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## Examining the Effects of Nurse Work Hours, Inter-Shift Recovery, Fatigue, and Sleep Debt on Intent to Leave

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EXAMINING THE EFFECTS OF NURSE WORK HOURS, INTER-SHIFT  
RECOVERY, FATIGUE, AND SLEEP DEBT ON INTENT TO LEAVE

By

Amy M. Manderscheid

A THESIS

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## ABSTRACT

### EXAMINING THE EFFECTS OF NURSE WORK HOURS, INTER-SHIFT RECOVERY, FATIGUE, AND SLEEP DEBT ON INTENT TO LEAVE

By

Amy M. Manderscheid

The nursing profession contains dedicated professionals who work varying shifts with assorted timeframes to recover before returning to work. The purpose of this study was to examine shiftwork, inter-shift recovery, fatigue, sleep debt and intent to leave among full-time nurses. Data were collected through the use of electronic questionnaires from a sample of 36 registered nurses from the Sigma Theta Tau Kappa Epsilon Chapter-at-Large.

Findings revealed significant differences among nurses working 10 hour shifts and their accumulation of sleep debt in comparison to nurses working 8 or 12 hour shifts. Significant differences were not found between acute and chronic fatigue, and inter-shift recovery by shiftwork. However, several significant relationships were found between acute and chronic fatigue, inter-shift recovery and sleep debt. Additionally, significant differences were not found among acute and chronic fatigue, inter-shift recovery and sleep debt by intent to leave.

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## Table of Contents

List of Tables.....	vi
List of Figures.....	vii
List of Appendices.....	viii

### CHAPTER

1	INTRODUCTION.....	1
	Shiftwork.....	1
	Fatigue.....	2
	Fatigue in the Workplace.....	4
	Recovery.....	6
	Intent to Leave.....	7
	Purpose of the Study.....	8
2	CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW...	10
	Neuman Systems Model.....	10
	Review of Literature.....	15
	Shiftwork in Nursing.....	15
	Recovery.....	25
	Fatigue.....	33
	Intent to Leave.....	35
	Summary and Implications for Study.....	41
	Research Questions.....	41
	Definition of Terms.....	41
3	METHODOLOGY.....	43
	Research Design.....	43
	Sample and Setting.....	43
	Characteristics of the Sample.....	44
	Instruments.....	46
	Demographic Questionnaire.....	46

	Occupational Fatigue Exhaustion Recovery Scale....	46
	Intent to Leave.....	47
	Procedure.....	48
	Human Subjects Considerations.....	49
	Threats to Validity of Design.....	50
4	RESULTS.....	52
	Shiftwork.....	52
	Acute and Chronic Fatigue.....	53
	Inter-shift Recovery.....	53
	Sleep Hours and Sleep Debt.....	53
	Intent to Leave.....	54
	Research Question One.....	56
	Research Question Two.....	56
	Research Question Three.....	57
	Additional Analyses.....	58
	Comparison of Demographic Characteristics.....	58
	Shiftwork and Direct Care Providers.....	60
	Fatigue among Direct Care Providers.....	60
	Inter-shift Recovery among Direct Care Providers.....	60
	Sleep Hours and Sleep Debt among Direct Care Providers...	60
	Intent to Leave among Direct Care Providers.....	62
	Research Question One.....	63
	Research Question Two.....	64
	Research Question Three.....	64
5	DISCUSSION AND IMPLICATIONS.....	66
	Discussion of the Findings.....	66
	Research Question One.....	66
	Research Question Two.....	68
	Research Question Three.....	69
	Relationship of Findings to Previous Research.....	70
	Relationship of Findings to Conceptual Framework..	71
	Strengths, Limitations, and Recommendations.....	74
	Implications of the Study.....	75
	Significance to Nursing Administration.....	75
	Significance to Nursing Practice.....	77
	Significance to Nursing Education.....	78
	Significance to Nursing Research.....	78
	Conclusion.....	79
	APPENDICES.....	80
	REFERENCES.....	86

## List of Tables

### Table

1	Reliability Coefficients of the OFER.....	47
2	Reasons for Leaving Current Position.....	55
3	Correlation Matrix for Study Variables.....	57
4	Comparison of Age, Years of Experience and Years in Current Position.....	59
5	Sleep Hours among Direct Care Providers.....	61
6	Reasons for Leaving Current Nursing Positions.....	63
7	Correlation Coefficients among Direct Care Providers.....	65

## List of Figures

### Figure

1	Neuman Systems Model.....	11
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## List of Appendices

### Appendix

A	Demographic Data Questionnaire.....	80
B	Occupational Fatigue Exhaustion Recovery (OFER 15) Scale.....	82
C	Assessment of Nursing Intent.....	83
D	Cover Letter.....	84
E	Recruitment Flyer.....	85

## CHAPTER 1

### INTRODUCTION

The American culture has challenged the concept of corporate success through one's investment in long work hours and sacrifice of a healthy work-life balance. In turn, sacrifices made by individuals in our American culture have created lifestyles filled with sleep deprivation, disruption of circadian rhythms, and strain on one's physical and psychological states (Jansen, Kant, VanAmelsvoort, Nijhuis & VandenBrandt, 2003). This is often attributed to fatigue, shiftwork and the length of hours worked. In addition to issues concerning shiftwork, the length of recovery time needed for optimum performance is unknown. Furthermore, staff nurse retention in the healthcare industry is important, particularly as it relates to retention of nurses at the bedside.

#### *Shiftwork*

Due to social, economical, and technological changes in the past 10 years, the workforce has adapted to different forms of work schedules. Work schedules have changed in some industries to include flexible hours, irregular shifts and at times, elongated shifts (Jansen et al., 2003). Shiftwork may be defined as a job schedule other than the standard hours of 8am to 5pm (Institute for Work & Health, n.d.). Although many sources refer to shiftwork as time worked outside the standard working daytime hours, there are "shifts" that include daytime hours, specifically in healthcare and hospital

settings. Shiftwork in these settings usually revolve around 24 hour coverage, and is mostly characterized as 8 to 12 hours for full time employees.

Working hours, particularly in the nursing profession, are determined by shifts. Nursing shiftwork may be as little as four hours, or as high as 16 to 20 hours, with variable lengths of recovery in between. The traditional pattern of shiftwork in the nursing profession involves working different shifts or elongated shifts in an unpredictable pattern (Winwood, Winefield & Lushington, 2006). Yet, nursing work hours could influence workers' health in a variety of ways. They frequently contribute to disrupting circadian rhythms and impacting length of recovery time before a nurse returns to work. They also contribute to overall fatigue in the workplace, affecting nurses' vigilance and critical thinking (Tabone, 2004).

Shiftwork may be defined and examined in a variety of ways within the nursing profession, including type and duration of nurses' shifts. When combined with fatigue levels and inter-shift recovery, nurse work hours will be defined by duration of hours worked in shifts.

### *Fatigue*

Several descriptions of fatigue encompassing varying degrees of physical and psychological strain are described in the literature. Overall, fatigue serves as an indicator of an individual's response to physical and psychological demands (Ruggiero, 2003). It is also described by Ruggiero as a protective response to decreased capacity to maintain function. This particular response is often attributed to imbalance caused by psychological or physical stress (Strauss, n.d.), including sleep loss, inadequate recovery time, and the inability to maintain critical, creative thinking.

Only 60% of American women report they get adequate sleep a few nights per week, and 67% report frequently experiencing sleep problems (National Sleep Foundation, 2007). The National Sleep Foundation's Sleep in America poll in 2007 revealed that women often choose to put healthy activities last on their list of priorities as they struggle through daily challenges in their lives. One of the activities placed last on one's priority list is adequate sleep. The study also revealed that work related duties are the last priorities women would sacrifice when time is compromised or they feel sleepy (National Sleep Foundation). Consequently, sleep loss and experiences of fragmented sleep have led to fatigued individuals across the country.

Fatigue has been defined as one's states of drowsiness and sleepiness. These sleepy instances often result in physical impairment secondary to limited and fragmented sleep patterns (Fields & Loveridge, 1988). Ongoing fragmented and limited sleep patterns have contributed to insufficient recovery time and sleep deprivation that have factored into consequential slower response times, altered mood and motivation, reduced morale, and compromised initiative (Making Health Care Safer, 2001). Fragmented and limited sleep patterns may subsequently produce a sleep debt among individuals, specifically among health care workers. Acquisition of sleep debt is currently under investigation and research by organizations devoted to evaluating sleep patterns. According to the National Sleep Foundation, sleep debt is defined as the "accumulated sleep that is lost to poor sleep habits, sickness, and awakenings due to environmental factors or other causes" (National Sleep Foundation, 2008, section 3).

Sleep patterns have become of diligent concern when recognizing that pilots and healthcare providers experience disrupted circadian rhythms. According to the Federal

Aviation Administration (Strauss, n.d.), fatigue is not a mental state that can be overcome through motivation or discipline. Instead, fatigue is rooted in physiological mechanisms related to sleep, sleep loss, and circadian rhythms, which are of significant importance when conceptualizing recovery time. Recognizing sleep as a vital physiologic function is critical when noting its impact on errors and accidents. Fatigue, often the result of sleep loss and workload, is associated with approximately 100,000 vehicle accidents each year in addition to approximately 1,500 deaths in the United States (Tabone, 2004).

### *Fatigue in the Workplace*

Fatigue is a concern across the country, notably in the workplace. Workplaces have required an increased level of alertness, particularly as technology and expectations advance (Jansen et al., 2003). With increased demands on the workforce, such as extended work hours and additional responsibilities, fatigue may be of heightened concern particularly due to its effects on human performance. Extended work hours, reduced sleep hours and inadequate recovery are frequently related to undesirable outcomes involving shift workers. When physical or psychological strain and fatigue occur in the workforce, research suggests that job performance declines and several consequences occur (Tabone, 2004). Slowed reaction time, decreased alertness, weakened memory, impaired concentration, irritability and unsafe decision making are all factors that occur when an employee experiences fatigue in the workplace (Tabone).

The effect of sleep deprivation and highly compromised recovery periods have been shown to be equivalent to the performance effects of alcohol intoxication. In one study, performance after 24 hours of sustained wakefulness was equivalent to one's

functional capacity with a blood alcohol concentration of .10 percent (Dawson & Reid, 1997) exceeding the legal limit for operating a motor vehicle in most states.

By considering root causes related to this level of employee fatigue, an analysis suggests that work-related factors are a significant portion of the primary source. Long work hours, extended shifts and duty cycles contribute to heightened work-induced fatigue levels. These conditions have resulted in sleep deprivation and disrupted circadian rhythms in employees (Poissonnet & Veron, 2000). Thus, overall performance deficits yield poor occupation-related judgment, situation awareness, and decision making capabilities coupled with slower reaction times and impaired attention to detail (Strauss, n.d.).

When workers suffer from a decreased amount of quality sleep, work performance suffers (Golden & Jorgensen, 2002). Decreased levels of vigilance and attention to detail have resulted in heightened associated costs and elevated error rates. The National Commission on Sleep Disorders estimates that companies lose as much as \$150 billion per year due to employee fatigue (Golden & Jorgensen). When fatigue levels rise, lapses of attention to detail and compromised problem solving affect the workforce. These deficits are alarming in the hospital setting, particularly among nurses in direct care provider roles who suffer from compromised sleep and recovery periods.

Furthermore, current research indicates that workplace demands and decreased satisfaction with work performance affect an employee's overall level of satisfaction as well as influence one's intent to leave his/her position (Shirey, 2004). This is evident in the nursing profession as well. When a nurse feels overworked and fatigued, or unable to perform his/her duties secondary to heightened workload, job satisfaction subsequently

decreases. When job satisfaction begins to fall, intent to leave one's current position becomes more likely (Lynn & Redman, 2005).

### *Recovery*

Need for recovery from work is defined as the need to recuperate from work-induced fatigue, primarily experienced after a day of work. This entails the intensity of work-induced fatigue, both mental and physical, as well as the time period required to return to a normal or pre-stressor level of functioning (Jansen, Kant & VandenBrandt, 2002). Recovery from work is determined by length of time between shifts to allow for adequate rest and to recuperate from work-induced fatigue. One of the important factors when considering recovery time is the actual window of time available to recover from work. Working too many consecutive shifts, having short rest periods between shifts or sacrificing days off can negatively impact the opportunity to fully recover from work-induced fatigue (Jansen et al., 2003).

Recovery time in the nursing profession has been gaining attention from nurse researchers throughout the last several years. Although the Institute of Medicine (IOM) report (2004) recommended that nurses work no more than 12 hours per day with a maximum of 60 hours per week, nurses frequently work several consecutive 12 hour shifts, with some organizations supporting 12 hour shifts for 7 consecutive workdays. Shiftwork hours, coupled with inadequate recovery time may lead to dissatisfaction and ultimately, the intent to leave one's nursing position or the profession.

Job satisfaction is crucial to consider when investigating ways to improve nursing retention (Ruggiero, 2005). An adequate staff nurse workforce is vital to patient safety, job satisfaction and nurse retention. Additionally, adequate staffing in patient care units

decreases the overall intent to leave the profession and ultimately contributes to career satisfaction as a direct care provider (Larrabee et al., 2003).

### *Intent to Leave*

Employee retention is important among corporations around the world. Generally, employee retention is characterized by one's commitment to the organization or occupation (VanderHeijden, VanDam & Hasselhorn, 2007). Human resource departments monitor retention closely and identify methods to keep vacancy rates low and turnover rates favorable to the organization. This is also true in healthcare. As the nursing profession embarks on an unprecedented shortage, nurse retention becomes vital to the future of health care delivery.

Compared to other occupational groups, nurses tend to leave the profession at a much greater rate (VanderHeijden et al., 2007). Because retention of nurses is a critical issue for the nursing profession, studying factors that affect intent to leave is essential (Lynn & Redman, 2005).

Nurse retention among those in direct care provider roles may be described as the desire of remaining as a staff nurse in one's current role. Staff nurse retention is beginning to receive greater attention as turnover rates and the intent to leave become prevalent. The average age of the Registered Nurse (RN) workforce is 45 years old, making nursing the oldest professional group in the United States (Lynn & Redman, 2005). Given that most nurses fall within the baby boomer age bracket, nurses are retiring faster than educational programs are able to replace them. Fewer people are choosing nursing as a career, and more nurses are choosing positions outside of nursing. Moreover, between 1992 and 2000, there was a 28% increase in the number of nurses who choose



non-nursing positions because of a variety of dissatisfying factors within the profession (Lynn & Redman). Furthermore, nurses who graduated or have been in their current position for less than five years are more likely to indicate an intent to leave (Larrabee et al., 2003).

