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Nurse Characteristics That Increase a Healthcare System's Ability to Become a Highly Reliable Organization

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NURSE CHARACTERISTICS THAT INCREASE A HEALTHCARE SYSTEM'S ABILITY TO BECOME A HIGHLY RELIABLE ORGANIZATION

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Healthcare safety is a major focus for all members of the healthcare team. Registered nurses serve as the one member of the healthcare team that cares for the hospitalized patients throughout their entire stay. Nurses also comprise the largest collective member of the healthcare team. Their combined numbers and hours create the highest level of influence for navigating patients safely through their hospitalization. A higher level of mindfulness leads to a Highly Reliable Organization, improving the safety and quality outcomes for the patients within a healthcare system. Understanding the contributing factors of higher levels of mindfulness leads to a greater ability to safely care for patients within the system. This quantitative study examined the registered nurse characteristics that lead to higher levels of individual mindfulness and collective mindfulness. The study results showed that individual mindfulness has a significant relationship to collective mindfulness. Special training in a registered nurse's area of work was the only other variable that had a positive relationship with collective mindfulness. Going to school, working weekends, working overtime, and advanced education (e.g. MSN versus BSN) each had negative effects on mindfulness.

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INTRODUCTION

The Institute of Medicine (2008a) noted that deaths due to medical errors and preventable adverse events have made medical mishaps the eighth leading cause of death in the United States. These deaths raise concerns about hospital safety (2008a). In response, the Institute of Medicine stated, "Errors can be prevented by designing systems that make it hard for people to do the wrong thing and easy for people to do the right thing" (p. ix).

Brennan et al. (1991) defined preventable adverse events as injuries caused by medical management, not by the underlying disease or condition of the patient. Such preventable errors are costly. Notably, a 2008 study by the Society of Actuaries found 19.5 billion dollars were spent on preventable adverse events in hospitals (Ledue, 2010).

Centers for Medicare and Medicaid Services (2013) explain that recent changes in healthcare reimbursement policy resulted in the adoption of Pay for Performance, which ties the level of payment for care to patient outcomes. Due to these changes, hospital systems now face difficult choices to remain solvent. Systems can choose to focus on efficiencies and/or safe and quality care. Too often, systems inadequately focus on safety (Perrow, 1999).

Human error threatens the quality of patient care and safety in healthcare facilities (Institute of Medicine, 2008a). With the application of human factors, other high-risk industries have successfully implemented processes to reduce errors. These high risk industries include aviation, petroleum, and nuclear industries. Healthcare, too, must replicate these safety-promoting processes (2008a).

All of these issues point to the serious need for new approaches and systems geared toward improving care in healthcare institutions. According to the Institute of Medicine (2008), ensuring patient safety involves the establishment of operational systems and processes that increase the reliably of care. This research explores mindfulness, defined as a rich awareness of discriminatory detail in a context in which details differ and deviations from their expectations exist. Control over the wandering mind will achieve this state (Dane, 2011). Quality of attention and a focus on clear and detailed comprehension of emerging threats characterize mindfulness (Weick & Sutcliffe, 2007). Mindfulness is about noticing small failures and maintaining their distinctiveness instead of losing them in a category or dismissing them all together (2007).

High levels of mindfulness can move complex organizations to a higher level of reliability, causing these organizations to become Highly Reliable Organizations. (The Joint Comission, 2013). The Joint Commission, an independent organization recognized as the symbol of quality and the insurer of high performance standards, has encouraged all healthcare organizations to focus on becoming Highly Reliable Organizations (2013).

Research has shown that a Highly Reliable Organization can establish a more reliable level of patient care given higher levels of *collective* mindfulness that result from the presence of higher levels of mindfulness among its *individual* employees (Weick & Sutcliffe, 2007). This research focuses on the characteristics that create a high level of mindfulness at an individual nursing level. These characteristics may in turn move healthcare organizations to become Highly Reliable Organizations. Identifying the presence of a relationship between mindfulness and high reliability functioning, and between individual nursing characteristics and mindfulness, may help healthcare

organizations recruit staff with existing characteristics that favor a high level of mindfulness and help create training programs to foster these characteristics.

Background

As early as 1997, the Institute of Medicine brought the level of human error within the United States healthcare system to the forefront. According to the Center for Disease Control and Prevention (CDC), the number of hospital admissions topped 33.6 million in 1997, and as many as 98,000 people died in United States hospitals from preventable adverse events (Institute of Medicine, 2008). In 2012, the CDC's latest numbers from 2010 reported 35.1 million hospital discharges with a 4.8 day length of stay (Center for Disease Control & Prevention [CDC], 2015). If the rate of preventable adverse events remains the same, the number of preventable deaths for the projected 35.1 million patients will exceed 104,000 in 2015. Of the total number of inpatient and outpatient medical injuries in 2008, which cost 80 billion dollars, 25% were preventable (Ledue, 2010). Unless the healthcare field undergoes an improvement in preventable errors, the money spent on preventable human-error-related events in 2015 will reach over 25 million dollars.

According to a 2006 CDC report, healthcare spending accounted for 15.3% of the Gross Domestic Product (GDP), including healthcare goods, services, and infrastructure (CDC, 2013). The Centers for Medicare and Medicaid Services (CMS) recently forecasted National Health Expenditure Projections (NHE) from 2010 to 2020. In 2010, the NHE projected spending on healthcare to reach 2.6 trillion dollars with a growth of 3.9%, down from 4% in 2009. By 2020, projections for national health spending will reach 4.6 trillion dollars, which represents 19.8% of the GDP (Centers for Medicare and

Medicaid Services [CMS], 2012). Given this growth in healthcare expenditures, one can understand the need for controlling preventable expenses and the more important avoidable injuries and deaths.

Building a Culture of Safety

Funding the initiative. In 2010, the Agency for Healthcare Research and Quality (AHRQ)—with a mission to improve the quality, safety, efficiency, and effectiveness of healthcare for all Americans—was awarded a 300 million dollar grant from the federal government (Agency for Healthcare Research and Quality [AHRQ], 2011). Awarded funding occurred in six different portfolios, including areas such as prevention and care management, value, and innovative/emerging issues. Of the allotted forty-two million dollars to the patient safety and quality portfolio, 25 million supported efforts by healthcare systems to implement and evaluate patient safety approaches and medical liability reform models (AHRQ, 2011). Federal spending at this level seeks to avert preventable errors. As patients and their families become more involved in facility choice for their care, individual medical facilities increase their focus on patient safety. Poor quality outcomes not only result in devastation to the patient, but also become devastating to low performing healthcare systems. They create decreased volumes of patients and decreased reimbursement due to low performance.

