☐ Afternoons

☐ Midnight

☐ Rotating (specify):_____

7. Please state your number of clinical nursing experience days per week:

☐ 1-2 days

☐ 2-3 days

☐ 3-5 days

☐ > 5 days

8. Do you have additional employment:

☐ Yes

How many hours a week, on average, do you work at your outside job:_____

☐ No

9. How many hours of sleep do you receive, on average, before a clinical nursing experience shift:

☐ < 6 hours

☐ 6 – 8 hours

☐ > 8 hours

10. How many hours of sleep do you receive, on average, between consecutive shifts of your clinical nursing experience:

☐ < 6 hours

☐ 6 – 8 hours

☐ > 8 hours

☐ My clinical nursing consecutive shifts are **not** on consecutive days

11. Approximately how many hours a week do you spend on extra-curricular activities (e.g volunteer, team sports):_____

12. Approximately how many hours a week do you spend on school work, clinical preparation (ie. looking up medications), and other clinical requirements (ie. CPE documentation/competencies): _____

13. How many hours per week are you spending preparing for the NCLEX?

_____

Appendix D

Permission to Use OFER Scale by Dr. Peter Winwood

Request for Use of OFER
Kelly Riccardi on September 29, 2016
to peter.winwood

Good Morning Dr. Winwood,

My name is Kelly Riccardi and I am a graduate student at the University of Windsor enrolled in my MScN. I have attached a letter outlining a request to use the OFER scale for my study, and would highly appreciate your permission to do so.

If you have and questions or concerns, please feel free to email me.
Thank you,
Kelly Riccardi

Peter Winwood September 30, 2016
To me

Dear Kelly
Many thanks for your kind request.
The OFER scale is becoming the 'go to ' measure for work related fatigue and recovery particularly in the Health industry. Its capacity to assess failure to recover is unique and important to assess the most significant underpinnings of the most serious health effects of work. .
It is a commercial instrument however.
Still , it is my practice not to change students license fees for its use..
It IS necessary to purchase the manual for the OFER however at a cost of $US 100.
If you would like to proceed please contact me again and I will send an invoice which can be paid with any credit card using PayPal.
Kind regards
Peter Winwood

Sent from my iPad
<Request for OFER.doc>

Kelly Riccardi October 4, 2016

to Peter

Hello Dr. Winwood,
After speaking with my thesis committee they agreed that purchasing the manual was a definite yes, because this tool fits my study the most.

How would you like me to pay? PayPal?

Thank you!

Peter Winwood October 6, 2016
to me

Hello Kelly
Herewith attached is your copy of the OFER Manual.
May I gently remind you that use of the OFER scale by students who are not charged licencing fees is contingent on their agreement NOT to share the scale or scoring key with any other person without the authors express permission.
To do so violates international copyright rules applicable to this material.
Very best of luck with your research; I hope to see it published in the learned literature in due course.
I am available per email to offer sidebar support if required.
Regards

Appendix E

Circle a number from 0-6: “Strongly Disagree” to “Strongly Agree” which best indicates your response.

*In this survey the word **work** refers to school, family and employment obligations.

*Please answer the following questions based on how you’ve felt since the **start** of the winter 2017 semester

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree or Disagree	Slightly Agree	Agree	Strongly Agree
1. I often feel I’m at the ‘at the end of my rope’ with **work**	0	1	2	3	4	5	6
2. I often dread waking up to another day of **work**	0	1	2	3	4	5	6
3. I often wonder how long I can keep going at my **work**	0	1	2	3	4	5	6
4. I feel that most of the time I’m just ‘living to **work**	0	1	2	3	4	5	6
5. Too much is expected of me in my **work**	0	1	2	3	4	5	6
6. After a work shift I have little energy left	0	1	2	3	4	5	6
7. I usually feel exhausted when I get home from **work**	0	1	2	3	4	5	6
8. My **work** drains my energy completely every day	0	1	2	3	4	5	6
9. I usually have lots of energy to give my family or friends	0	1	2	3	4	5	6
10. I usually have plenty of energy left for my hobbies and other activities after I finish work	0	1	2	3	4	5	6
11. I never have enough time between shifts to recover my energy completely	0	1	2	3	4	5	6
12 Even if I’m tired from my shift, I’m usually refreshed by the start of my next shift	0	1	2	3	4	5	6
13. I rarely recover my strength fully between shifts	0	1	2	3	4	5	6
14. Recovering from work fatigue between shifts isn’t a problem for me	0	1	2	3	4	5	6
15. I’m often still feeling fatigued from one shift by the time I start the next one	0	1	2	3	4	5	6

Vita Auctoris

NAME:	Kelly Riccardi
PLACE OF BIRTH:	Windsor, ON
YEAR OF BIRTH:	1991
EDUCATION:	St. Anne's High School, Lakeshore, ON, 2009
	University of Windsor, B.Sc.N, Windsor, ON, 2013
	University of Windsor, M.Sc.N, Windsor, ON, 2017