As the nursing profession continues forward, it is imperative to promote the retention of nurses. Thus, it is crucial to increase insight into the processes and factors underlying nurses' intent to leave their positions as well as the profession at large (VanderHeijden et al., 2007). Intent to leave is defined as the number of times a nurse reports that he/she has seriously looked for another job while working at the hospital. Specific attributes, such as shiftwork, that are under administrative control have been suggested to influence a nurse's intent to leave his/her position.

Weisman, Alexander and Chase (1981) found that two thirds of resigning nurses left their current positions for jobs in clinical nursing at other hospitals. This particular finding suggests that most nurses desire to remain in the role, the organization or the profession (Weisman et al.). In contrast, Lynn and Redman (2005) found that 27% of the respondents in their study preferred not to work. This is a disturbing finding, given that the market shortage is already occurring. While past research has indicated a proportion of nurses who prefer not to work, it has generally been reported at much lower levels (Lynn & Redman).

### *Purpose of the Study*

Many factors may contribute to nursing retention and intent to leave, including one's levels of fatigue related to shiftwork and recovery time. In the nursing profession, it is particularly critical to evaluate nurses' intent to leave their bedside nursing positions

related to their level of fatigue. By doing so, opportunities to reduce work-related fatigue and compromised recovery periods that improve retention rates may become apparent. Therefore, the purpose of this study is to explore the relationships among shiftwork, recovery time, fatigue, sleep debt, and registered nurses' intent to leave their nursing position or the nursing profession.

## CHAPTER 2

### CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

The knowledge base of factors contributing to registered nurses leaving staff nurse positions has grown substantially in recent years through research studies and publications. Predictors of nurse turnover have included ones' intent to leave their position for various reasons, including burnout, job satisfaction, organizational commitment and financial status (Lynn & Redman, 2005). Shiftwork, fatigue and recovery time are stressors in their own context, and need to be examined to determine if they contribute to a nurse's decision to leave his/her position.

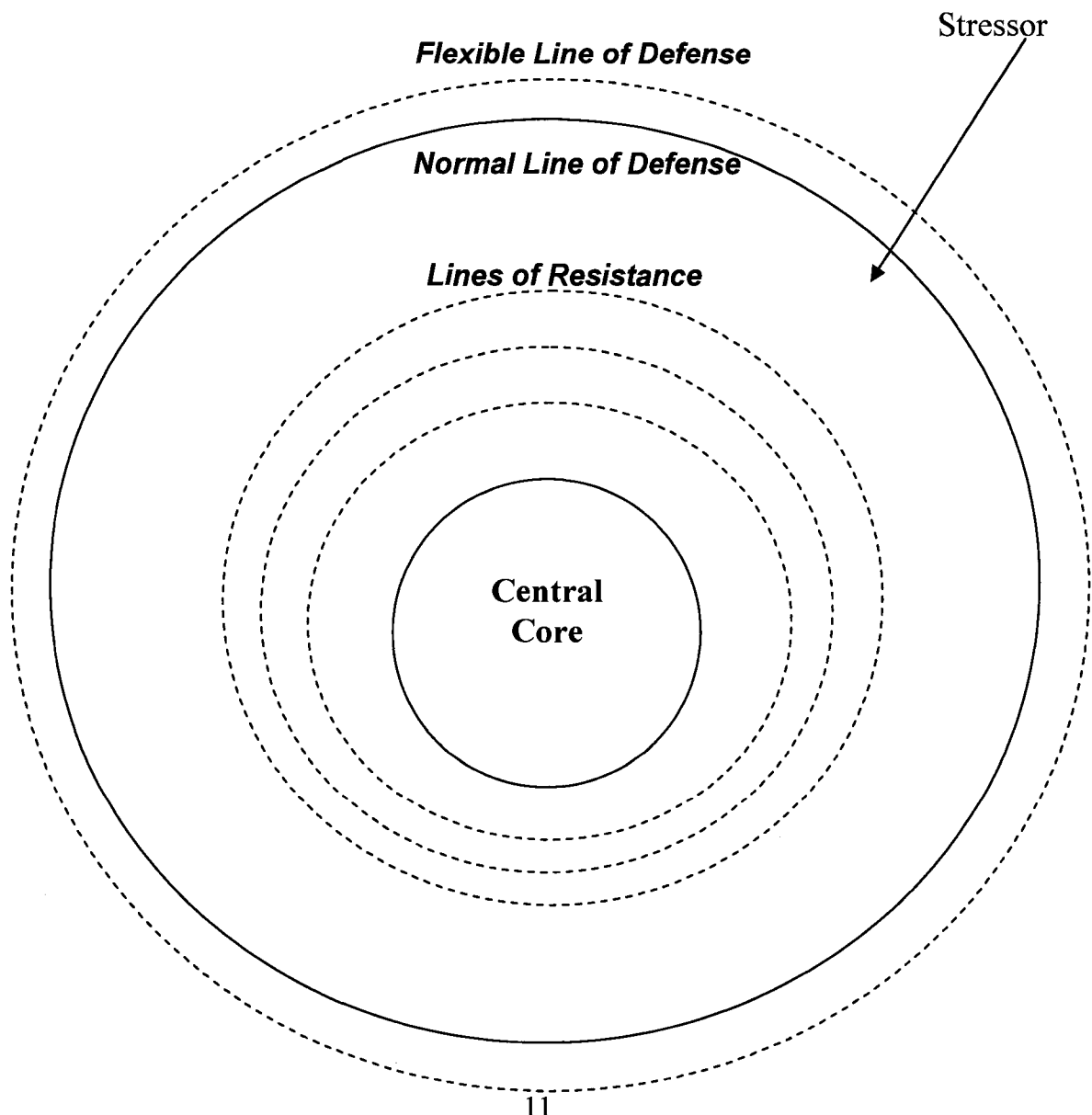
#### Neuman Systems Model

In the Neuman Systems Model (NSM), dynamic relationships among an individual, stressors, and the environment are depicted. The NSM (Figure 1) is utilized within this study to examine and explore relationships among shiftwork, recovery periods and nurses' intent to leave their positions.

The NSM focuses on how stress and the reactions from stress affect development as well as health maintenance. It uses a systems approach that is focused on the human needs of protection and the relief of reactions from stress. In particular, the NSM focuses on facilitating optimal client system stability among several components including

physiology, psychology, socioculturalism, development and spiritual variables. In Neuman's words, "Ideally the five variables function harmoniously or are stable in relation to internal and external environmental stressor influences" (Neuman & Fawcett, 2002, p. 17). According to Neuman, one component should not be isolated. As a single variable influences the whole, likewise, the patterns of the whole influence the single part (Neuman & Fawcett).

*Figure 1.* Neuman Systems Model



The NSM includes key elements known as the central core, flexible line of defense, normal line of defense, and lines of resistance. The central core consists of basic survival factors and baseline characteristics. Unique features or baseline characteristics may include adequate rest an individual needs before returning to the workplace. When these characteristics are disrupted, system stability is in jeopardy. The individual will attempt to correct the disruption until baseline characteristics are regained (Neuman & Fawcett, 2002).

The flexible line of defense is the first protective layer that prevents stressors from invading the central core or baseline wellness condition. It is dynamic and accordion-like in function; when expanding away from the normal defense line, greater protection is provided. When drawing closer, less protection is available. The flexible line of defense can be rapidly altered in conditions entailing undernutrition, sleep loss, or dehydration (Neuman & Fawcett, 2002).

The NSM also includes the normal line of defense and lines of resistance. Each individual has normal range of responses to the environment, which is considered a wellness/stability state. The normal line of defense is the result of these environmental stressors, as well as previous behavior. It also represents change over time through coping with diverse stressful encounters. As a result, the normal line of defense defines and maintains the stability and integrity of the central core (Neuman & Fawcett, 2002). In addition, lines of resistance serve as protective mechanisms between the normal line of defense and the central core. They serve as stabilizers and protective agents of the central core, and contain information that support the client's basic needs, ultimately protecting

central core integrity. In reference to Neuman's work, inability of the lines of resistance to guard and protect the core structure could subsequently lead to energy depletion and death (Neuman & Fawcett, 2002).

The NSM provides an explanation of stressors and the body's reaction. Each person is constantly affected by stressors from the internal and external environment. Stressors, known as tension producing stimuli, may potentially disturb a person's equilibrium. Neuman identifies three stressors by their source, intrapersonal (arises within the person), interpersonal (arises between persons) and extrapersonal (arises outside the person in the external environment). Neuman further explains that resistance to stressors is provided by a flexible line of defense; a "protective buffer" reflecting the person's condition, spiritual beliefs, developmental state, cognitive skills, age, and gender (Neuman & Fawcett, 2002). These particular variables determine the person's overall resistance to stressors. As stressors interact with an individual and the state of equilibrium, flexible lines of defense are encountered. Stressors, such as shiftwork and recovery time, may impact a nurse's normal line of defense. When these two variables lead to system instability and core disruption, a nurse may decide to leave his/her position, the organization or the profession.

According to Neuman, if a stressor breaks through the flexible line of defense, it disturbs the individual's equilibrium, and triggers a reaction. The reaction may lead toward restoration or a decline, depending on internal lines of resistance that attempt to restore balance. The reaction to the stressor and the prognosis are influenced by the number and strength of the stressors affecting the person, the length of time the person is affected, and the meaningfulness of the stressor to the person. Ultimately, Neuman

intends for the client to “retain, attain or maintain optimal system stability” (Neuman & Fawcett, 2002, p. 25).

The NSM includes the concepts of primary, secondary and tertiary prevention. Primary prevention encompasses directing energy to diminish stressors or reinforce the flexible lines of defense. This level of prevention focuses on providing additional protection for the individual’s baseline level of performance. Primary prevention is appropriate before the individual is in contact with a stressor. Objectives of secondary prevention strategies include intervention after the normal lines of defense have been breached. This treatment approach would target the need for additional protection and begin to repair the normal lines of defense to regain optimal system stability. After restoration and repair have occurred, tertiary prevention strategies focus on methods to prevent further stressor penetration and support restoration of one’s level of functioning. Tertiary prevention accompanies restoration of balance as the individual recovers from stress related causal agents.

The concepts and relationships within the NSM are congruent with the variables of interest under investigation. The central core in this study is nurse retention, as the intent to leave is measured among nurses. The flexible line of defense, normal line of defense and lines of resistance prevent stressor penetration and disruption of the central core. In this research study, stressors are identified as duration of nursing shiftwork and length/adequacy of inter-shift recovery with associated fatigue and sleep deprivation. The less recovery obtained by a nurse, coupled with shiftwork, may contribute to strained lines of resistance, with potential jeopardy to the central core (nurse retention). If stressors penetrate through lines of resistance and damage the central core, nurses may

subsequently intend to leave their positions. Overall, these stressors may disturb equilibrium of nurse retention, therefore, consequently increasing nurses' desire to leave their positions.

Primary prevention is needed before the individual is in contact with such a stressor. An example of primary prevention includes diminishing overtime hours while augmenting recovery time between shifts. Secondary prevention of stressors includes several strategies. Treatment of the stressors may include promoting retention through improving work hours, shift duration, and increasing inter-shift recovery. By augmenting inter-shift recovery, sleep debt and fatigue may subsequently diminish. When treatment occurs and is maintained, the restoration of balance may be achieved through tertiary prevention.

#### Review of Literature

The literature review primarily focuses on the independent variables, identified as shiftwork, fatigue and recovery, specifically as they affect registered nurses. Shiftwork and shift patterns are presented and explored with correlating consequences as suggested in the literature. The "recovery" variable is also considered by examining several studies. In addition, the dependent variable, identified as the intent to leave, is explored with several sources of literature. Although several studies were conducted in North America and the United States, some studies included in the literature review involve nurses in Australia, the Netherlands, and England.

#### *Shiftwork in Nursing*

Throughout the last two decades, American employees have been "clocking" more hours on the job than in years past. It is believed that Americans work more than



workers in any other industrialized country (Golden & Jorgensen, 2002). This is true in the nursing profession as shiftwork is the primary scheduling approach used for nurses at the bedside. However, shiftwork in the nursing profession may pose threats to patients more than anticipated. In 2004, the American Nurses Association (ANA) praised a study that suggests a strong link between nurses' long work hours and patient safety. According to a study conducted by Rogers, Hwang, Scott, Aiken, and Dinges (2004), patient safety is a significant concern when nurses' shift work exceeds 12 consecutive hours, includes significant overtime, or nurses work more than 40 hours per week. Logbooks completed by a total of 393 hospital staff nurses revealed approximately 40% of 5,317 shifts worked exceeded 12 hours. It is important to note that approximately 30% of originally scheduled shifts were 12 or more hours in duration, compared to the 40% that were actually worked. In addition, long shifts exceeding 12 hours increased the likelihood of errors or near-errors, which could compromise patient safety. This study reinforced findings from the 2004 Institute of Medicine Report titled, "Keeping Patients Safe: Transforming the Work Environment of Nurses" which revealed nurses' long work hours threaten the safety of patients.

Since the 1990s, the health care sector has endured many changes, including restructuring and downsizing. It is estimated that 20% to 25% of the general population work outside typical business hours. This includes healthcare providers, and specifically registered nurses at the bedside. A variety of shifts exist to satisfy hospital nurse staffing, which often consist of 8, 10 and 12 hour shifts throughout various times of day. There is widespread belief that longer shifts, such as 12 hours, may provide improved

communication and less time spent at change of shift when handoffs occur (Kilpatrick & Lavoie-Tremblay, 2006).

Kilpatrick and Lavoie-Tremblay (2006) narratively explore how shiftwork relates to physiologic changes, performance and possible solutions to maximize the effectiveness of shiftwork. This literature synthesis examines shiftwork by evaluating many sources on the topic. Prolonged shiftwork has crucial impact on employee health and sleep patterns. It is known that shiftwork alters the body's normal circadian rhythms and is thought to alter several body systems. Temperature, blood pressure, mental alertness, and the synthesis and secretion of hormones are affected. Job-related stress, including shiftwork, is believed to be linked to health repercussions including cardiovascular, mental and reproductive health. Job related stress is also higher in nurses working in rotating shift patterns than nurses who work fixed day, afternoon or night shifts. These nurses reported higher burnout, lower work satisfaction and "expressed a greater willingness to leave the workplace" than fixed shift nurses (Kilpatrick & Lavoie-Tremblay, 2006).

In a study by Fitzpatrick, While and Roberts (1999), nurses in their first year of practice (n = 34) were observed to examine shiftwork and its impact on nurse performance. Approximately half of the nurses participating in this study worked 8 hour shifts (52%) while the remaining half worked 12 hour shifts. King's nurse performance scale was utilized to measure physical, psychosocial, professional, communication, and care management domains. A Kruskal-Wallis test was used to examine differences between shift duration, clinical performance, time of shift and nurse performance. This study revealed that nurses working a shift of 8 hours or less achieved a higher overall clinical performance score than nurses who worked 12 hour shifts (p = .04). According to

Fitzpatrick et al., it is possible that factors such as mental and physical fatigue may have inhibited nurses' overall performance in shifts longer than 8 hours. Additionally, if fatigue affects the performance of nurses working longer shifts, diminished performance levels may be compounded if a nurse works several consecutive longer shifts.