Significance of a culture of safety. A strong culture of safety holds safety of operations as the primary goal. Such a culture welcomes the reporting of concerns, discourages blame for errors, and focuses resources on safety. Moreover, hierarchy gives way to safety (National Association for Healthcare Quality [NAHQ], 2012). Notably, only 44% of surveyed healthcare providers describe their experience as non-punitive

when reporting errors, leaving a majority of employees in a culture of blame (Sorra, Famolaro, Dyer, Nelson, & Smith, 2012). Should such environments discourage individuals to report near misses, underlying systemic issues may likely remain unaddressed, increasing the chance of untoward events (NAHQ, 2012).

Underreporting contributes to an unmindful culture (Agency for Healthcare Research and Quality [AHRQ], 2008). Therefore, organizations with chronic underreporting are unlikely to become Highly Reliable Organizations. However, results from studies of high-risk industries with existing levels of High Reliability, such as aviation or nuclear power, may prove fruitful for healthcare (NAHQ, 2012). Vogus and Sutcliffe (2007b) found that the combination of safety organizing (also known as collective mindfulness) and well-designed caregiving systems promotes Highly Reliable healthcare organizations and safer, quality patient care.

Safety practices in the study population. The Health System in this study delivers care using evidence-based protocols in an effort to improve safety. Examples of nurse driven protocols include hourly rounding, ventilator care, and indwelling catheter care and removal. One example of a physician protocol is computer physician order entry (CPOE), which uses patient diagnosis to guide physicians in following pathways for care based on evidence. These nurses and physicians consistently follow the protocols and enforce them. Such standardized protocols create connections among the staff and permit a degree of coordination for patient care (Vogus & Sutcliffe, 2007b).

Reimbursement policy. The Affordable Care Act, which includes the Hospital Value-Based Purchasing Program (HVBP), authorized CMS to adjust payments based on readmission rates of high volume and high cost conditions such as heart attack,

congestive heart failure, and pneumonia (CMS, 2015). The readmission may be due to complications from treatment during hospitalization, including inadequate treatment, poor coordination of care, and worsening of the disease process. The program withholds payment to healthcare systems for hospital-acquired conditions, and reimbursement amounts can be increased or decreased based on quality outcomes (2015). Prior to this program, a culture of safety never had such an effect on hospital reimbursement (NAHQ, 2012).

Healthcare systems are experiencing a greater sense of urgency due to the provisions of the Affordable Care Act. As of October 1, 2012, adjustment of payments beyond readmission rates now include no payment for preventable adverse events within healthcare organizations (CMS, 2015). CMS adjusts payments to hospitals based on outcomes of patient satisfaction and quality. Payment adjustments are made after comparing results of each hospital's baseline to the outcomes of all hospitals (2015). This is known as the Hospital Value-Based Purchasing Program (HVBP). Payment is based on quality outcomes and *not* quantity of service (U. S. Department of Health & Human Services [USDHH&S], 2011).

Commercial insurers such as Blue Cross and Aetna are beginning to follow the same new payment practice, resulting in a higher sense of providing high quality, safe patient care. HVBP, measured in fiscal year (FY) 2013, focused on how closely hospitals follow best clinical practices and how well hospitals enhance patients' experience of care (CMS, 2015). When hospitals follow best practices, patients receive higher quality care and experience better outcomes. Following prescriptions of care is only part of the

equation for reimbursement from CMS. Patient outcomes are quickly becoming the highest percentage of reimbursement (CMS, 2015).

Hospital Safety

Basic concepts reside at the forefront of Highly Reliable Organizations and are defined in more detail within Chapter Two. Helping patients heal without complication can improve health and ultimately reduce health care costs to the levels achieved by Highly Reliable Organizations (CMS, 2011). As safety programs evolve, more attention will be paid to patient outcomes and less to patient experience and adherence to strict protocols without mindful attention (CMS, 2015). Becoming Highly Reliable will improve patient outcomes by increasing the need for mindful staff capable of adjusting patient care based on being resilient and being observant of small changes in their patients' conditions.

Hospital safety concerns find their genesis in the individuality of care delivery within the complex healthcare team (Vogus, Sutcliffe, & Weick, 2010). Individuality results in an ineffective and piecemeal healthcare delivery system that fails to identify and address underlying issues (Institute of Medicine, 2008b). In addition, the existing culture of medicine contributes to the incomplete, ineffective, and piecemeal implementation of patients' plans of care (Nembbard, Alexander, Hoff, & Ramanujam, 2009).

Healthcare administrators and managers need to enable a safety culture by focusing on safety-relevant aspects of the larger organizational culture. Doing so makes it possible for staff to translate their local healthcare routine into safe, quality care. The organization must embrace a context in which staff can feel safe to speak up and act in

ways to improve safety (Vogus, Sutcliffe, & Weick, 2010). Safe organizations need consistent translation, enactment, and reenactment of safety guidelines into meaningful practices used by front line staff (Reason, 1997). Efforts to enact a safety culture at all levels rely on mindful organizing (2010). For this reason, this research explored characteristics that create a high level of mindfulness within individuals. Individual mindfulness may improve the level of collective mindfulness within nursing units, thereby increasing the possibility of achieving a Highly Reliable Organization. Healthcare organizations must foster a culture of safety from within; therefore, organizations must place importance on understanding staff characteristics that may result in a high level of mindfulness. At times, it may even prove necessary to undertake development to proactively create more mindful staff members.

Researcher Position

I was the Chief Nursing Officer at the time of this research and had a vested interest in the outcomes of this study. Patients expect safety when they receive healthcare treatment. Due to their accessibility, presence, and oversight of patient care, nurses play a pivotal role in assisting patients through their healthcare experience. I was in a constant search of how to build a team that produces high quality and safe patient care within our healthcare system as we strive to become a Highly Reliable Organization. Because of the general scarcity of research on nurse characteristics, little understanding exists as to the characteristics needed to build a quality nursing team within a Highly Reliable Organization. Within the limited body of research available, studies have addressed effects on patient outcomes such as certification, level of nursing education, and longevity in nursing.