A strength of this study includes an examination of participants at the same level of clinical experience in their first year of practice. It would be important for future research to examine other shiftwork variables such as pattern, scheduling, duration of shift and number of consecutive shifts worked into the research design for further exploration. The impact of shiftwork upon process (quality of care), nurse outcomes, patient care (length of stay, satisfaction) and organizational effectiveness (absenteeism, productivity) should be included in future studies as well (Fitzpatrick et al., 1999). However, a major limitation in this study is the exclusion of diverse years of experience and expertise.

In a 2003 study by Ruggiero, a national, random sample of critical care nurses (n = 247) was performed to examine their perceptions of their shift and work schedules. Participants ranged in age from 24 to 63 years. Most (85%, n = 211) identified their ethnicity as European-American, with the remaining 15% identified as Asian-Pacific, African American or Hispanic. Most participants (72%, n = 181) worked 12 hour shifts, 22% (n = 55) worked 8 hour shifts, and 6% (n = 11) worked 10 hour shifts. Shift assignments entailed day/evening (40%, n = 99), night shift (32%, n = 77), and rotating shift (28%, n = 71).

Several tools were utilized to measure and analyze findings from the study. Ruggiero's descriptive study entailed use of the Standard Shiftwork Index Chronic

Fatigue Scale, Pittsburgh Sleep Quality Index to measure global sleep quality, Beck Depression Inventory-II to measure depression, and the Beck Anxiety Inventory to measure anxiety among bedside nurses. Based on the findings, shiftwork impacted sleep, circadian rhythms, and fatigue. Sixty-eight percent of the nurses in this study met the criteria for poor sleep patterns. In addition, permanent night nurses had significantly more depression and worse sleep quality than nurses who worked during the day (Ruggiero, 2003).

Furthermore, chronic fatigue was positively correlated in nurses with poor sleep quality ( $r = 0.13$ ), depression ( $r = 0.63$ ) and anxiety ( $r = 0.46$ ) (Ruggiero, 2003). Ruggiero also found that nurses who worked day hours and those who worked night hours had the same level of chronic fatigue. However, similar fatigue levels in day and night nurses may be attributed to similar shift duties in the critical care environment. Overall, both day and night critical care nurses reported poorer sleep quality than non-shift workers in different occupations (Ruggiero). Research findings may suggest that the critical care environment may be viewed as a stressor impacting sleep and adequate rest.

Respondents specifically answered two questions from the Standard Shiftwork Index about advantages and disadvantages of their shift system. Four hundred twenty five responses were analyzed qualitatively and themes were identified. Regardless of shift, most participants expressed dissatisfaction with working mandated overtime, irregular shift schedules and rotating shifts. In addition, nurse participants reported dissatisfaction with working holidays and weekends. Although sleep and circadian rhythm disruptions were mostly reported by nurses working night shifts, some day/evening nurses also

voiced complaints attributing their sleep disturbance to early wake hours, or retiring too late in the evening (Ruggiero, 2003).

One of the limitations of Ruggiero's (2003) study includes lack of data about nurses' choice of shift. Additionally, the descriptive, cross sectional nature of this study excludes the exploration of causality. However, the findings of this study support the need to explore the relationships among work schedules, sleep problems, and fatigue. Additional information as it relates to these topics could facilitate innovative solutions to current scheduling issues and fatigue management.

Nurses have been greatly affected by some of the changes in healthcare over the past decade attributed measures to decrease costs, resulting in extended work shifts. Extended work schedules, those that vary from 35-40 hours per week and eight hours a day, include longer shifts, irregular schedules and on-call requirements. The use of extended work schedules, compounded by the worsening nursing shortage, is becoming problematic for the nursing profession. A study performed by Trinkoff, Geiger-Brown, Brady, Lipscomb and Muntaner (2006) sought to describe the nature and prevalence of extended work schedules across the nursing profession. Survey data collection occurred between November 2002 and March 2003, as a part of a longitudinal design supported by the National Institute of Occupational Safety and Health. The sample (n = 2273), consisting of randomly selected participants, was predominantly female (95%), white (86%) and married (73%), with a mean age of 45 years. Furthermore, four subgroups within the sample were identified as hospital staff nurses (n = 1020, 44.9%), nurses who held more than one job (n = 440, 19.4%), nurses who were single parents (n = 188, 8.4%), and nurses 50 years of age and older (n = 865, 38%).

The study was performed using the Standard Shiftwork Index, which has been utilized internationally to standardize self-reporting measures in shiftwork research. In reporting work schedules, participating registered nurses were requested to consider their typical work schedule within the previous six months, in order to remain as consistent as possible without reflecting on recent unusual occurrences. Nurses were requested to report the hours they actually worked instead of what they were scheduled to work. Their reports included overtime, as well as any other extensions onto their originally scheduled shifts including length of shift, most days worked in a row without a day off, whether they worked more than one job, “off shifts,” and whether they had on-call requirement (Trinkoff et al., 2006).

The results indicated that 17% of hospital staff nurses, 4% of managers, and 7% of advanced practice nurses exceeded the Institute of Medicine’s (IOM) proposed work-time guidelines on a regular basis. Compared with nurses in other workplaces, hospital staff nurses most frequently worked more than 12 hours per day. Additionally, 4% of staff nurses (most of them working in the hospital setting) exceeded the IOM recommendation of a maximum 60-hour work week. Overall, a substantial proportion of nurses reported working schedules that conflict with the IOM recommendations in regard to long work hours, few days off, and little time off between workdays (Trinkoff et al., 2006). Trinkoff et al. concluded that the extension of nursing schedules beyond what nurses can reasonably and comfortably fulfill is discouraging many nurses from remaining in the profession.

Recommendations from this study urge health care providers and legislators to recognize the limits within which bedside nurses can practice safely. Nurses prefer

working in environments with predictable work hours, schedules and appropriate patient loads. Provision of more healthful scheduling with minimal overtime may address a component of the nursing shortage by retaining and attracting nurses within the nursing profession (Trinkoff et al., 2006).

Hoffman and Scott (2003) explored career satisfaction differences by shift length in hospital staff nurses. Using a descriptive cross-sectional research design, a random sample of 500 nurses in the state of Michigan was selected. The study included nurses who only worked in a hospital setting, employed at least part time, and were scheduled to work shift patterns of 8, 10 or 12 hours in length. The response rate exceeded 50%, with 252 nurses responding to the original 500 mailed packets. The Nursing Stress Scale (NSS) and Index of Work Satisfaction (IWS) were used to collect the study data. Reliability analysis in regard to the NSS revealed a coefficient alpha of 0.92. The career satisfaction portion of the IWS revealed a coefficient alpha of 0.92, with the other subscales ranging from 0.49 (professional status) to 0.90 (pay).

Findings from Hoffman and Scott (2003) suggest that staff nurses in shiftwork patterns experience greater professional fulfillment when autonomy, pay and professional status are valued and promoted in the nursing environment. Although nurses classified salary levels as an imperative source of career satisfaction, the 8-hour nurses were more satisfied with their current salary. However, nurses who worked 12-hour shifts obtained greater satisfaction in regard to professional status than nurses who worked 8-hour shifts. Overall, study results reveal that nurses working 8 and 12 hour shifts did not report differences in their level of career satisfaction (Hoffman & Scott).

Although no significant differences in role stress were reported between nurses working 8 and 12 hour shifts, Hoffman and Scott (2003) discuss revelations from an initial analysis that describe increased stress levels among nurses with less work experience as compared to their colleagues. The authors comment that new graduate nurses are mostly employed in 12-hour shift patterns. When combined with the “unpredictable nature of the practice setting,” less experienced nurses may perceive greater levels of stress (Hoffman & Scott, 2003, p. 341). New graduate nurses may not have developed adequate, functional flexible lines of defense, normal lines of defense and lines of resistance related to stress management in the workplace.

When coupling fatigue with the unpredictable nature of the work environment in 12-hour shifts, and a lesser amount of nursing experience, stressors become more prevalent in staff nurses. The longer shift nurses work, the more fatiguing practice may become in the clinical setting. Furthermore, nurses in this study indicated an increase in role stress, with a corresponding decrease in career satisfaction. This is important to recognize in the nursing profession as it may lead to burnout, leaving one’s position and turnover; and ultimately contribute to the growing nursing shortage (Hoffman & Scott, 2003).

Shiftwork continues to be linked to a variety of health conditions. The health effects of work schedules in healthcare professionals are noteworthy. Increasing variation in work patterns and new shift schedules have raised concern about the quality of life and job performance in the healthcare setting. Poissonnet and Veron (2000) completed a systematic review of the literature on the effects of irregular schedules in healthcare professionals. Although Poissonnet and Veron did not pinpoint conclusive evidence on



any specific work systems, they discovered that extended workdays between 9 and 12 hours in length should be avoided. Increased hours in a work environment with high physical and psychosocial demands can adversely affect the health of bedside nurses providing patient care. Physical and mental health, in addition to sleep, job performance, and psychosocial well-being are all listed as adverse effects secondary to shiftwork in the health profession.

In addition to long work hours and extended days, high workload and psychological strain are important factors to note when considering the combination of shiftwork and recovery in the nursing profession. Chronic stress is known to negatively affect neurologic, immune, musculoskeletal and cardiovascular systems (Trinkoff et al., 2006). Higher levels of burnout and intent to leave nursing were present in nurses (n = 392) working rotating shifts than found among those in fixed-shift positions (Krausz & Koslowsky, 1995). These results were in accordance to those published earlier by Jammal and Baba (1992).

If burnout and intent to leave are indeed noticeable consequences to shiftwork and lack of recovery in the nursing profession, then Neuman's central core's integrity has become further threatened. In addition to these concerns impacting nurses, the overall concept is influencing the profession as well. The central core and energy resources within the nursing profession as a whole are becoming increasingly endangered and susceptible to harm if nurses are leaving the profession secondary to shiftwork, inadequate recovery and health problems secondary to chronic stress.

## *Recovery*

Recovery is gaining increasing attention in the literature as it relates to productivity and other correlating factors in the work environment. In a study completed by the National Sleep Foundation (2007), telephone interviews were conducted in the fall of 2006 to a random sample of women between ages of 18 and 64. Findings show that on average, respondents (n = 1003) reported approximately seven hours of sleep per night, less than the eight hours of recommended sleep required for superior performance, safety and health (National Sleep Foundation). In a 2001 poll by the National Sleep Foundation, it was found that those who work sleep significantly less than individuals who do not work. This is particularly true in individuals who work more than 40 hours per week. Interestingly, 38% of respondents reported working 50 hours or more per week; thus, further decreasing the amount of sleep and recovery time. Additionally, those who reported working more than 40 hours per week also reported more sleepiness during awake time, as well as insomnia and other sleep disorders (National Sleep Foundation).

Recovery is particularly important as it relates to shiftwork. Minors and Waterhouse (1981) found that circadian rhythms are influenced by both internal and external factors. According to Minors and Waterhouse, studies have shown that humans are diurnal; their “clocks” replicate the 24-hour sequence of day and night produced by the earth as it spins on its axis. The majority of biochemical, physiological, and behavioral processes (adrenaline release, mood, sleep-wake cycle) have cyclical circadian rhythms interacting with one another. In fact, the natural rhythm for secretion of the sleep-dependent hormone and low levels of time-dependent corticosteroids and adrenaline is during the night, with high levels of corticosteroids and adrenaline being

released during the day. Any type of shiftwork interrupting time when one normally sleeps will affect these biological rhythms. These findings are particularly noteworthy when considering night workers have reduced restorative value of their recovery and sleep times when adrenaline release is at its peak. Conversely, low levels of these hormones during the night when night shift staff are working may cause workers to be less efficient (Oswald, 1980).

In an Australian study completed by Winwood et al. (2006), the relationships between work-related fatigue, recovery, age, domestic responsibilities, and shiftwork in full-time female nurses were examined. A questionnaire was distributed in 2004 to a total of 2400 nurses employed at two hospitals in Australia. The authors received a 54% return rate of the distributed questionnaires. Of the 1280 responses, 846 nurses reported working full time; the remaining responses were excluded from this study based on hypothesis statements.

Winwood et al. (2006) included two hypotheses in their study. The first hypothesis was, “Among full time working nurses, older, partnered nurses with dependents would report lower levels of recovery between shifts and higher fatigue compared with younger nurses without dependents” (p. 440). The second hypothesis was, “Regularly working a rotation of different shifts, particularly including night duty, would be associated with lower recovery and higher maladaptive fatigue (independent of age and domestic responsibilities) compared with regularly working a single predictable day shift” (p. 440).

Participants of Winwood et al.’s (2006) study completed the Occupational Fatigue Exhaustion Recovery scale (OFER). This particular tool evaluated levels of fatigue and

recovery through its three subscales. Subscales measured chronic fatigue (OFER-CF), acute fatigue (OFER-AF) and recovery between shifts (OFER-IR). The OFER scale has been reported to hold internal reliability (Cronbach's alpha) of the subscales ranging from 0.80 to 0.85. The authors comment that the OFER scale has been validated as a gender-bias free measure of fatigue and recovery among several populations, including nurses (Winwood et al.).

Relationships between shift pattern, fatigue and recovery were investigated using a multivariate approach. Utilizing MANOVA analysis, chronic fatigue and inter-shift recovery were entered as dependent variables while partnership and dependent status were included as independent variables. The authors revealed several patterns that emerged from their tests. Results indicated higher chronic fatigue levels are present when work pattern entails rotating shifts, including night shift. In addition, reduced levels of recovery exist between shifts when the work pattern includes rotating shifts (including nights). Consistently low recovery time between shifts suggest the progression toward chronic fatigue symptoms (Winwood et al., 2006).

Limitations of this study include its descriptive design and the use of self report data. Another limitation noted by the investigators included studying nurses from only two hospitals in Australia. Limiting the geographic area may not capture the representation one would prefer in a sample of registered nurses. Additionally, there may be characteristic differences among hospital systems in Australia. Therefore, chronic fatigue levels may vary in these nurses, and results from a study limited to two hospital systems may not be generalizable to other nurses and hospital settings.

Jansen et al. (2003) explored the relationships between shiftwork, patterns, and need for recovery from work in a diverse array of jobs and professions in the Netherlands. It was a part of the Maastricht Cohort Study on Fatigue at Work, capturing employees (n = 12,095) from 45 different companies and organizations. Working time arrangements, work characteristics, demographics, health factors and need for recovery from work were a few of the study variables explored in this study.

The Need for Recovery scale was utilized and contained 11 dichotomous items, including concern for needed recuperation time after one day of work. The Cronbach's alpha of the Need for Recovery scale was reported as 0.78 (Jansen et al., 2003). The baseline questionnaire included 32 questions in regard to working time arrangements to determine working hours, patterns, and work schedules. Overtime and irregular shifts were captured separately from one's regular work schedule. Additionally, the Job Content Questionnaire was used to measure psychological job demands and decision latitude. Cronbach's alphas were reported for the psychological job demands and decision latitude as 0.69 and 0.81, respectively (Jansen et al.).

Statistical analysis was conducted using two different methods. The first method was in regard to the need for recovery. A Poisson regression analysis was used to examine the relationships between working time arrangements and need for recovery from work. Second, multiple logistic regression analyses were performed to capture the link between working time arrangements and need for recovery in two contrasting groups, representing high and low need for recovery. All analyses were conducted for men and women in separate groups. Additional statistical tests included Chi-Square tests, independent sample t-tests and ANOVAs (Jansen et al., 2003).

Findings showed that increased work hours per week indicated a higher need for recovery in women. Men working over 40 hours a week reported significantly higher need for recovery than their peers working 36-40 hours a week (Jansen et al., 2003). By evaluating the data and statistical results, the more hours one works in a week, the more need for recovery exists for both men and women. Frequent overtime work was associated with a higher need for recovery in both groups of men and women. When overtime work was reported as troublesome in employees with frequent overtime hours, the need for recovery was reported even higher (Jansen et al.).

In regard to the pattern of number of work days per week, Poisson regression analysis yielded non-significant associations between the number of work days per week and the need for recovery in men. Conversely, women who worked five days a week reported a higher need for recovery than women who worked three days a week (Jansen et al., 2003). However, these observations were accompanied with a major limitation in this study; encompassing the lack of awareness of how long reported “work days” are in terms of hours between both groups of men and women. Because data were not collected about shift length, the effects of shift duration on recovery needs could not be examined within groups or compared between groups.

This study also compared the time of day one worked with their perceived need for recovery. The Poisson regression analysis indicated that the need for recovery was greater among participants who worked rotating shifts or irregular shifts in both groups of men and women. The percentages of physical, emotional and psychological job demands were highest in irregular shift and rotating shift workers. Additionally, working in shift

systems was associated with elevated levels of recovery needs compared to the traditional 8 hour work days, 5 days a week (Jansen et al., 2003).

Totterdell, Spelten, Smith, Barton and Folkard (1995) from the University of Sheffield in England examined whether increasing the number of rest days between work shifts would increase psychological recovery and improve well-being and performance on subsequent workdays. The study also examined the effect of increasing the number of consecutive shifts on well-being and performance. Participants (n = 61) included female nurses recruited from those who took part of a larger survey in England and Wales in 1993. The authors selected the nurses from the larger sample by using a cross factorial design. The intent was to balance factors contributing to this study, including rotating and permanent night shift systems, flexible and nonflexible shift systems, teaching and provincial hospitals, and a diverse representation of psychological health distribution scores. Mean age of the participants was 33.55 years, ranging from 22 to 51. The mean participant length of experience in a shiftwork environment was approximately 13 years, ranging from 7 months to 33 years, and the mean length of time spent in their current position was 5.91 years, ranging from 1 to 25 years (Totterdell et al.).

Two groups of nurses were compared in this study including one group in rotating shifts and the second group on permanent night shifts. Both groups of nurses completed the Standard Shiftwork Index (SSI) and the General Health Questionnaire. Separate demographic comparisons of both groups were conducted, as well as the variables of work time, health, well being, and sleep measures obtained from the SSI (Totterdell et al., 1995).

Participants recorded data on a pocket size computer for 28 days. Participants completed a daily set of self rating scales before every main sleep period and a sleep diary after every main sleep period. Additionally, participants completed rating scales and performance tasks every two hours while working their shifts (Totterdell et al., 1995). A pooled time-series analysis was used to test for significant changes over a series of shifts or days. ANCOVA analysis and multiple regression statistical tests were performed. Bonferroni corrections were made to the alpha levels to account for the number of tests conducted. The alpha was set at 0.007 for the seven daily measures and at 0.005 for the on-shift measures (Totterdell et al., 1995).

Over four weeks of data collection, mean hours worked per week was approximately 36 for rotating shift nurses, and 42 for full time, permanent night shift nurses. Mean lengths of shifts included 8.26 for the day shift, 7.90 for the evening shift, and 11.03 for the night shift (Totterdell et al., 1995). Results showed that sleep patterns tended to be worse on the first rest day following work shifts as compared to subsequent rest days. This observation suggests that recovery from a shift did not occur by the end of the first rest day, but might have occurred by the end of the second rest day (Totterdell et al., 1995).

Additionally, recovery measures were reported as worse on rest days following night shifts as compared to following day shifts. Length of time to rest may factor into this finding in addition to readjusting from nocturnal to diurnal routine on days off. Adequate recovery may also be further compromised by night shift workers because their shift ends chronologically later than a nurse working a shift during the day. Shortened



recovery time may impact the first rest day in these circumstances (Totterdell et al., 1995).

Results indicate that two consecutive rest days should be scheduled together before returning to work for adequate recovery to be achieved (Totterdell et al., 1995). Results of this study show that an individual day off is likely to be of lower quality because of the need to recover over a period of days. The amount of time needed to recover from work-induced stress and demands may depend on the adaptive costs of the work. High intensity work demands may require longer time to recover, whereas low intensity demands may not require as lengthy of a recovery period. Interestingly, findings from Totterdell et al.'s study endorse findings from Ruggiero's (2003) study in the critical care environment.

Furthermore, Totterdell et al. (1995) comment that work schedules and lack of recovery can be one of the greatest dissatisfying factors in regard to the nursing profession. Nurses often report that it can be difficult to capture consecutive time off. Time may be classified as a healer in this sense. Therefore it is important to further explore the impact of recovery on fatigue and intent to leave the nursing profession.

Ruggiero (2003) suggests that granting a "sleep" or "recovery" day to nurses working mandated overtime and rotations may help decrease overall nurse fatigue. Since sleep problems and circadian rhythm disruption were reported by nurses working all shifts, recommendations include educational programs regarding sleep hygiene and reinforcement to take breaks at work, as well as access to free or affordable exercise facilities to help decrease overall fatigue levels (Ruggiero). Totterdell et al. (1995) and

Ruggiero share a mutual belief of purposely scheduling two consecutive days off to allow adequate recovery for bedside nurses.

### *Fatigue*

Long work hours and extended shifts have contributed to a fatigued workforce across America. This is particularly true in the nursing profession. Shiftwork combined with overtime and unpredictable schedules contribute to feelings of fatigue among nurses. Several studies have explored causal agents contributing to fatigue among nursing staff.

Work related fatigue and shiftwork were examined in a study by Fields and Loveridge (1988). This study compared critical care nurses' fatigue levels to 8 and 12 hour shifts. The sample of bedside nurses in this study (n = 102) completed the Subjective Symptoms of Fatigue Test in the first and last hours of their shift. This instrument evaluated three areas of fatigue including the degree of drowsiness, difficulty of concentration, and projection of physical impairment (Fields & Loveridge).

Results of this study revealed that total fatigue scores “were significantly higher at the end of the shift than at the beginning of the shift” (Fields & Loveridge, 1988, p. 190). However, when nurses working 8 and 12 hour shifts were divided, data did not indicate a difference in subjective feelings of fatigue. Although nurses did not report a subjective difference in fatigue levels, results differed from total fatigue scores when the subcategories of the Subjective Symptoms of Fatigue Test were analyzed. Specifically, only subjective symptoms of drowsiness and projection of physical impairment “increased significantly” throughout the work day in all nurses who participated in this study (Fields & Loveridge, 1988, p. 190). Further exploration of the 8 and 12 hour sample groups revealed that nurses working 12 hour night shifts were “significantly more

drowsy” than their peers working other shifts (Fields & Loveridge, p. 190). When data were re-analyzed using nurses who only work daytime hours, there were no differences between nurses who work 8 or 12 hours in regard to fatigue scores or any of the subcategories (Fields & Loveridge).

While this study provides insight into the problem of nurse fatigue, it is recognized that the results were obtained 20 years ago. With notable changes in the nursing profession between 1988 and 2008, results may differ with increased demands, expectations and vigilance required of the current nursing workforce.

Josten, Ng-A-Tham, and Thierry (2003) studied the effects of extended workdays on fatigue on 134 nurses in the Netherlands. The purpose of their study was to examine differences in nurses who work 8 or 9 hour shifts as direct care providers in three nursing home settings.

Fatigue was measured using two scales. The first scale was a “checklist that measured levels of fatigue” at the beginning and at the end of the workday (Josten et al., 2003). It was completed retrospectively for each shift the participant had worked in 4 weeks preceding the study. The second scale was termed “need for recovery” and was completed for each workday. The authors reported Cronbach’s alphas as 0.97 and 0.88, respectively.

Results showed that levels of fatigue at the beginning of both shifts did not differ. However, results revealed a difference in 8- and 9-hour shifts at the end of the workday. The 9-hour group was “significantly more fatigued at the end of both the early shift and late shift” (Josten et al., 2003, p. 648). Participants in this study also indicated that the 9 hour shift was more fatiguing than the 8-hour shift. The 9-hour group also scored higher

on need for recovery than nurses working 8-hour shifts. When participants were asked which shift they preferred to work, 80% chose to work a maximum of 8 hours (Josten et al., 2003). The authors comment that since 9-hour shifts were associated with increased levels of fatigue, one possible reason could be attributed to the “increases in workload since the 1980s” that make extended shifts more fatiguing in current nursing environments (Josten et al., 2003, p. 651).

This study reveals noteworthy data, including the significance of one additional hour in regard to fatigue levels among nurses. Fatigue levels were shown to increase in nurses working 9-hour shifts compared to those working 8-hour shifts. Although this study reveals increased fatigue levels associated with longer shifts, a limitation in this study is the exclusion of evaluating nurses who work 12-hour shifts. Twelve hour shifts are common among the majority of nurses in current direct care provider positions. Further exploration of rising fatigue levels in extended 12-hour shifts in comparison to 8-hour shifts may warrant attention of nurses and leaders in the health care sector.

### *Intent to Leave*

Intent to leave was not specifically studied with shiftwork and length of recovery time in the literature. However, intent to leave has been used when exploring independent variables such as organizational commitment.

A study conducted between 1998 and 1999 included more than 43,000 (n = 43,329) nurses representing 711 hospitals in five countries: United States, Canada, England, Scotland and Germany. A core nurse questionnaire was developed to study areas including career plans and feelings of job burnout. Career plans were specifically stated as leaving one’s nursing position within one year (Aiken et al., 2001).

In the United States (n = 13,471), more than 40% of nurses working in hospital settings reported job dissatisfaction. Interestingly, job dissatisfaction among nurses was higher than any other profession in the United States. According to Aiken et al. (2001), data from the General Social Survey of the National Opinion Research Center indicate that approximately 10-15% of Americans reported job dissatisfaction. When comparing the general population to nurses in the state of Pennsylvania, job dissatisfaction was three to four times greater in the nursing profession. This degree of job satisfaction and feelings of burnout reported by nurses in this study included high scores of emotional exhaustion and feeling “overwhelmed” by their work (Aiken et al.).

Overall, job dissatisfaction and feelings of burnout may ultimately lead to intent to leave one’s nursing position. Results from this study indicated that 17% to 39% of respondents planned to leave their job within a year due to job demands. More than 30% of nurses in England and Scotland and more than 20% of nurses in the United States planned on leaving their nursing positions within one year, as reported by Aiken et al. (2001). Findings indicate that registered nurses under the age of 30 who planned to leave their positions within the year were much higher than the remaining nurses in other age groups. These data suggest greater problems for hospitals in future years as these trends stemming from recruitment loss are addressed and monitored to keep nurses in the profession. The current nursing shortage, which is destined to worsen in future years, is of concern when young nurses are leaving their positions (Aiken et al.).

Aiken et al. (2001) alluded to recent reengineering of hospitals that emulate industrial models of productivity improvement, rather than address nurses’ concerns. Restructuring attempts have had little impact on nurse retention, and the intent to leave

one's nursing position continues to be of consideration for many nurses in the workforce. According to Aiken et al., in order to retain qualified staff nurses, emphasis needs to be placed on developing a plethora of opportunities that include flexible work schedules to promote loyalty and retention (Aiken et al.).

Job satisfaction and the intent to leave were measured in a study conducted by Larrabee et al. (2003). Predictors of nurse turnover were discussed, and specifically included work-shift discrepancy between a nurse's expected and actual work schedule. The convenience sample (n = 90) for this study included nurses employed on two medical, two surgical, and three intensive care step-down units at a university medical center in West Virginia. Several tools were utilized in this study during February to July 2000. Specifically, intent to leave was measured using Price's single item with a five point Likert scale, and defined as "anticipation of vacating job in the foreseeable future" (Larrabee et al., 2003, p. 272).

Multivariate regression analyses evaluated models that best predict nurse job satisfaction and intent to leave. Predictors of intent to leave were evaluated using logistic regression and then stepwise multiple regression, while controlling for factors including years since graduating from a nursing program and years in one's current job. Results revealed 22.5% nurses reported intent to leave, similar to Aiken et al.'s work (2001). Over 37% of nurses in the sample indicated uncertainty in remaining in the position. Differences related to one's intent to leave were found between experience in nursing and length of time since graduating from nursing programs, but not among specialty units or educational preparation (Larrabee et al., 2003). Additionally, similar to the study conducted by Aiken et al. (2001), nurses who have graduated less than five years earlier

and who have been in their current job for less than five years were more likely to indicate intent to leave their positions. Unlike the study conducted by Aiken et al., Larrabee et al. defined leaving one's position as "within the foreseeable future," whereas Aiken's group defined their "intent to leave" as leaving one's nursing position within one year.

One of the limitations of Larrabee et al.'s (2003) study includes recognition of the homogenous, non-random nature of the sample. The authors note that replication of this study should "be done cautiously using multiple, diverse sites" (Larrabee et al., 2003, p. 279). Although the sample was not random in Larrabee et al.'s study, it is noteworthy to recognize the similarity in results when comparing the results of nurses to Aiken et al.'s (2001) generalized sample from Pennsylvania, in addition to several other countries. The intent to leave one's nursing position has become a factor for several countries including the United States.