The recently resolved nursing shortage will cycle again as it has twice during my 30-year career as a registered nurse. Currently, there are enough nurses to fill acute hospitals' needs. Recruitment of nurses has become easier with greater availability of all levels of nursing education graduates. This ease of recruitment includes bachelor's prepared nurses, which previously were difficult to recruit. Therefore, focusing on the specific nurse characteristics needed to move the healthcare system to a Highly Reliable Organization makes sense at this time.

The current recruiting environment allowed me to focus on recruiting and training efforts aimed at developing the highest level of collective mindfulness in each nursing unit. I believe collective mindfulness develops over time as a team appropriately provides care and learns how to be resilient. Clearly, team stability has importance. Therefore, I measured the longevity of staff on a specific unit in order to identify the role of stability in creating Highly Reliable Organizations. I also believe that identifying and understanding the characteristics of a nursing staff are necessary to fortify the level of the team's collective mindfulness.

The healthcare system used in this study has typically rewarded characteristics achieved through further education and study. Specifically, nurses received money to pay for their certification examination and 500 dollars a year for maintaining certification in their area of practice. Upfront payment for the exam was a rate-limiting factor; therefore, the healthcare system lifted that barrier. Notably, the healthcare system enjoyed being in the top quarter of Magnet® organizations for having a high number of certified registered nurses practicing at patients' bedsides. Magnet® organizations are peer reviewed nursing organizations recognized for having better than average patient quality and patient

satisfaction outcomes (American Nurses Credentialing Center, 2013). The limited body of research finding that education and certification are beneficial in improving patient outcomes, according to Aiken et al. (2011), supports the healthcare system's decisions. In addition, the healthcare system pays a higher salary to nurses with a bachelor's degree, a practice that is not common in Central Pennsylvania, and offers tuition reimbursement for those nurses who would like to continue their education by earning a bachelor's degree. Achievement of a bachelor's degree in nursing results in higher pay for the nurse, a practice which rewards behavior that may lead to better patient outcomes.

Because HVBP has dominated healthcare, putting patient safety and quality secondary, a pressing reason exists to move to a Highly Reliable Organization. This program, as described earlier, will either help healthcare systems gain in a fiscal manner or put the organization at financial risk. Nursing represents more than 27% of the studied healthcare system's work force, a statistic that emphasizes the importance of focusing on nurse characteristics capable of generating collective mindfulness. As the Chief Nurse, I feel responsible for supporting the healthcare system's mission to promote the most efficient, highest quality care possible for the patients in our system. As commonly said, no money means no mission. Therefore, I must focus on appropriate spending which can help the studied healthcare system become a Highly Reliable Organization and achieve the highest quality, safest patient outcomes.

As a complex healthcare system, the system in this research study has complex patients. The diverse staff makes the system even more complex. Patients and the caregivers differ in each room. Educational levels, longevity in the profession, and other characteristics create a diverse nursing team. As a referral hospital, the system cares for

patients from throughout the Eastern and Central Pennsylvania regions, adding further to the complexity of the patients referred without a relationship to the physicians or the hospital.

The healthcare system has made great progress moving our organization toward a zero error status. An industry standard expects zero errors: no infections, no falls, no medication errors, and no preventable errors. Nurses want to provide a high level of safe care and never want to harm a patient. Some nursing units embrace protocols of care while being resilient. Other units have not had the same success. I have often wondered what makes the difference. Is it the number of nurses holding Bachelor of Science in Nursing (BSN) degrees, the longevity of the staff, the time working on the unit, or something else? What creates a mindful nurse?

As a Magnet® organization, the healthcare system prides itself on decision making done at the level closest to the patient, thus negating the hierarchy found in many other healthcare organizations. Magnet® organizations are nationally recognized by the American Nurses Credentialing Center for delivering high quality, excellent patient care (American Nurses Credentialing Center [ANCC], 2005). Patients deserve and expect highly reliable care without errors; it was my job to ensure the healthcare system's nursing staff always delivered this expectation, hence my primary motivation for this study.

Significance of the Study

Institutional Highly Reliable Organizations benefit from routines. Protocols such as Hourly Rounding® and evidence based care provide a standardization of care in the search for higher reliability. The healthcare system in this study used both rounding and

evidenced based protocols. Notably, Langer (1989) found that routines such as Hourly Rounding® created mindless individuals. Routines come with caution, as they may potentially become mindless acts (1989). More recently, Levinthal (2006) suggested that routines improve organizational mindfulness. As an example of routines employing the framework of Levinthal's research, Hourly Rounding® can instrumentally increase mindful behavior and move an organization toward higher reliability (2006). Staff need to remain mindful of their acts as they deliver care in a complex environment framed with routines such as rounding and other care protocols. This study reviewed a multiple hospital healthcare system that used Hourly Rounding® and evidence based protocols in an effort to become a Highly Reliable Organization. Since risks are heightened with mindless acts and high damage potential can lead to catastrophic consequences when mistakes occur in hospitals, care decisions made accurately and mindfully are of the greatest importance (Roberts, Stout, & Halpern, 1994).

This study measured mindfulness at the individual registered nurse level to identify the characteristics leading to a high level of mindfulness. The level of mindfulness was measured using the Mindfulness Organizing Scale. Units with a high level of collective mindfulness have better quality outcomes (Vogus & Sutcliffe, 2007b). High levels of *collective* mindfulness can be created through high *individual* levels of mindfulness. These compounding levels of mindfulness improve patient outcomes and create a culture of safety and high reliability (Vogus & Sutcliffe, 2007a). This research explored the characteristics of nurses in relation to mindfulness. The results will provide insights for developing mindful improvement interventions and thereby foster increased reliability in the delivery of healthcare within acute medical facilities.

Registered nurses provide the majority of patient care and create consistency. To create a high level of collective mindfulness in a unit, a high level of individual mindfulness must exist among the individual nurses. Understanding the nurse characteristics that relate to a high level of mindfulness will facilitate the development of plans to improve mindfulness within current employees and aid in the recruitment of nurses having the identified characteristics. Proper development and recruitment help foster Highly Reliable Organizations. Improving the level of collective mindfulness provides a foundation for building a Highly Reliable Organization (Weick & Sutcliff, 2007). That foundation will enable organizations to support their fiscal responsibility by developing and rewarding characteristics that increase individual mindfulness. Creating a high level of collective mindfulness can move an organization toward higher levels of performance and improve its ability to increase pay for performance. Currently, patient satisfaction (30%), patient outcomes (35%), and meeting the core measures (35%) are used to determine at risk payments (CMS, 2015). Core measures are prescriptive practices proven to improve patient outcomes. During 2015, *meeting the core measures* will be eliminated, *patient satisfaction* will make up 30% of pay for performance, and *patient outcomes* will create the other 70% (2015). Staff need to be mindful and not just follow prescriptive practices. It will take mindful acts to meet the requirements of improved patient outcomes; simply following routines serves only as a guide toward becoming highly reliable.