In a study by Ingersoll, Olsan, Drew-Cates, DeVinney and Davies (2002), career intent was explored as it relates to organizational commitment (intent to leave one's position and intent to leave the profession). Ingersoll et al. studied a random sample of nurses (n = 1853) in the state of New York. Two commonly used measures of job satisfaction and affective commitment (to the nurses' employer) were included in the questionnaire. Career commitment and intent to stay were assessed through individual items reflecting one-year and five-year intent, educational advancement planning, and willingness to encourage others to consider joining the nursing profession. Questions within the questionnaire essentially explored factors that affect nurses' decision to stay or leave the nursing profession. As utilized in other studies, the Organizational Commitment

Questionnaire and the Index of Work Satisfaction tools were distributed to measure level of satisfaction and plans to remain or leave their nursing career. One year and five year intent response options focused on intent to stay with the current employer, intent to change position within the employer, intent to temporarily leave the nursing profession, and intent to permanently leave the nursing profession, including retirement (Ingersoll et al.).

Overall findings of this study suggest that the organization environment, educational preparation and personal characteristics affect current job satisfaction, organizational commitment and plans for continuing in one's position. Job satisfaction was reported as highest among advanced practice nurses, nurse educators, and nurse administrators. Masters prepared nurses also reported significantly higher satisfaction than baccalaureate, associate or diploma prepared nurses. The least satisfied nurses were those working in hospitals and nursing homes in the areas of critical care, medical-surgical and rehabilitation. Furthermore, nurses who reported higher satisfaction also reported higher organizational commitment (Ingersoll et al., 2002).

One and five year intervals were assessed inquiring nurses' intent to leave their job or the nursing profession within those defined timeframes. Differences were mostly noticeable according to age of the respondent. For example, the oldest group (greater than 60 years of age) planned to leave the profession permanently within the year for retirement reasons. Similarly, the age group between 51-60 years of age expected to leave the profession within the next five years for retirement purposes (Ingersoll et al., 2002). One of the most interesting observations remains consistent with studies conducted by Aiken et al. (2001) and Larrabee et al. (2003), where the one-year intent to leave their



nursing position and change employers were notably highest in nurses younger than 30 years of age. According to Ingersoll et al., the age group of nurses younger than 30 years of age was no more or less likely to permanently leave the nursing profession than other age groups.

Differences in level of commitment were seen for those intending to stay at the same organization, those intending to change organizations, and nurses intending to permanently leave the profession. Nurses intending to change employers were less committed than nurses planning to stay at their current organization ( $p = <0.0001$ ) (Ingersoll et al., 2002). Data also suggests that nurses planning to change employers were overall more committed than nurses planning not to work at all ( $p = <0.0001$ ). Furthermore, nurses planning to leave nursing temporarily were more committed than nurses who reported not planning to work at all ( $p = 0.02$ ) (Ingersoll et al.).

Groups participating in the five-year projection were classified by educational level, employment status, county of employment, primary employment setting, and specialty area. Differences in five-year intent were consistent in regard to educational preparation, and not surprising in nurses who work part-time status. At five years, nurses with graduate degrees were much less likely to change positions, employers or leave nursing. Conversely, nurses who work part time or “per diem” were more likely to leave the nursing profession than any other group in the study. However, nurses in urban areas reported a higher indication to change employers within the area than nurses employed in rural regions (Ingersoll et al., 2002).

### *Summary and Implications for Study*

Several studies have individually explored the effects of the nursing profession in the arenas of shiftwork, fatigue, and inter-shift recovery, and how a variety of stressors may impact nurses' decisions to leave their positions. However, throughout an extensive literature review, studies were not found that examined the effects of these combined variables. Therefore, due to the absence of the amalgamated variables in one research study, the primary objective of this study was to examine if shiftwork, length of recovery, and level of fatigue predict intent to leave one's nursing position.

### *Research Questions*

Three research questions of interest were identified for this study:

1. What are the differences between acute and chronic fatigue, inter-shift recovery and sleep debt by shiftwork?
2. What are the relationships between acute and chronic fatigue, inter-shift recovery and sleep debt?
3. What are the effects of acute and chronic fatigue, inter-shift recovery and sleep debt on intent to leave?

### *Definition of Terms*

*nurse work hours*- A work schedule that includes 24 hour coverage of patient care, and characterized by duration of consecutive hours (such as 8- or 12-hour shifts), variable length, flexible hours, and regular or irregular shifts. First shift (day) is characterized by hours worked between 7a-7p. Second shift (evening) is characterized by hours worked between 3p-11p; and third shift (night) is characterized by hours worked between 7p-7a.

*fatigue*- One's state of drowsiness (Fields & Loveridge, 1988) rooted in physiological mechanisms related to sleep, sleep loss and circadian rhythms (Tabone, 2004); an indicator of an individual's response to physical and psychological demands (Ruggiero, 2003).

*acute fatigue*- Immediate quantum of physical and/or psychological energy retained after a minimum of one work shift (Winwood et al., 2006).

*chronic fatigue*- Persistent state of fatigue, characterized by declining interest, involvement and commitment; and reduced concentration and motivation (Winwood et al., 2006).

*inter-shift recovery*- A time period between shifts to recuperate from work-induced fatigue, both mentally and physically, to return to a pre-stressor level of functioning (Jansen et al., 2002).

*intent to leave*- A nurse's desire to leave one's current position and/or profession (VanderHeijden et al., 2007).

*sleep debt*- the accumulated amount of lost sleep, based on the recommendation of eight hours of sleep per night (National Sleep Foundation, 2008).

## CHAPTER 3

### METHODOLOGY

#### Research Design

A non-experimental, descriptive, cross-sectional research design was used for this study. This design allowed the researcher to examine the effects of nurse work hours, fatigue, and inter-shift recovery on intent to leave.

Advantages of this method included the ease of administration to registered nurses, lack of interviewer bias, and subjects' anonymity. However, disadvantages of the study design include the inability to clarify questions on the research instruments with respondents and the possibility of missing information.

#### *Sample and Setting*

The target population was registered nurses as study participants using the membership list of a professional nursing organization. Registered nurses were included in this study if: 1) employed on a full-time basis ( $\geq 36$  hours per week) and 2) scheduled to work 8-, 10-, or 12-hour timeframes. Charge nurses and float nurses were included in this sample due to the nature of their positions. Charge nurses may not hold the charge nurse role every day and may engage in direct patient care. Additionally, advanced practice nurses, agency nurses, and nurses in administrative positions were invited to participate in this study. The sample was not limited to any particular nursing specialties.

Exclusion criteria included licensed practical nurses (LPNs), nursing assistants, nursing technicians, or any other care assistants in the nursing arena.

Participants were recruited from the Kappa Epsilon Chapter-at-Large of Sigma Theta Tau International. Sigma Theta Tau International is a nursing honor society that supports the learning, knowledge, and professional development of nurses. Membership is by invitation to baccalaureate and graduate nursing students who demonstrate excellence in scholarship, and to nurse leaders exhibiting exceptional achievements in nursing (Sigma Theta Tau, 2007). The Kappa Epsilon Chapter-at-Large of Sigma Theta Tau International consists of 399 members. According to e-mail addresses provided on the membership roster, it was estimated that 195 members were eligible to participate in this study. The desired response rate was targeted at 25% participation of the membership.

#### *Characteristics of the Sample*

Of the 195 RNs selected to receive the questionnaire, 36 (19%) responded. An overview of the sample's characteristics demonstrates 94.4% were female, with 5.6% male nurse participants. The ages of the sample ranged from 27 to 63 years with a mean age of 47.5 years (SD = 10.83). Most participants were identified as Caucasian (97.2%), while 2.8% were identified as African-American. Participants in the study were asked to identify living arrangements, including caring for children, aging parents or other relatives. Of the 36 returned surveys, the majority of the study participants (n = 25) reported that they were not caring for children or aging parents/relatives (n = 32).

Participants were asked to identify years of experience as a registered nurse, time spent in current position, full-time status (based on 36 hours per week), involvement in

direct patient care, and shift length and type. Additionally, participants were asked to identify the type of position they practice in, whether they work a second job, and average commute time (one-way).

Years of experience ranged from 5 to 42 with a mean of 24.9 years (SD = 11.10). Fifty percent of participants had over 27.5 years of experience. Additionally, 50% of participants have spent less than 5.5 years in their current position, with a range of 6 months to 30 years. Most participants (n = 34) reported being employed full time, while 5.6% (n = 2) reported working less than 36 hours per week. Twenty-one participants engage in direct patient care (58.3%), spending at least 50% of their time involved in direct patient care within their respective positions.

Staff nurses comprised 44.4% of the sample (n = 16). The remaining participants were identified as faculty/academia/researcher (n = 9), nurse manager/administrator (n = 3), advanced practice nurses (n = 4), and other (n = 11). Additionally, 16.7% participants (n = 6) work a second job, with a mean of 12.5 hours (SD = 4.12). Overall, 77.8% participants reported working during the day, 11.1% reported working rotating shifts, and 2.8% reported working at night.

Participants reported one-way commute time between home and place of employment. Most participants (n = 13) spend 11-20 minutes en route one-way between home and work. Other participants cited less than 10 minutes (n = 4), 21-30 minutes (n = 10), 31-40 minutes (n = 3), 41-50 minutes (n = 4), and 51-60 minutes (n = 2).

## *Instruments*

Instruments used in this study include a demographic questionnaire to capture personal and professional information, the Occupational Fatigue Exhaustion Recovery Scale and questions concerning one's intent to leave the profession.

*Demographic questionnaire.* The demographic questionnaire developed for this study includes questions pertaining to personal data including age, gender, living arrangements and length of commute time between home and the place of employment. Professional data were assessed including type of shift, length of shift, specialty area, years of experience in the nursing profession, and years of experience in the place of employment (Appendix A).

*Occupational Fatigue Exhaustion Recovery.* Permission was obtained by the author to utilize the Occupational Fatigue Exhaustion Recovery scale (OFER) for this study (Appendix B). The 15-item OFER scale evaluated levels of fatigue and recovery through its three subscales that measure chronic fatigue (OFER-CF), acute fatigue (OFER-AF) and recovery between shifts (OFER-IR). Each item contains a six-point Likert response scale.

The OFER scale has been reported to have convergent validity and internal reliability of each of the subscales ranging from 0.83 to 0.89. It has been developed and validated as a gender-free bias measure of fatigue/recovery periods among several populations, including nurses. Assessing recovery between shifts on this scale is unique among reported fatigue measurement scales (Winwood & Lushington, 2006).

Previous reliability of the instrument was reported utilizing Cronbach alpha coefficients. Winwood and Lushington (2006) report reliability coefficients ranging from

0.80 to 0.85 among subscales. In addition, Winwood, Lushington and Winefield (2006) report reliability coefficients for each subscale; including 0.86 reflecting chronic fatigue (OFER-CF), 0.84 reflecting acute fatigue (OFER-AF) and 0.84 reflecting recovery between shifts (OFER-IR). Reliability coefficients in this study ranged from 0.84 to 0.93 (Table 1). According to Polit and Beck (2004), reliability coefficients above 0.70 are considered satisfactory to make group comparisons.

Table 1

*Reliability Coefficients of the OFER*

	Winwood et al. (2006)	Manderscheid (2008)
OFER-CF	.86	.84
OFER-AF	.84	.93
OFER-IR	.84	.93

*Intent to leave.* Assessing intent to leave the nursing profession was a component of this research study. Staff nurses' intent to continue to practice nursing within the profession as well as in one's current position was measured using researcher-developed questions. Additional questions asked about the self-reported causes and rationale related to one's future departure from the nursing profession or from one's current position. These questions relating to staff nurses' intent to remain or leave the profession are in Appendix C.



## Procedure

The investigator obtained permission from the Sigma Theta Tau Kappa Epsilon executive board to conduct the study among its membership. In addition, the investigator obtained an email distribution list of their members of a regional chapter. Information about the study was provided to the subjects in a cover letter (Appendix D) preceding the electronic questionnaire, outlining the purpose, benefits, and risks associated with the study. Potential participants were notified of the study by email using an advertisement flyer. The advertisement flyer (Appendix E) included the nature of the study surrounding nurse work hours, the link to the website containing the questionnaire, contact information of the researcher, statements outlining benefits and risks, as well as a disclaimer for online research data collection.

Members who participated in the study had two weeks to complete the questionnaires. A reminder email was sent to members one week before the conclusion of the study. Confidentiality and anonymity were maintained throughout the study. While personal and work-related characteristics of the participants were collected, information was not collected that can be used to identify participants. Data were compiled electronically through Survey-Monkey, an online software program designed to create questionnaires, and subsequently transferred to SPSS software for statistical analysis.

According to Polit and Beck (2004), the typical response rate of electronic questionnaires is less than 50%, whereas a conducted interview achieves higher response rates between 80% and 90%. Although response rates are higher with other methods, several factors contributed to the decision to proceed with an electronic questionnaire. Time efficiency, cost-effectiveness, increased access and the ability to efficiently

download data into SPSS software were contributing factors that influenced the decision to request electronic participation.

### Human Subjects Considerations

Permission to conduct the study was obtained from the Institutional Review Board from Grand Valley State University. Participants were informed that there were no direct benefits associated with their participation. One of the possible indirect benefits of participating included obtaining information that may be used by nurse executives to make more informed decisions about work schedules which allow for adequate recovery and fatigue reduction. In addition, the researcher explained that there were minimal risks involved with completing the study questionnaires. In attempts to minimize respondent burden, the questionnaire remained as concise as possible to encourage participation.

All effort was made to keep responses confidential. Although participants were encouraged to complete the study questionnaires, they were free to discontinue at any time. Consent was implied based on completion and submission of the electronic questionnaire. Although information provided was anonymous, it was transmitted in a non-secure manner. There was a remote chance that skilled, knowledgeable persons unaffiliated with the research project could track the information provided to the IP address of the computer from which it was sent, however no identification information was collected.

Data were protected electronically by password entry into the Survey-Monkey software. The principal investigator had sole access to the data. The investigator assumed responsibility for transferring data to SPSS, and limited access to the thesis committee chair as analysis occurred. All data were reported in an aggregate manner without

individual descriptions or references. Because data were de-identified and no raw data were obtained, the electronic data file will be maintained for a maximum of five years.

### *Threats to Validity of Design*

Possible threats to internal validity include participant self-selection. Self-selection may have been hindered in this study due to the nature of what the study entails, as well as the availability for nurses to check email in addition to duties related to their role. Thus, if nurses were suffering from fatigue and insufficient recovery time, they may not have responded due to feeling the effects from these two variables, as completing a survey would require slight effort on their behalf. Nurses may have refrained from participating due to undisclosed identification of those who are retired.

Certain groups within the target sample may differ in regard to the variables of interest. For example, if one particular nursing specialty was consistently requesting nurses to work additional hours, these nurses may respond with heightened fatigue levels and less inter-shift recovery time than nurses who work in an area operating without a need for overtime.

Another threat to internal validity was history. Any events that may have occurred related to the variables of interest within the target sample may not pose favorable responses, or may affect the method in which nurses respond to this survey.

Possible threats to external validity include generalizability of research findings, the Hawthorne effect, and measurement effects. Generalizability may be difficult due to the small sample size and sampling frame used for the study. As a result, findings from this study may not be a comprehensive representation of professionals in nursing positions across health care settings.

Additionally, participants may have provided different answers on the questionnaire due to being aware that they are participating in a research study (Hawthorne effect). Measurement effects may have impacted the audience this study influences. Thus, nurses with certain characteristics may respond to the invitation to participate if they are feeling fatigued or have intentions to leave their positions.

Another external threat to the validity of this study includes the publication of the unprecedented shortage of registered nurses across the nation. Additional media reports that reflect long work hours and increased rate of errors secondary to fatigue may affect participants' responses.

## CHAPTER 4

### RESULTS

The purpose of this study was to examine the relationships between shiftwork, fatigue, inter-shift recovery and intent to leave among nurses. The research questions of interest were 1) What are the differences between acute and chronic fatigue, inter-shift recovery and sleep debt by shiftwork? 2) What are the relationships between acute and chronic fatigue, inter-shift recovery and sleep debt? and 3) What are the effects of acute and chronic fatigue, inter-shift recovery and sleep debt on intent to leave?

Analysis of the data was conducted by using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to characterize the study sample and describe the variables of interest. Pearson r moment correlation coefficients were used to examine the relationships between personal and work-related variables with fatigue, inter-shift recovery and sleep debt. Chi-square and T-test procedures were used to explore differences between fatigue, inter-shift recovery and sleep debt by intent to leave the nursing profession. The level of significance was established at  $p < 0.05$  for all statistical procedures.

#### *Shiftwork*

Shiftwork was measured by asking participants to report the length of their shift. Most participants reported work shifts of 10 hours (36.1%) or 12 hours (33.3%). The

remaining participants reported working 8 hour shifts (25%). Consequently, over two-thirds of the sample who responded to this question worked at least 10 hours per shift.

#### *Acute and Chronic Fatigue*

Acute and chronic fatigue was measured by two subscales of the OFER. Five questions of the 15-item questionnaire assessed chronic fatigue. According to findings, nurses' chronic fatigue scores ranged from 0 to 76.67 ( $M = 34.0$ ,  $SD = 22.3$ ,  $Mdn = 33.3$ ). Thus, half of respondents reported scores between 33.3 and 76.67 to indicate their level of chronic fatigue.

In addition, five questions of the 15-item questionnaire assessed acute fatigue. Participants reported a maximum acute fatigue level of 100 ( $M = 54.6$ ,  $SD = 28.7$ ,  $Mdn = 56.6$ ). As a result, half of respondents reported scores between 56.6 and 100 to indicate their level of acute fatigue. Eight participants reported acute fatigue scores that exceeded the maximum reported score for chronic fatigue.

#### *Inter-shift Recovery*

The last 5-item subscale of the OFER measured inter-shift recovery. According to the findings, participants reported an average inter-shift recovery score of 58.5 ( $SD = 25.2$ ,  $range = 13.3 - 93.3$ ). Although half of respondents reported scores greater than 63.3, nine (36%) respondents reported inter-shift recovery scores less than 50, suggesting insufficient recovery between work shifts.

#### *Sleep Hours and Sleep Debt*

Sleep hours were reported by participants as the amount of sleep obtained from the previous five nights prior to completing the study questionnaire. A subsequent question inquired about the amount of sleep needed to optimally perform. Based on the

participant median sleep duration results, 50% of the nurses reported between six and seven hours of sleep per night. Furthermore, the results indicate that participants desire approximately eight hours of sleep to be fully alert and at peak performance ( $M = 7.8$ ,  $SD = 0.9$ ,  $Mdn = 8.0$ ).

Sleep debt was calculated for 35 participants, as one participant refrained from answering questions pertaining to obtained sleep hours. Overall, sleep debt ranged from 1 to 22 hours among 69% of participants ( $n = 24$ ). Among the participants who reported a sleep debt, 23% of participants ( $n = 8$ ) reported a minimum of eight hours of sleep debt, however 16 participants had accumulated almost three days of sleep debt over a 5-day period. Only one-third of the participants ( $n = 11$ ) had obtained enough sleep that did not result in a sleep debt.

#### *Intent to Leave*

Participants were asked to identify a timeframe indicating how much longer they plan to remain in the nursing profession. Responses were categorized as intending to leave the profession in 10 years or less, within 11-15 years and greater than 16 years. The sample responses indicated that 40% would remain in the nursing profession for 1-10 years, 22.9% would continue to practice in the nursing profession for 11-15 years, and 37.1% would remain in the profession for a minimum of 16 years or greater.

Furthermore, participants specified the amount of time they plan to remain in their current positions. A total of 48.6% plan to remain in their current position for the following 1-5 years, 40% will continue in their current roles for the following 6-10 years, and 11.4% of participants plan to stay in their current positions for the next 11-15 years.

Therefore, findings illustrate that 88.6% of participants plan to leave their current positions in the next 1-10 years.

Participants were asked about possible reasons for a decision to leave their current position. Overall, 36.1% would accept a position at a different organization, 30.6% participants signified they would take another position at the same organization, 22.2% would retire, and 8.3% would accept a position outside of the nursing profession.

Participants reported a variety of reasons for leaving one’s current position that involved both personal and professional aspects. The major reason for leaving one’s current position would be for other career opportunities. In addition, participants selected age as a predominant reason to leave, which may be attributed to pending retirement (Table 2).

Table 2

*Reasons for Leaving Current Position*

Rationale	Percentage
Other career opportunities	63.9%
Age	22.0%
Physical demands of the job	19.4%
Mental demands of the job	16.7%
General lack of job satisfaction	13.9%
Personal/family concerns	13.9%
Salary/wage issues	13.9%
Childbearing/childrearing	8.3%



### *Research Question One*

Kruskal Wallis statistical procedures were conducted to answer the first research question. Based on the results, no significant differences were noted in perceptions of acute fatigue, chronic fatigue, or inter-shift recovery between nurses working 8-, 10-, or 12- hour shifts. However, an initial statistical difference was noted for sleep debt. Post hoc Mann-Whitney U procedures revealed a significant difference in sleep debt among participants who worked 8 ( $M = -2.1$ ) and 10 ( $M = -7.1$ ) hours ( $Z = -2.3$ ,  $p = 0.020$ ).

When examining the magnitude of sleep debt, participants who worked 10 hours had significantly higher sleep debt than those who worked 8 hours. While four of the eight participants working 8-hour shifts reported sleep debt between 1.5 and 9 hours, 92.3% ( $n = 12$ ) of participants working 10 hours reported sleep debt between 1 and 17 hours.

Additional analyses revealed a significant difference in sleep debt among participants who worked 10 and 12 hours ( $Z = -2.4$ ,  $p = 0.011$ ). Of the six 12-hour nurses who had a reported sleep debt, all but one had a sleep debt ranging between 1 and 7 hours. The remaining participant had a 22-hour sleep debt.

### *Research Question Two*

Pearson  $r$  moment correlation coefficients were used to examine the relationships between acute and chronic fatigue, inter-shift recovery and sleep debt. Moderate to strong correlations were revealed among all four variables (Table 3). A strong, positive correlation was found between acute and chronic fatigue ( $r = 0.72$ ). In addition, positive correlations were noted between acute fatigue and sleep debt ( $r = 0.36$ ), as well as

chronic fatigue and sleep debt ( $r = 0.45$ ) suggesting that as the magnitude of sleep debt increases, so does acute and chronic fatigue. The final analysis revealed a moderately strong inverse relationship between inter-shift recovery and sleep debt ( $r = -0.54$ ). This relationship suggests that as sleep debt increases, perceived recovery between work shifts decreases.

Table 3

*Correlation Matrix for Study Variables*

	Chronic Fatigue	Acute Fatigue	Inter-shift Recovery	Sleep Debt
Chronic Fatigue	1			
Acute Fatigue	.72**	1		
Inter-shift Recovery	-.87**	-.63**	1	
Sleep Debt	.45*	.36	-.54**	1

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

*Research Question Three*

In order to answer the final research question, analyses were conducted between acute and chronic fatigue, inter-shift recovery and sleep debt by intent to leave. Kruskal-Wallis tests were performed to assess for differences among the study variables.

However, no significant differences were found between intent to leave and chronic fatigue, acute fatigue, inter-shift recovery, or sleep debt.

### *Additional Analyses*

Inasmuch as 58.3 % (n = 21) of the sample involved direct care providers, additional analyses were conducted to examine the variables of interest among these participants. Prior to this examination, the demographic and work variables of direct care providers were compared to non-direct care providers (n = 15).

*Comparison of demographic characteristics.* Most participants were female and Caucasian, with exception of two males in the direct care provider group, and one African American in the non-direct care provider group. Overall, it was revealed that non-direct care providers (M = 54.2, SD = 5.71) were approximately 10 years older than direct care providers (M = 43.1, SD = 11.2).

In addition, most participants were married and not raising children (direct care providers = 81%, 70%; non-direct care providers = 78.6%, 73.3% respectively). Additionally, 20% of non-direct care providers and 4.8% of direct care providers reported caring for an aging parent or relative.

Participants reported type of position, percentage of time spent in direct care, years of nursing experience, and length of time in their current positions. Responses indicated direct care providers were predominately staff nurses (76.2%). At least half of participants spend the majority of time in direct care activities (M = 74.2, SD = 29.9, Mdn 82.5). Direct care providers reported having 5 to 33 years of experience (M = 19.4, SD = 10.6), and being employed in their current position between 6 months and 19 years (M = 7.1, SD = 6.0). Overall, direct care providers work predominately day-time hours (81% days, 4.8% nights, 14.3% rotating). More than half (57.1%) work 12-hour shifts, and nearly a quarter (23.8%) work 8 hour shifts.

Non-direct care providers work in predominately faculty/academia/researcher positions (46.7%), followed by nursing management/administration (13.3%). Six remaining participants reported being advanced practice nurses in clinical nurse specialist positions, or working in other nursing positions. Non-direct care providers reported a range of 23 to 42 years of nursing experience (M = 32.6, SD = 6.2). Moreover, at least half of nurses working in non-direct care provider positions have a minimum of 30 years of experience in the nursing profession (Mdn = 30). Non-direct care providers also reported being employed in their current position an average of 10 years (M = 10.4, SD = 9.8; Range = 1-30), with 93.3% being employed full-time.

While the two groups were similar on most of their personal and work characteristics, two significant differences were noted. Non-direct care providers were significantly older and had significantly more years of experience as a registered nurse than direct care providers (Table 4).

Table 4

*Comparison of Age, Years of Experience and Years in Current Position*

	<u>Direct Care Providers</u>		<u>Non-Direct Care Providers</u>		t	df	p
	M	SD	M	SD			
Age	43.1	11.2	54.2	5.7	3.82	31.26	.001
Years – Nursing	19.4	10.6	32.6	6.2	4.68	33.01	.000
Years – Position	7.1	6.0	10.4	9.8	1.21	33.00	.231

### *Shiftwork and Direct Care Providers*

Shiftwork was measured by asking participants to report the length of their shift. More than half (57.1%) of direct care providers worked 12 hour shifts (n = 12). Nearly a quarter (23.8%) of direct care providers worked 8 hour shifts, followed by 19% who worked 10 hour shifts. Therefore, over three-quarters of direct care providers worked at least 10 hours per shift.

### *Fatigue among Direct Care Providers*

Chronic fatigue scores among direct care providers ranged from 0 to 66.7 (M = 28.6, SD = 21.3, Mdn = 21.7). Half of respondents reported scores between 23.3 and 66.67 to indicate their level of chronic fatigue. Participants reported a maximum acute fatigue level of 96.67 (M = 50.7, SD = 27.3, Mdn = 48.3). As a result, half of respondents reported scores between 50.0 and 96.67 to indicate their level of acute fatigue. Five participants reported acute fatigue scores that exceeded the maximum reported score for chronic fatigue.

### *Inter-shift Recovery among Direct Care Providers*

Direct care providers reported an average inter-shift recovery score of 62.9 (SD = 27.1, range = 13.3 - 93.3). In this study, four (28.6%) participants reported inter-shift recovery scores less than 36.6, suggesting an insufficient recovery between work shifts. Fifty-percent of direct care providers reported scores less than 70, which includes reported insufficient recovery scores noted among 28.6% of direct care providers.

### *Sleep Hours and Sleep Debt among Direct Care Providers*

Direct care providers reported hours of sleep attained during the previous five nights as well as the amount of hours needed to optimally perform (Table 5). Fifty-

percent of direct care providers obtained between six and seven hours of sleep per night based on the median sleep duration results. In order to achieve peak performance, results indicate that direct care providers desire approximately eight hours of sleep ( $M = 7.6$ ,  $SD = 1.0$ ,  $Mdn = 8.0$ ). Therefore, results indicate that direct care providers obtained less than eight hours of sleep recommended by the National Sleep Foundation required for superior performance, safety and health (2004).

Table 5

*Sleep Hours among Direct Care Providers*

Day	M	SD	Mdn
1	7.0	1.7	6.0
2	7.0	1.4	7.0
3	7.1	2.0	7.0
4	7.1	1.5	7.0
5	7.0	1.4	7.0
Optimal Performance	7.6	1.0	8.0

Sleep debt was calculated for 21 direct care providers. Overall, sleep debt ranged from 1 to 22 hours among 57% of participants ( $n = 12$ ). Of the direct care providers, 43.2% participants ( $n = 9$ ) reported a minimum of seven hours of sleep debt, calculating to approximately one full night of rest. Additionally, three participants (14.3%) reported a sleep debt ranging between one and three days. Participants reported a sleep debt that

exceeded one day of rest (n = 1), two days of rest (n = 1), whereas another participant reported a sleep debt accruing to nearly three days of sleep debt over a five-day period. Nine remaining direct care providers did not report a sleep debt in this study.

#### *Intent to Leave among Direct Care Providers*

Participants indicated how much longer they plan to remain in the nursing profession by selecting an estimated timeframe. In the next 1-10 years, direct care providers indicated that 23.8% plan to continue to practice nursing. In the next 11-15 years, 23.8% of direct care providers will remain in the profession, and 9.5% will continue to practice for 16 years or longer.

Participants specified the amount of time they plan to remain in their current positions. In the next 1-5 years, 52.4% plan to remain in their current roles as direct care providers. Additionally, 33.3% of direct care providers will remain in their current positions for the following 6-10 years, and 14.3% plan to practice in their current roles for the next 11-15 years. Findings suggest that 85.7% of direct care providers plan to leave their positions within the next 1-10 years.

Direct care providers indicated reasons of leaving their current position, including accepting another position at a different organization (47.6%), accepting another position within the same organization (33.3%), inquiring a position outside of nursing (9.5%), and retiring (9.5%). Rationale for leaving current nursing positions consist of a variety of reasons, including age, job satisfaction, childbearing/childrearing, personal/family concerns, physical and mental demands, salary/wage issues and other career opportunities. Direct care providers reported an assortment of reasons for leaving one's

current position that included both personal and professional facets. This data is summarized in Table 6.