Healthcare systems reward, through payment, certain nurse characteristics in an effort to improve reliability and quality of direct patient care. Twenty-five percent of most healthcare organizations' operating budgets account for 40% of the direct care costs

(Aiken et al., 2011). Nursing represents the largest part of hospitals' budgets and, to remain fiscally responsible, healthcare institutions must monitor these payment practices for effectiveness. The search for high reliability has a multi-faceted approach with competing priorities.

Purpose and Objectives of the Study

This study sought to identify staff characteristics at the individual registered nurse level that create high levels of mindfulness, which, in turn, contribute to a high level of collective mindfulness. The Joint Commission (2013) has researched Highly Reliable Organizations and found the more reliable an organization, the better the outcomes, and the greater the organization's ability to adjust to safety issues over time. Thus, this study sought to identify specific characteristics that create a high level of mindfulness. The findings may be used for staff development and/or recruitment of new staff. The identification of these characteristics provides a road map of focused recruitment that will improve collective mindfulness at the unit level. This, in turn, will improve the overall levels of quality and safety of patient care. A high level of collective mindfulness results in improved quality patient outcomes and safety, consistent with fiscally responsible and Highly Reliable Organizations.

This study also sought to contribute to the body of knowledge related to Highly Reliable Organizations and nursing management. This work may stimulate further research on mindfulness. Perhaps this work will also assist policy makers by providing insights into developing ways to manage the development of Highly Reliable Organizations.

Moreover, recruiting and developing a mindful staff has favorable cost benefit consequences. Money spent on staff recruitment and development related to mindfulness will create a higher level of collective mindfulness, improving patient care and the financial situation of the healthcare organization (Vogus & Sutcliffe, 2012). The individual nurse serves as the unit of analysis for this research due to the need to establish individual mindfulness before achieving collective mindfulness. With the emergence of collective mindfulness, healthcare institutions can increase the probability of becoming High Reliability Organizations.

Design and Methods Overview

This quantitative study employed two existing established surveys. First, the Mindful Attention Awareness Scale (MAAS), created by Kirk Warren Brown and Richard Ryan (2007) was used to collect data on individual mindfulness in search of higher levels of midfulness. This scale acted as the operational definition of individual mindfulness. The MAAS measured college students, community adults, and individuals with cancer. Brown and Ryan (2003) found a single factor structure for the MAAS. The scale was found to be valid and reliable among the identified samples.

Second, this study employed the Safety Organizing Scale (SOS), created by Timothy Vogus and Kathleen Sutcliffe (2007) for measuring collective mindfulness. This scale acted as the operational definition of collective mindfulness. The SOS was tested with a nursing population and found to be a valid and reliable tool. Vogus and Sutcliffe (2007a) found that a higher level of collective mindfulness on a nursing unit resulted in better patient outcomes, creating higher reliability. The collective mindfulness score was found by averaging the individual mindful scores of nurses (2007a).

In this study, the survey data measuring individual mindfulness (MAAS) as well as the individual scores in the collective mindfulness assessment (SOS) were examined in relation to the individual nurses' characteristics in an effort to discover what characteristics create a high level of mindfulness and support a collective mindful way of thinking.

The research involved surveying 1036 bedside registered nurses within the healthcare system using a cross-sectional design. The individual responses were anonymous. I conducted an exploratory factor analysis on the MAAS tool since it was not previously tested within a nursing population. I also conducted factor analysis on the SOS to explore its appropriateness of measure to the study population. I then employed multiple regression methods to analyze the relationship between nurse characteristics and levels of mindfulness. Elimination of unit specific data occurred to insure the anonymity of the nursing staff.

Research Question and Hypothesis

Health care continues to become more complex, causing patient safety to grow as a serious concern. Healthcare institutions may achieve the prevention of undesirable outcomes. But as they focus on efficiency and, at the same time, strive to become Highly Reliable Organizations, the hunt for sustainability can easily overshadow the focus on safety. Mindless acts can lead to poor patient outcomes. Staff need to maintain a mindful state as they deliver care to patients. With this as a backdrop, the primary research question for this study asks: What characteristics of registered nurses affect their level of mindfulness? From this, the following hypotheses were developed:

- The higher the level of education of a registered nurse, the higher the level of mindfulness.
- Certification in a registered nurse's area of practice will result in a higher level of mindfulness.
- The nurse's age will affect the level of mindfulness.
- The nurse's longevity in the nursing profession will affect the level mindfulness.
- A nurse's longevity on a specific unit will affect the level of mindfulness.
- A nurse's employment status, defined as either full-time or part-time, will affect the level of mindfulness.
- Units with high collective mindfulness have more nurses with high levels of individual mindfulness.

Assumptions and Definition of Terms

The following sections provides an explanation of assumptions made by the researcher in relation to the study. Additionally, I present definitions of terms to clarify meaning for the reader and eliminate any ambiguity as these concepts are encountered within the context of the study.

Assumptions

Patient safety and nurse characteristics are not created equal. Patient safety, as measured by patient outcomes, differs among units. The literature review explores the journey of organizations toward high reliability and the nurse characteristics that create the high level of mindfulness needed in Highly Reliable Organizations. The current literature focuses on unit level characteristics and not on the individuals creating collective mindfulness. Once an understanding of the nurse characteristics that result in

increased levels of mindfulness is reached, developing a plan to support and develop such characteristics will become paramount.

Definition of Terms

Terms in this research may not be familiar, nor are they healthcare centric. Therefore, the following section defines the terms used in this study.