Table 6

*Reasons for Leaving Current Nursing Positions*

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Rationale

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Other career opportunities	66.7%
Age	23.8%
Physical demands	19.0%
Salary/wage	19.0%
Mental demands	14.3%
Childbearing/childrearing	14.3%
Personal/family concerns	9.5%
Lack of job satisfaction	9.5%

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*Research Question One*

Kruskal-Wallis and T-test statistical procedures were conducted to answer the first research question. Based on the results, no statistical differences were found pertaining to acute fatigue, chronic fatigue, inter-shift recovery or sleep debt among nurses working 12 hour or less than 12 hour periods. However, mean acute fatigue scores were higher among direct care providers who work 12 hours or greater ( $M = 54.6$ ) than direct care providers who work less than 12 hours ( $M = 45.5$ ). Findings were similar



among direct care providers and chronic fatigue. Statistics revealed that mean chronic fatigue scores were higher among direct care providers who work a minimum of 12 hours (M = 33.8) than direct care providers who work less than 12 hours (M = 21.7). Nurses working 12 hours or more reported lower mean inter-shift recovery scores (M = 55.8) than nurses working less than 12 hours (M = 72.2). Additionally, nurses working 12 hours or more reported lower mean sleep debt scores (M = -2.3) than nurses working less than 12 hours (M = -3.9).

#### *Research Question Two*

Moderate to strong correlations were revealed among all four variables (Table 7). A strong, positive correlation was found between acute and chronic fatigue ( $r = 0.70$ ). In addition, positive correlations were noted between acute fatigue and sleep debt ( $r = 0.43$ ), as well as chronic fatigue and sleep debt ( $r = 0.62$ ) suggesting that as the magnitude of sleep debt increases, so does acute and chronic fatigue. The final analysis revealed a strong inverse relationship between inter-shift recovery and sleep debt ( $r = -0.66$ ). This relationship suggests that as sleep debt rises, direct care providers perceive diminished recovery between work shifts.

#### *Research Question Three*

In order to answer the last research question, analyses were conducted between acute and chronic fatigue, inter-shift recovery and sleep debt by intent to leave. A Kruskal-Wallis test did not reveal statistical significance among these variables.

Table 7

*Correlation Coefficients among Direct Care Providers*

	Chronic Fatigue	Acute Fatigue	Inter-shift Recovery	Sleep Debt
Chronic Fatigue	1			
Acute Fatigue	.70**	1		
Inter-shift Recovery	-.97**	-.69**	1	
Sleep Debt	.62*	.43	-.66**	1

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

## CHAPTER 5

### DISCUSSION AND IMPLICATIONS

The purpose of this study was to examine relationships among shiftwork, inter-shift recovery, fatigue, sleep debt and intent to leave among nurses. The Neuman Systems Model provided the conceptual framework for the study and a channel to interpret the results.

#### Discussion of the Findings

##### *Research Question One*

Although significant differences were not found between all variables of acute and chronic fatigue, inter-shift recovery and sleep debt by shiftwork, several observations were noted. One statistically significant difference was found between sleep debt among nurses working 10 hour shifts as compared with participants working 8 or 12 hour shifts. However, 10 hour shifts are not traditionally offered among most direct care provider positions, with the exception of specialty roles including staff positions within the operating room or among advanced practice nurse positions.

In this study, participants were employed full-time within their respective roles. Schedules consisting of 10 hour shifts suggest that the nurse works an average of approximately four to five days a week to fulfill full time status. A work schedule consisting of multiple consecutive 10-hour days may impact ability to fully recover

between shifts, resulting in higher sleep debt among participants in comparison to nurses working 8 and 12 hour shifts. In comparison, nurses working 8 hour shifts have increased time between shifts to achieve adequate recovery. Additionally, nurses who work 12 hour shifts may have ability to recover dependent on whether shifts were scheduled consecutively or days apart.

Although fatigue levels were not statistically different, it is important to note trends found in the data analysis. Acute fatigue scores were consistently reported higher than chronic fatigue scores. Specifically, direct care providers who work 12 hour shifts reported higher mean fatigue scores than direct care providers working less than 12 hours. Findings of elevated fatigue levels may link directly to compromised inter-shift recovery scores. These results are concerning among direct care providers as the nursing shortage becomes increasingly apparent. In future months and years, nurses may be asked to work longer hours and more shifts, decreasing the opportunity for inter-shift recovery. Currently, specific data show a relationship between inter-shift recovery and acute fatigue scores as evident by its correlation of  $r = -0.69$  among participants in this study. This relationship will be increasingly important to monitor throughout the next decade as nurses become increasingly scarce.

Data analysis revealed nurses working 12 hour shifts reported less sleep debt than nurses working less than 12 hours. This may suggest that there is increased opportunity to recover between shifts, as full time schedules consist of three shifts per week. Therefore, a day off may exist between shifts, offering time to fully restore and recover before returning to work.

### *Research Question Two*

Although significant differences were not found between acute and chronic fatigue levels, acute fatigue was reported with greater magnitude than chronic fatigue. Several participants reported acute fatigue scores higher than the maximum chronic fatigue score. In addition to findings indicating a fatigued nursing workforce, sleep debt was reported as high as 22 hours. Correlations evidently show relationships between sleep debt and chronic fatigue ( $r = 0.45$ ), inter-shift recovery and chronic fatigue ( $r = -0.87$ ), sleep debt and inter-shift recovery ( $r = -0.54$ ).

Findings suggest that as recovery decreases between shifts, acute fatigue and sleep debt rises. Additionally, as acute fatigue rises, chronic fatigue begins to occur over an extended period of time, noted with the correlation of  $r = 0.72$ . These variables may show additional compromise as participants report working a second job, have lengthy commute times, or care for several family members. Direct care providers may be predisposed to increased levels of acute fatigue based on their role as a nurse and associated shiftwork. According to Ruggiero (2003), shiftwork impacted sleep, circadian rhythms, and fatigue among study participants. Sixty-eight percent of the nurses met the criteria for poor sleep patterns. Findings suggest that nurses experience fatigue secondary to shiftwork regardless of working during the day or night. Participants attributed their elevated fatigue levels to rising early or retiring late (Ruggiero, 2003).

Furthermore, the average age of a registered nurse is 45 years (Lynn & Redman, 2005), indicating the possibility of caring for children as well as parents or other aging relatives. Non-work related domestic responsibilities coupled with longer shifts, decreased recovery, increased sleep debt and increased fatigue scores indicate need for

restoration among registered nurses to achieve optimal performance. This is particularly suggested by correlations between sleep debt and inter-shift recovery among participants ( $r = -0.54$ ) and specifically among direct care providers ( $r = -0.66$ ). Participants reported sleep debt up to 22 hours over a 5 day period. This calculation reflects nearly 3 missed nights of sleep, which may attribute to elevated acute fatigue findings.

### *Research Question Three*

Although significant differences were not found between acute and chronic fatigue, inter-shift recovery and sleep debt by intent to leave, meaningful observations are noted. Data analysis of participant demographics revealed significant differences among age and years of nursing experience. In this study, non-direct care providers were significantly older and had more years of experience than direct care providers. This significance is vital when considering findings encompassing intent to leave.

Study findings indicate that 47.2% of participants plan to remain in their positions for the next 1-5 years, and 38.9% of participants plan to remain in the profession for the next 1-10 years. A notable finding illustrates that only 11.1% of participants plan to remain in their positions in the next 11-15 years, indicating that 88.9% of participants plan to leave their current positions in the next decade. Nearly 30% of these participants plan to retire or accept a position outside of the nursing profession. As nurses retire and/or leave the nursing profession, the industry will be highly seeking nurses to compensate for an escalating nursing shortage and to care for the aging population.

As the profession embarks on an imminent nursing shortage, identification of reasons nurses leave the profession is vital. Professional aspects including other career opportunities, physical and mental demands, job satisfaction and salary/wage issues were

identified by study participants. Although further rationale was not deeply explored pertaining to ‘other career opportunities,’ corresponding professional aspects of demands and satisfaction may factor into that choice. Professional development, career advancement and desire to change positions for learning purposes may contribute to one’s decision to seek other career opportunities.

#### *Relationship of Findings to Previous Research*

Results from this study supported findings from previous studies and journal articles. Similarities were noted between this study and Ruggiero’s (2003) research. Ruggiero (2003) reported the impact shiftwork has on sleep and fatigue levels. Likewise, participants in this study reported the same amount of sleep as the national average reported by the National Sleep Foundation (2007).

Study findings between inter-shift recovery and chronic fatigue ( $r = -0.97$ ) support research by Winwood et al. (2006). Research conducted by Winwood et al. (2006) utilized the OFER scale among nurses employed in two different hospitals in Australia. Data analyses reported consistently low recovery time and progression of chronic fatigue.

Furthermore, study findings among direct care providers and intent to leave support earlier findings. Aiken et al. (2001) reported that 17% to 39% of respondents planned to leave their positions within one year. In comparison, findings in this study suggest that 76.2% of direct care providers plan to leave their positions within the next 1-10 years. Likewise, Larrabee et al. (2003) reported intent to leave among 22.5% nurses as “in the foreseeable future.” Larrabee et al. (2003) and Aiken et al. (2001) reported characteristics among nurses including age and recent graduation from a nursing program. In addition, Aiken et al. (2001) reported nurses who have graduated less than

five years earlier and who have been in their positions for less than five years were more likely to leave their positions. Although this study did not examine recent graduation, years of experience among direct care providers was examined. Overall, intent to leave among nurses in direct care positions remains an important variable within the next several years.

### *Relationship of Findings to Conceptual Framework*

This study incorporated a conceptual framework focusing on essential variables of shiftwork, fatigue, inter-shift recovery and intent to leave within the nursing profession. In this study, retention within the nursing profession is identified as Neuman's central core. Severity of single or multiple variables indicate the response of the flexible line of defense, normal line of defense and lines of resistance. The normal line of defense is defined as a range of responses to the environment, developed as nursing retention improves or declines. As noted in Chapter 2, it is a dynamic state that can change over time and is determined by five client variables: physiological, psychological, sociocultural, developmental and spiritual factors. Variables in this study align with Neuman's conceptual symptoms as stressors penetrate the normal line of defense.

In this study, nurses working 10 hours had significantly higher sleep debt than nurses working 8 or 10 hours. The significance found in sleep debt among nurses working 10 hours may impede flexible and normal lines of defense and lines of resistance as sleep debt continues. Study findings illustrate a strong inverse relationship between inter-shift recovery and chronic fatigue among participants ( $r = -0.87$ ). Additionally, a strong positive correlation was found between acute and chronic fatigue among participants ( $r = 0.72$ ). Relationships noted among inter-shift recovery and acute and



chronic fatigue may disrupt flexible and normal lines of defense and lines of resistance as well. Noting the central core identified as nurse retention, these variables may indirectly cause one to seek other career opportunities and leave one's position over a period of time. The synergistic relationship among these variables may support the primary reason that 63.9% of participants would leave their current position for other career opportunities.

Literature findings suggest that nurses with less than five years of experience have intent to leave their positions "in the foreseeable future" (Larrabee et al., 2003). In addition, study results suggest that nurses younger than 30 years of age have significant intent to leave their positions (Aiken et al., 2001). Results were similar in a study by Ingersoll et al. (2002) whereas highest reports to leave one's nursing position were evident in nurses younger than 30 years old. Age and level of experience may suggest nurses are in early phases of developing stress management skills. Nurses with less than five years of experience or younger than 30 years old may not have developed adequate, functional flexible lines of defense, normal lines of defense and lines of resistance related to stress management in the workplace.

In consideration of Neuman's model, physiological symptoms may include shift length, inter-shift recovery, fatigue, sleep debt, and age. Psychological symptoms may include intent to leave, whereas spiritual symptoms may include job satisfaction as a reason nurses may intend to leave their positions. Neuman's developmental symptoms may be identified as years of experience and other career opportunities in this study. Neuman's sociocultural symptoms may reflect demographics and personal/family concerns within this study.

Neuman's conceptual framework encompasses primary, secondary and tertiary prevention in protection of the central core. This application of Neuman's model illustrates nurse retention in the central core. Findings in this study identify how primary, secondary and tertiary prevention may be interpreted. One primary prevention strategy includes obtaining adequate amount of rest between shifts. Participants reported achieving an average of 6 to 7 hours of sleep per night, whereas they reported a desire of approximately 8 hours. Promoting and achieving desired amount of rest may decrease acute fatigue, enhance inter-shift recovery, and ultimately decrease chronic fatigue.

Secondary prevention strategies include treatment and intervention of stressors after the normal lines of defense have been violated. Treatment includes improving work hours, reducing shift duration, and subsequently expanding the timeframe for inter-shift recovery to occur. These adjustments may allow increased time for rest, thus decreasing sleep debt and improving fatigue. By making adjustments in the workplace and in one's sleep patterns, nurses may choose to stay in their positions as well as in the profession for a longer period of time.

Tertiary prevention strategies include restoration of balance between stressors, lines of defense and the central core. After restoration and repair have occurred, tertiary prevention strategies identify methods to prevent further penetration of stressors. In addition, tertiary prevention strategies support achieving balance after treating stress-related causal agents. In this study, tertiary prevention strategies include achieving a healthy work-life balance that promotes and maintains adequate inter-shift recovery, attaining desired rest, and diminishes fatigue levels. These tertiary prevention strategies may attract nurses to remain in their positions as well as within the profession of nursing.

As the nursing profession strives to retain nurses, Neuman's statement of an "understanding of the influence of prevention interventions on the relation between stressors and client-system stability" (Neuman & Fawcett, 2002, p. 117) is vital to diminish stressors that may impede retention.

#### *Strengths, Limitations, and Recommendations*

This study has several notable strengths. The first strength captures relevant, timely, significant issues within the nursing profession. Shiftwork, inter-shift recovery, fatigue and intent to leave are pertinent issues that affect nurse retention. Nurse executives and healthcare administrators are continuously identifying methods to retain nurses in the profession as the nursing shortage becomes increasingly apparent. Overall, diverse representation among nursing specialties was noted between direct and non direct care providers. Although this study contributes findings to the profession at large, it supports the need for further investigation of the combination of shiftwork, inter-shift recovery, fatigue and intent to leave. Studies were not found in the healthcare industry addressing this variable combination. Subsequent studies noting the importance of shiftwork, fatigue, recovery and intent to remain or exit the nursing profession would be valued among healthcare executives and nurses across the profession.

The researcher acknowledges limitations contained in this study. The sample size contained 36 participants with 21 of the participants being direct care providers, limiting generalizability of the results. However, it is important to note that nurses may have received an invitation to participate and did not meet the inclusion criteria. For example, several responses indicated desire to participate, but had recently retired from the profession or did not meet the requirement of full-time status. It is important to recognize

that although nurses in the Sigma Theta Tau Kappa Epsilon Chapter provided their respective email addresses, it is possible internet access was compromised. Additionally, Kappa Epsilon members may have changed their email address without notification. The researcher recommends targeting a larger population in quest of a larger sample size, as well as exploration of mailings in addition to electronic invitations in future studies. Additionally, the researcher recommends consideration of state or national research to increase participant responses and level of generalizability. Consideration of larger organizations, hospital groups, or expanding research beyond one chapter of a professional organization may yield increased numbers of participants, including those working in direct care provider positions. Furthermore, the researcher recommends conducting this study solely among direct care providers. Assessing intent to leave among nurses working in direct care positions will assist in identifying factors that influence the retention of bedside nurses.

### Implications of the Study

#### *Significance to Nursing Administration*

Results of this study are beneficial for nursing leaders to take into consideration as they lead their respective organizations. Findings garnered from this study may lead to beneficial outcomes for patients, staff and healthcare systems. Recognizing that the average age of a registered nurse is 45 years, nurse executives may strongly consider action plans and factors that improve retention of nursing staff.

In reference to Neuman's model, prevention strategies could be adopted among nurse executives in addressing fatigue levels, with subsequent positive effects on inter-shift recovery, sleep debt and overall retention of nursing staff. Concentration on fatigue

management among nurses may lead to positive subsequent effects regarding other variables in this study. Adopting primary prevention strategies in relation to fatigue management may provide education, knowledge and a refreshed approach to designing work schedules for optimal sleep hours and favorable periods to recover between shifts.

According to Gold et al. (1992), sleep deprivation and misalignment of circadian rhythms caused by shiftwork lead to increased errors on performance tasks. Nurse executives and hospital policymakers may want to examine potential consequences to disrupted sleep patterns and elevated fatigue levels among nurses, particularly those in direct care provider positions. Furthermore, according to Ruggiero (2003), sleep quality and shiftwork are likely contributors to fatigue among nurses working in the critical care setting.

Nurse executives could consider several actions to be implemented within their respective healthcare organizations. For example, developing initiatives centered on nurse-wellness is supported among several leading hospitals in the country. Nurse wellness activities may include focus on a healthy work-life balance, onsite health classes to reduce fatigue, and offer opportunities to engage in professional development.

Professional development is valued within hospital environments, and may subsequently lead to improved nurse retention rates. According to Ingersoll et al., masters prepared nurses also reported significantly higher satisfaction than baccalaureate, associate or diploma prepared nurses. In addition, nurses who reported higher satisfaction also reported higher organizational commitment (Ingersoll et al., 2002). Noting the majority of direct care providers (85.7%) plan to leave their positions within the next

1-10 years, nurse executives may improve retention rates by offering opportunities for advanced education and support for professional development.

Findings from this study also suggest consideration of re-examining work schedules to reduce sleep debt and fatigue. These actions may lead to improved inter-shift recovery, a healthier workforce and subsequent enhanced nurse retention rates. Nurse executives may consider different scheduling systems, self-scheduling among staff nurses, and flexible scheduling options. However, heightened attention to nurse schedules should abide by guidelines established by the 2004 Institute of Medicine Report titled, “Keeping Patients Safe: Transforming the Work Environment of Nurses.” This report revealed nurses’ long work hours that occasionally deviate from the Institute of Medicine recommendations, and thus, threaten the safety of patients.

Nurse executives would find improved retention rates appealing when considering less turnover, financial prosperity, and development of a more clinically competent nursing workforce. These outcomes may subsequently lead to decreased patient hospital stays, decreased morbidity and mortality, and improved quality of care. Understanding the potential impact that issues such as fatigue, compromised inter-shift recovery and sleep debt may have on the workforce is vital in being proactive to offer a healthy work-life balance and assist staff in being as vigilant as possible when on duty.

### *Significance to Nursing Practice*

Registered nurses practicing at the bedside have important roles to fulfill as they care for patients, families, each other as well as themselves. Factors that influence their care environments such as a fatigued workforce, or compromised inter-shift recovery may impact these processes. If nurses recognize ongoing issues that prevent safe and

quality patient care, one's responsibility must be upheld to provide honest feedback to nursing managers and directors. By becoming a part of the shared governance process in respective organizations, the nurse's voice is heard and valued within decision making processes. Additionally, nurses may join professional organizations at the local, state and national levels to help raise awareness and contribute to identification of potential solutions.

#### *Significance to Nursing Education*

The implications of this study to nursing educators may be helpful when preparing nurse graduates to adopt strategies and skills to decrease fatigue and optimize inter-shift recovery time. Additionally, it is important for nurse educators to recognize that nurses may have compromised learning abilities when suffering from fatigue and sleep debt. Moreover, if nurses are having thoughts to leave one's position or the profession, their level of engagement and commitment to learning new processes or policies in their work environment may be diminished.

#### *Significance to Nursing Research*

This study recognized glimpses of the relationships between its variables and how they may potentially impact the nursing workforce in years to come. It is recognized that further work is necessary to broaden how shiftwork, fatigue, inter-shift recovery and intent to leave may be further connected. The researcher recommends replication of this study targeting a larger sample size, and consideration of longitudinal application to pinpoint when nurses begin considering intent to leave. Use of log books over a longer period of time may provide valuable information pertaining to inter-shift recovery, sleep debt, and fatigue. Sleep patterns, work schedules, and inter-shift recovery periods could

be closely monitored over a longer timeframe. Additionally, objective measures of sleep and fatigue could be considered beyond self reporting methods.

Although this study considered several potential causes of intent to leave, the option of 'other career opportunities' could be expanded to list specific rationale of considering other career opportunities, as well as which career opportunities are being considered. This could promote identification of how to retain nurses in current positions, or within the nursing profession at a minimum.

### Conclusion

The future of the nursing profession is dependent upon every nurse in the profession in addition to nursing executives, educators, and leaders to recognize where our areas of improvement exist and how we will work together to provide solutions. Empowerment to achieve a healthy work-life balance among our nurses is vital as the profession focuses on retention and continues to advance forward. As research continues, this study is an important step of the process as further examination of shiftwork, fatigue, inter-shift recovery, sleep debt and intent to leave occurs within the nursing profession.



## APPENDICES

APPENDIX A

Demographic Data Questionnaire

APPENDIX A

Demographic Data Questionnaire

Please indicate your response for each question.

1. Your gender:  Male  Female

2. Please indicate your age: \_\_\_\_\_

3. Which of the following racial categories do you identify with?

- |   |   |
|---|---|
| <input type="checkbox"/> African-American               | <input type="checkbox"/> Hispanic                         |
| <input type="checkbox"/> American Indian/Alaskan Native | <input type="checkbox"/> Multiracial                      |
| <input type="checkbox"/> Asian                          | <input type="checkbox"/> Native Hawaiian/Pacific Islander |
| <input type="checkbox"/> Caucasian (non-Hispanic)       | <input type="checkbox"/> Other                            |

4. What are your living arrangements?

- Single  Living with spouse/significant other

5. Do you have children living at home?  Yes  No

If yes, please indicate age of the children (select all that apply)

- <1 year  
 1-6 years  
 7-12 years  
 12-18 years

6. Are you caring for aging parents or other relatives on a regular basis?

- Yes  No

7. How many years have you worked as a registered nurse? \_\_\_\_ hours

8. How many years have you worked in your current position? \_\_\_\_ hours

9. Are you employed full time (36 hours/week or greater) as a registered nurse?

- Yes  No

10. Does your role include direct patient care?

- Yes  No

11. Estimate the percentage of time in your position is spent providing direct patient care.

\_\_\_\_\_%

12. How long is the shift you usually work?

- 8 hours  10 hours  12 hours

13. Which shift do you usually work?

- Day       Evening       Night       Rotating

14. What type of position do you practice in?

- Staff nurse/clinician  
 Nurse Practitioner/Anesthetist  
 Nurse Administrator/Manager  
 Clinical Nurse Specialist  
 Faculty/Academia/Researcher  
 Other

15. Do you work a second job?       No       Yes

If yes, how many hours do you work per week at your second job? \_\_\_\_\_ hours

16. What is your average commute time (one-way) between home and work?

- <10 minutes  
 11-20 minutes  
 21-30 minutes  
 31-40 minutes  
 41-50 minutes  
 51-60 minutes  
 >60 minutes

17. Over the last five days, please report how many hours of sleep you had each night:

	Identify the day of the week: SU, M, T, W, TH, F, S	Number of Sleep Hours Obtained
Day 1		
Day 2		
Day 3		
Day 4		
Day 5		

18. Think about a day when you felt alert and your top performance. How many hours of sleep did you get the night before?

\_\_\_\_\_ Sleep hours obtained

\_\_\_\_\_ Not sure

## APPENDIX B

### Occupational Fatigue Exhaustion Recovery (OFER 15) Scale

## APPENDIX B

### Occupational Fatigue Exhaustion Recovery (OFER 15) Scale

These statements are about your fatigue and inter-shift recovery at work and at home.  
Select a number from 0-6: Strongly Disagree to Strongly Agree which best indicates your response.

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree/ Disagree	Slightly Agree	Agree	Strongly Agree
1) I often feel I'm 'at the end of my rope' with my work	0	1	2	3	4	5	6
2) I often dread waking up to another day of my 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 typical work period 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 to 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 work shift to recover my energy completely	0	1	2	3	4	5	6
12) Even if I'm tired from one shift, I'm usually refreshed by the start of the next shift	0	1	2	3	4	5	6
13) I rarely recover my strength fully between work shifts	0	1	2	3	4	5	6
14) Recovering from work fatigue between work 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

## APPENDIX C

### Assessment of Nursing Intent

## APPENDIX C

### Assessment of Nursing Intent

1. How much longer do you plan to practice nursing?

- 1-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- more than 20 years

2. How much longer do you plan to practice nursing in your current position?

- 1-5 years
- 6-10 years
- 11-15 years
- 16-20 years
- more than 20 years

3. If you decide to leave your current nursing position, will it be to...(select one):

- take another nursing position at the same organization?
- take another nursing position with a different organization?
- take a position outside of nursing?
- retire?
- quit nursing?

4. If you decide to leave your current nursing position, will it be because of...  
(select all that apply)

- age
- general lack of job satisfaction
- childbearing/childrearing
- personal or family concerns
- physical demands of the job
- mental demands of the job
- salary/wage issues
- other career opportunities



APPENDIX D

Cover Letter

APPENDIX D  
Cover Letter

August 16, 2008

Dear Colleague:

My name is Amy Manderscheid and I am a graduate nursing student at Grand Valley State University. I am conducting a study examining working hours and associated conditions related to the nursing profession. This invitation to participate is being sent to members of the Sigma Theta Tau Kappa Epsilon chapter who have provided email addresses to the organization. As a member of Sigma Theta Tau, I have learned that our chapter highly supports nursing research, and is evident by allowing me to conduct my research within our Kappa Epsilon chapter. Thus, our membership list was retrieved from the Sigma Theta Tau International office. The information that you provide will assist me in understanding nurse work hours and aspects of the nursing profession.

Please take approximately ten minutes to click on the attached link and complete questions surrounding the topics as described above. Although there are no direct benefits from participating in this research study, I hope to utilize the information retrieved from the results from improve the nursing practice environment as it relates to shiftwork and corresponding effects in the nursing profession. This information may assist professionals in the nursing profession to make more informed decisions related to shiftwork and other variables examined in this study. This is imperative as we embark on a national, precedent shortage of registered nurses.

Your participation in this study is voluntary and your responses will remain anonymous. Submission of the electronic questionnaire will serve as your implied consent to participate in this study.

There are minimal risks associated with your participation in this study. All information collected will be anonymous, and no information will be collected that would identify you as an individual. The results will only be reported as collective data in aggregate; individual information will not be identified in any report. The information collected will be used for the stated purposes of this research project only and will not be provided to any other party for any other reason at any time. You should be aware that although the information you provide is anonymous, it is transmitted in a non-secure manner. There is remote chance that skilled, knowledgeable persons unaffiliated with this research project could track the information you provide to the IP address of the computer from which you send it. However, your personal identity cannot be determined.

Please contact me if you wish to receive a copy of the results when the study concludes. Please provide your email address, as results will be disseminated electronically.

If you have questions about this study, you may contact me at (616) 607-9083. If you have questions concerning your rights as a research participant, please contact Dr. Paul Reitemeier, Chair of the Human Research Review Committee, Grand Valley State University by telephone at (616) 331-3417 or email at [hrrc@gvsu.edu](mailto:hrrc@gvsu.edu).

Sincerely,  
Amy M. Manderscheid RN BSN  
[mandersa@student.gvsu.edu](mailto:mandersa@student.gvsu.edu)

APPENDIX E

Recruitment Flyer

# FULL TIME RNs: YOUR OPINION IS VALUED!

**You are invited to participate in a study examining nurse work hours and corresponding effects.**

**Must :**

- Be a full-time registered nurse ( $\geq 72$  hours/pay period)
- Practice as a staff nurse providing direct patient care
- Be willing to donate 10 minutes of your time; and
- Consent to participate (considered as implied consent if participating)

**Participant Risks**

Your participation in this study is voluntary and your responses will remain anonymous.

- There are minimal risks associated with your participation in this study.
- All information collected will be anonymous, password protected and no information will be collected that would identify you as an individual.
- The results will only be reported as collective data in aggregate; individual information will not be identified in any report.
- Although the information you provide is anonymous, it is transmitted in a non-secure manner. There is remote chance that skilled, knowledgeable persons unaffiliated with this research project could track the information you provide to the IP address of the computer from which you send it. However, your personal identity cannot be determined. Data at Spectrum Health will be deleted once transfer to statistical analysis software occurs.

**Benefits**

- Contribution to issues being examined surrounding nursing shiftwork
- Possible improvement of the nursing practice environment as it relates to shiftwork and corresponding effects in the nursing profession
- This information may assist professionals in the nursing profession to make more informed decisions related to shiftwork and other variables examined in this study

**Interested nurses—please complete an online survey at:**

**[https://www.surveymonkey.com/s.aspx?sm=DNC\\_2bwOqMTL3LKqldoNWmLw\\_3d\\_3d](https://www.surveymonkey.com/s.aspx?sm=DNC_2bwOqMTL3LKqldoNWmLw_3d_3d)**

Principal Investigator:

Amy Manderscheid RN BSN

Office Number: (616) 607.9083

E-mail: [mandersa@student.gvsu.edu](mailto:mandersa@student.gvsu.edu)

If you have questions concerning your rights as a research participant, please contact: Dr. Paul Reitemeier, Chair of the Human Research Review Committee, Grand Valley State University at (616) 331-3417 or [hrrc@gvsu.edu](mailto:hrrc@gvsu.edu).

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