- Mindfulness – Quality of attention and rich awareness of discriminatory detail. One is aware of the context in which details differ and of deviations from expectations. Focused on clear and detailed comprehension of emerging threats, small failures are noticed and their distinctiveness is retained rather than lost in a category. Mindfulness can be achieved when one prevents the mind from wandering (Weick & Sutcliffe, 2007). As measured by the MAAS.
- Collective Mindfulness – The ability of a system to concentrate on the state of here and now (Weick & Sutcliffe, 2007). A high level of collective mindfulness occurs in a system where everyone within the organization is acutely aware of the smallest of failures in protocols or safety initiatives that can lead to catastrophic adverse outcomes (Chassin & Loeb, 2011). As measured by the Safety Organizing Scale.
- Organizational Mindfulness – The extent to which an organization captures discriminatory detail about emerging threats and creates a capability to quickly act in response to the findings (Weick & Sutcliffe, 2007).
- Mindful Organizing – A social process which is dynamic and comprised of specific ongoing actions rather than focused on organizational characteristics. It

becomes collective through the actions and interactions of the individuals (Vogus & Sutcliffe, 2012).

- Highly Reliable Organization – Mindfulness that averts the tendency toward inertia at an organizational level (Weick, Sutcliffe, & Obstfeld, 1999). HROs are preoccupied with failure, are reluctant to simplify interpretations, have sensitivity to operations, are committed to resilience, and have underspecified structuring (Weick & Sutcliffe, 2007).
- Hourly Rounding® – A tactic involving staff, registered nurses, and ancillary staff such as nursing assistants, rounding on patients every hour. The round includes assessing the patients' needs in regards to pain, toileting, and positioning (Sullivan & Charles, 2010).
- Quality Indicators – Measures used to measure the success or a failure of patient care.
- Safety – "Freedom from accidental injury." (Institute of Medicine, 2008, p. 58)
- Accident – An event that includes unintended damage to people or objects, affects the functioning of the system or person, and has unfortunate or untoward outcomes (Perrow, 1999).
- Incident – A failure or disruption of a system that does not affect a person or a system with unfortunate or untoward outcomes. Incidents happen more often than accidents (Perrow, 1999).
- Error – "The failure of a planned sequence of mental or physical activities to achieve its intended outcome when these failures cannot be attributed to chance" (Reason, 1990, p. 54).

- Registered Nurse – The professional member of a health care team on a nursing unit that directs patient care in the inpatient setting throughout a course of treatment.
- Patient Care Assistant – The unlicensed member of the patient care team. These members provide basic care to patients such as activities of daily living, which include bathing and toileting.
- Patient Care Team – The registered nurses and patient care assistants who provide direct care to an acute care patient twenty-four hours a day, seven days a week, while the patient is in the hospital. Physicians are not unit specific and move between units.
- Coupling – "There is no slack or buffer between two items. Large systems tightly coupled have more time dependent processes and sequences are fixed. When paired with complexity small failures can grow into large accidents" (Institute of Medicine, 2008, p. 59).
- Nursing Unit – A location where nursing care is provided by a defined team of registered nurses and nursing assistants to a prescribed group of patients based on diagnosis and acuity. A nurse manager administers the unit with an assistant.
- Protocols – Guidelines based on the evidence to assist registered nurses in caring for patients with specific needs and or disease processes. Guidelines are utilized with little to no guidance from physicians and or colleagues and are considered a recipe for care (Lippincott, Williams, & Wilkins, 2003).
- Failure to Rescue – The lack of prevention of deterioration at an early stage for patients while they are being cared for in a healthcare institution. This can be a

complication of underlying illnesses in which an adverse event may go unnoticed until death, prolonged illness, or permanent disability has occurred (AHRQ, 2013).

- Certification – Nursing certification represents a voluntary act completed to validate competency in the workforce for staff nurses who do not have an advanced degree (Kendall-Gallaher & Blegen, 2009).
- Evidence Based Practice – "The Process by which nurses make clinical decisions using the best available research evidence, their clinical expertise, and patient references" (ANCC, 2005, p. 78).
- Magnet Recognition – The highest level of organizational recognition by the ANCC. Three areas of focus are included to advance the practice of nursing: promote quality, deliver excellent care to patients, and provide a "mechanism" to share best practices (ANCC, 2005).

Limitations and Delimitations

Due to the limited research on nursing characteristics, this study adds to the body of knowledge in healthcare. Understanding what registered nurse characteristics improve patient outcomes is meaningful. The study's limitations include its use of a convenience sample in a cross-sectional design. Experimental design often proves difficult in healthcare organizations due to the risk of untoward outcomes resulting in patient injury or death.

A delimitation for the study relates to its sole focus on nurses. There are many members of healthcare teams other than nurses. However, as nurses subsume the greatest budgetary requirements and oversee most of the frontline patient care, this study will only

assess their level of mindfulness. Registered nurses serve as consistent members of the care team, providing care 24 hours a day, seven days a week. Due to the amount of contact with patients, nurses have the ability to respond to small fractures in care to improve patient outcomes. Physicians, respiratory therapists, physical therapists, patient care assistants, and others are all important members of the team; yet, they were not part of this study. Concentrating on the nurses provided a positive focus for this research of mindfulness, as they are the ones who can see the subtle changes in the patient and overt human errors by identifying near misses and changing patient conditions. The registered nurse communicates with the physicians and other members of the team to create a picture of the patient's needs based on the 24 hours of care.

Because routines, standardization, and the makeup of the care team differ among organizations, the study's generalizability is limited. However, the large number of nurses and nursing unit types in the sample assisted in minimizing this limitation. Further, there is a limited body of research addressing patient safety that is achieved through mindfulness and collective mindfulness. This research adds to that body of knowledge. Understanding the micro level of individual mindfulness will build to the macro, collective level of Highly Reliable Organizations.

Summary

Little research exists on the characteristics that create a high level of mindfulness in registered nurses. High-risk industries such as aviation, nuclear power plants, and the petroleum industry provide a model recently adopted by healthcare systems seeking to become Highly Reliable Organizations. Chapter Two explores the Normal Accident Theory and High Reliability Theory as both provide a foundation for organizations

striving to become Highly Reliable Organizations. Highly Reliable Organizations develop from a group level of collective mindfulness (Weick & Sutcliffe, 2007). Collective mindfulness results from higher levels of individual mindfulness (Vogus & Sutcliffe, 2007b). Collective mindfulness at the organizational and unit levels can best be achieved by improving individual mindfulness.

Chapter Two focuses on the literature supporting the framework for this study, provides a brief history capturing the evolution of the High Reliability Theory, and explores the collective mindfulness found in Highly Reliable Organizations. The work of Weick and Sutcliff (2007) related to understanding mindfulness will serve as the framework used to define mindfulness at the individual level.

Chapter Three provides an explanation of the methodology for this study, while Chapter Four offers a review of the model development and a description of the final model. Chapter Four also includes regression criticism (in an effort to validate the findings), highlights of the results, and a brief overview of the findings.

In Chapter Five, I discuss the research question and the hypotheses in light of the findings from the regression analysis. The chapter also includes a discussion of key recommendations for addressing the findings, a review of the limitations and delimitations, and recommendations for future research.

CHAPTER TWO

LITERATURE REVIEW

This chapter explores the evolution of Highly Reliable Organizations through theory development. Industries such as nuclear power, aviation, and healthcare have become increasingly complex and technologically advanced. As these organizations have evolved, the development of organizational theory has focused on safety in response to accidents occurring in complex, high technology organizations. This research focuses on the nurse characteristics within the complexity of a working hospital and investigates evidence of characteristics in relationship to individual mindfulness, which results in collective mindfulness.

A registered nurse must be in a state of mindfulness to enhance a nursing unit's level of collective mindfulness and provide a high level of quality care and safe patient care (Vogus & Sutcliffe, 2007b). For complex systems to become Highly Reliable, researchers found that fostering a high level of mindfulness in these tightly coupled, complex organizations has a positive effect (Weick & Sutcliffe, 2007). A need to understand the levels of individual and collective mindfulness, and address the weaknesses, has become necessary to move an organization toward high reliability.

Human error can be attributed to most accidents in any industry (Institute of Medicine, 2008). Human error haunts healthcare because of its organizational complexity, which increases the probability of occurrences (Perrow, 1999). The healthcare industry depends on the staff to be in a state of mindfulness. Identifying the registered nurse characteristics that create a high level of mindfulness may provide one

avenue for improving the ability of healthcare organizations to achieve a high level of collective mindfulness, which will yield a Highly Reliable Organization.

Historical Background

In the past, the solution to hospital quality and safety issues has sometimes appeared clear, and many have declared victory over these problems (Chassin & Loeb, 2011). Chassin, president of the Joint Commission, reviewed previous declared victories by Ignaz Seemel-Weis, who instituted hand washing; Florence Nightingale, who focused on soldiers' living conditions; and Earnest Codman, whose focus was on hospital standards (2011). Despite these previous gains, hospital safety continues to be under greater scrutiny because the battle with patient safety rages on. Although the previously mentioned pioneers in healthcare safety have saved countless lives, their findings did not move the complex healthcare systems of today toward becoming Highly Reliable Organizations.

In the 1960s, Medicare's formation created greater access to healthcare, which increased the focus on safety (Chassin & Loeb, 2011). During that time, Avedis Donabedian (1966) worked on a framework for healthcare quality, finding quality as measured by assessing structures, processes, and outcomes of care. Donabedian's work was the beginning of better patient outcomes and hospital safety, yet his work did not lead to what makes hospitals Highly Reliable Organizations. Change for improvement moves on a long and difficult path in healthcare. Notably, Balas, and Boren (2011) found that it takes 17 years of research into best practices in healthcare before a standard becomes a best practice. Because the change to best practices takes so long, staff mindfulness must arguably be present to ensure a safe patient environment in the present.

Historically, healthcare can be described as a Weberian bureaucracy with a hierarchical decision making structure (Institute of Medicine, 2004). Kathleen Roberts (1990) encouraged healthcare organizations to move to a transformational process with built in redundancy in work design and equipment creating a safer environment. Blatt, Christianson, Sutcliffe, and Rosenthal (2006) indicated that 22% of errors occurred with staff knowing a critical error was occurring; yet, due to the existing hierarchy, they chose not to intervene. Eliminating the hierarchal nature of healthcare by development a mindful, resilient staff is necessary. Achievement can occur through transformational leadership. Barriers can be eliminated and mindful leaders and staff closest to patients can coordinate their care (2004). Aligning goals for patient safety with mindful staff having redundancy, accountability, and rewards will lead to Highly Reliable Organizations (Roberts & Bea, 2001).

Human Error

Human error accounts for 60-80% of accidents in healthcare systems (Institute of Medicine, 2008). James Reason (1990) found a renewed interest in human error with the emergence of large scale potentially hazardous technologies; technologies can now have adverse effects on whole continents and over several generations. For more than 10 years, human error concerned Reason—from the 1977 Tenerife runway collisions, to the 1988 Piper Alpha oil platform explosion and the Three Mile Island (TMI) event in 1979 (1990).

In Highly Reliable Organizations, all healthcare workers must prevent errors. Error prevention can be achieved when organizations understand why and how errors occur. According to Reason (1990), human error takes limited forms and tends to be rarer

than would be expected. The three major elements associated with an error include the task and the environmental circumstances; the mechanisms governing performance; and the individual. Reason stated that an understanding of the nature of errors would allow for a forecast of the conditions in which the error will occur and the form it will take (1990). The predictability of errors raises the expectation that errors are controllable within the healthcare setting. But the unpredictable and unfolding nature of healthcare poses significant challenges for preventing errors (Blatt et al., 2006). There are two basic types of errors: lapses and mistakes. Slips take the form of human error or lapses when actions do not go according to plan. Mistakes occur when a plan fails to achieve the objectives (1990).

Often, when a lapse in reliability happens, the involved staff members tend to be unaware until the consequences occur (Blatt et al., 2006). Blatt et al. (2006) found that little ability exists among staff to manage lapses or human errors in real-time. The researchers stated that healthcare members often find themselves in situations where the consequences of the lapse or error have already occurred before being noticed. Such findings support the notion that failure to address small fractures will result in mistakes created by human errors.

Theoretical Framework

High-Risk Industry Theories

There are two main theories addressing safety organizing around high hazard technology organizations: Normal Accident Theory (NAT) and High Reliability Theory (HRT) (Vogus & Sutcliffe, 2012). After the Three Mile Island disaster, NAT pushed to the forefront as a safety theory in high technology, highly complex organizations. NAT

posits that accidents are inevitable in certain systems, although rare accidents are "normal" in complex systems due to high technology (Perrow, 1999). NAT focuses on studying the causes of accidents and errors that have already occurred (Institute of Medicine, 2008).

In contrast, HRT focuses on the prevention of accidents occurring through changes in organizational design and good management (Institute of Medicine, 2008). A commitment to safety, redundancy, and a strong safety culture with a willingness to change promotes high reliability (Roberts, 1990). Accidents are rare, but when they do occur, the HRT suggests viewing them as an opportunity to redesign processes (2008).

High performing healthcare organizations must seek to eliminate human errors to become Highly Reliable Organizations. Mark Chassin (2013), president of the Joint Commission, states that the ultimate goal must be zero errors. Learning from the aviation and nuclear industries, Chassin (2013) feels that major progress in patient safety will not occur until zero errors becomes an organization's goal.

Normal Accident Theory

Significantly, Perrow's work (1999), with its focus on human error, led to the development of NAT, which focuses on the macro level of organizations; a technological, structural perspective drives the theory. Perrow's work following the TMI event was influenced by other high-risk technologies (Weick, Sutcliffe, & Obstfeld, 1999). Perrow established the foundation for NAT, which continues to be built upon today. The Swiss cheese analogy, as described by Reason (1997), illustrates the conceptual framework of NAT. It does not matter how many slices of cheese there may be or how high they are piled. The holes will eventually line up, and the established defenses will be breached

(Cooke & Rohleder, 2006). Normal accidents, as defined by Perrow (1999), are system failures which happen in many industries beyond the nuclear industry. They include high technology industries that are tightly coupled, well-run, and focused on safety. Tightly coupled organizations have a high degree of action in one part of the system that quickly affects other parts of the system (Weick & Sutcliffe, 2007). Tight coupling, complexity, and the errors that result in catastrophe define high-risk systems (Perrow, 1999).

Perrow (1999) found that four independent failures caused the TMI event. The four failures were small, and none of the operators were aware of the small fractures. Therefore, the system caused the failure, not the operators (1999). Perrow hypothesized that any system in which elements are tightly coupled and interactively complex will have accidents as part of their normal functions (Perrow, 1994). No way to eliminate accidents or disaster exists for those working within these systems. Perrow (1994) stated that either changes from tight to loose coupling or from interactively complex to linear transformation systems would decrease the chances of accidents or errors, but such changes would not totally eliminate all errors (1999).

Perrow (1999) also identified the risk of familiarity. Managing interactive systems involves dealing with the problem of complacency, which stems from a level of familiarity with smoothly functioning systems. Unfortunately, such complacency comes with staff not being alert and searching for the extremely rare event. Systems become accident-prone when unexpected interactions of small failures go unnoticed (1999). A cause for concern exists with familiarity in healthcare, especially among the nursing staff. Following routines, staff can practice mindless acts while providing complex patient care.

Thus, to become a Highly Reliable Organization, staff must always be mindful when providing care.

According to Cooke and Rohleder (2006), catastrophic accidents such as the 1986 Challenger explosion, the 1992 Westry Mine explosions in Nova Scotia, and the 1997 Shell chemical plant disaster occurred due to a failure to synthesize and share information from *precursor incidents*; therefore, appropriate action was not taken to reduce the risk of error. While the ability to completely eliminate errors in complex organizations may prove improbable, the ability to significantly reduce errors in these organizations does exist (2006). Cooke and Rohleder (2006) stated that the previously mentioned events had precursor events, and a focus on small fractures, as described by Perrow (1999), could have decreased the level of devastation that occurred (2006). Mindfulness would have focused staff on the small fractures; collectively, they may have synthesized information concerning the small fractures and avoided, or at least lowered, the level of devastation.

Accepting accidents as a part of doing business represents an unacceptable thought (Institute of Medicine, 2008). However, NAT provides hope. Perrow (1999) found that the number of accidents decreases when the causes of the accidents are studied, and then changes are made for the future (2008). Highly Reliable Organizations review and learn from their mistakes so as not to repeat them. Perrow (1999) acknowledged the inability to completely negate errors, due to interactive complexity and tightly coupled systems; no matter the focus, there will always be major failures. However, Perrow (1999) argued that accidents are avoidable when those closest to the situation have quick decision making abilities, are able to immediately sense the potential problem, and can reduce the consequences of errors. Only quick decisions can decouple

the path of the error (Roberts, Stout, & Halpern, 1994). Thus, nursing staff need the highest level of mindfulness and also the ability to act at the level of care delivery. Healthcare systems play a role creating a culture of safety in which those closest to care may appropriately question and adjust care to avoid potential errors. Hospital hierarchy is an area of further study.

High Reliability Theory

In contrast to NAT and pursuant to HRT, accidents are preventable through organizational design and management (Institute of Medicine, 2008). Characteristics of the HRT include an organizational commitment to safety; high levels of redundancy in personnel and safety measures; and a strong organizational culture for continuous learning and willingness to change (Sagan, 1993). Early characterizations of HRT used in Highly Reliable Organizations emphasize the total elimination of error and the absence of trial-and-error learning (Weick, 1987). HRT focuses on safety with careful attention to design and procedures, learning through simulation, redundancy, decentralized decision-making, and a culture of responsiveness to potential accidents (LaPorte, 1994). Staff need to be mindful as they assess patients and deliver care.

NAT theorists criticize HRT theorists for neglecting the complexity of environmental influences affecting the single-minded pursuit of safe operations. HRT theorists challenge NAT, stating that the theory disregards conditions in which a tightly coupled system can be built with interactivity so the system will not fail (Weick, Sutcliffe, & Obstfeld, 1999). Weick, et al. (1999) support the thinking of HRT and believe that, through a systems approach, safety within systems can be built. Further development of HRT has led to theorist Rijpma (1997) finding that overall reliability is

built through interactive complexity and tight coupling. Complexity and tight coupling motivate staff to create more redundancy in a system, favor the development of multiple theories of system functioning, and encourage continual learning. This, in turn, discourages complacency by early identification of small fractures (1997). As the HRT represents the foundation for Highly Reliable Organizations, nurses must be mindful at all times to avoid those human errors creating preventable errors. However, doing so in complex organizations proves difficult.

Healthcare Complexity

Blatt et al. (2006) described the complexity with which healthcare activities and cognitions unfold over time. Uncertain medical work entails significant ambiguity and dynamism. Thus, healthcare providers may work with incorrect diagnoses or changing circumstances, and at times they may lack the skills or knowledge to handle problems appropriately (2006). While Perrow did not identify healthcare as a complex system; others suggested that healthcare *has* become complex and tightly coupled as the complexity of both patients and technology has increased (Cook, Woods, & Miller, 1998). More precisely, the Institute of Medicine (2008) noted that healthcare organizations are tightly coupled and prone to accidents created by their complexity. Rarely do the people involved in complex organizations observe the compounding coincidences causing systems to fail. Complex and tightly coupled systems can create *nasty surprises* (Reason, 1990). Healthcare systems have complexity; one component can interact with others. Often, errors are invisible and unexpected (IOM, 2008a).

Although some identify healthcare as predictable and routine when caring for patients, these patients are actually variable and unpredictable, and this makes healthcare

even more complex (Blatt et al., 2006). The thought of routines may place organizations at risk. Blatt (2006) explained that healthcare's variability comes from varying clinical conditions which patients present. For example, patient conditions may evolve or change over time. Transitions and handoffs of the healthcare team can take place, and care delivery may occur in a variety of settings. Each of these examples adds to the complexity of the healthcare team. Additionally, the frequently changing composition of team members who often have little experience working together further adds to the complexity (2006). The changing nature of the team makes healthcare different from other high-risk organizations where teams are developed to work together in their high-risk industries. The system complexity and the reality of the ever-changing patient and healthcare team create a need to develop a level of individual mindfulness that produces a higher level of collective mindfulness. Thus, a safe environment is created with a unit level collective mindfulness. Each unit creates a constant level of collective mindfulness through the members of its team. This aids in dealing with the complexity of care and leads to a Highly Reliable Organization.

Highly Reliable Organizations

A focus on safety and the avoidance of accidents have led complex organizations to strive to become Highly Reliable Organizations. Highly Reliable Organizations work within difficult, complex conditions, while experiencing fewer accidents than comparable organizations who have not become highly reliable (Weick & Sutcliffe, 2007). An organizational goal in healthcare systems must be safety. But many safety goals conflict with other goals in healthcare systems. For example, emergency room wait times, fast lab results, accurate lab results, and efficiency sometimes conflict with the focus on safety

(Carol & Rudolph, 2006). Through enrichment via implementation of NAT and HRT, systems strive to become Highly Reliable Organizations. The processes in Highly Reliable Organizations provide a cognitive infrastructure with adaptive learning and reliable performance (Weick, Sutcliffe, & Obstfeld, 1999). Becoming a Highly Reliable [healthcare] Organization is best described as a journey toward a destination: the wellbeing of the entire organization and the patients receiving care. Weick (2013) noted that a recipe for Highly Reliable Organizations does not exist, explaining that the Chief Nurse must focus on the staff's level of mindfulness. As staff members develop higher levels of individual mindfulness, a higher level of collective mindfulness will merge, resulting in significant advancements toward achieving high reliability as an organization (2013).

Furthermore, Highly Reliable Organizations have the capacity to continuously and appropriately manage working conditions (Weick, Sutcliffe, & Obstfeld, 1999). As an ongoing accomplishment, reliability requires chronic suspicion that small deviations may enlarge, and people must understand inertia as a complex state (Weick, 1987). High reliability is achieved through employees who are mindful in their immediate work and in aggregate with other individually mindful workers. This creates a high level of collective mindfulness (Weick & Sutcliffe, 2007). Organizations without high reliability, on the other hand, have underdeveloped cognitive processes that cause people to focus on success and efficiencies rather than reliability (1999).

A hospital becomes a Highly Reliable Organization through continuous development obtained via staff being individually and collectively mindful in their immediate work (Weick & Sutcliffe, 2007). Becoming a Highly Reliable Organization is

an evolutionary process based on the patient outcomes achieved through the staff's collective mindfulness (2007). Being in a state of continuously uncovering safety concerns enables healthcare organizations to address and fix mistakes or errors before they become catastrophic (Chassin & Loeb, 2011). Most healthcare organizations provide care based on evidence based practice. Yet, the organizational complexity and the presenting patients' variability do not allow for a cookbook method to becoming a Highly Reliable Organization.

The work of Karl Weick and Kathleen Sutcliff (2007), who have completed research on collective mindfulness and its effects on the culture of Highly Reliable Organizations, will serve as the backdrop and grounding for this study. This research rests on the premise that Highly Reliable Organizations' cultures are built on the concept of collective mindfulness, which can be achieved only through individual mindfulness (Langer, 1989). Weick and Sutcliffe (2007) identified five principles that create Highly Reliable Organizations in complex organizations. The first three principles focus on anticipation, and they include: preoccupation with failure, reluctance to simplify, and sensitivity to operations. The final two concepts address commitment to resilience and deference to expertise (2007). The following sections will further explore the five principles and their relationship to individual mindfulness and collective mindfulness as they relate to healthcare organizations becoming Highly Reliable Organizations.

Preoccupation with Failure

Mindfulness failures must be anticipated and diverted. There are two themes within preoccupation with failure. First, close attention to weak signals of failures must be maintained, and it must be made clear what types of mistakes will not be tolerated

within the organization (Weick & Sutcliffe, 2007). Tracking small failures means that staff members within Highly Reliable Organizations treat any lapse as a symptom that something may be wrong and could have severe consequences if several such small situations coincide. Highly Reliable Organizations encourage the reporting of such errors; they learn from near misses, no matter how small the lapse; they focus on not being complacent; and they resist the temptation to reduce safety margins by drifting automatic processing, all while continuing to articulate mistakes made and improving processes so the mistakes do not trigger other mistakes (2007).

In tightly coupled organizations, the reporting of small mistakes or "minor" abnormalities requires a mindful staff collectively changing the course of action for a patient. Lab results, test results, and abnormal vital signs—when viewed alone—may be seen as weak signals. Together, they can create a holistic diagnosis much different than the sum of the parts. The team's collective mind creates the safe, appropriate plan.

Reluctance to Simplify

A Highly Reliable Organization seeks to keep the staff from moving toward a state of mindlessness. The staff must have an ongoing renegotiation of routines and a focus as to how, as an organization, they will fight the drift toward a state of mindlessness (Weick, Sutcliffe, & Obstfeld, 1999). Tasks and details, such as routines, lie within categories. Highly Reliable Organizations must exercise caution when simplifying mindless tasks in which small changes can go unidentified (Weick & Sutcliffe, 2007). Roberts (1994) found that individuals with the greatest amount of longevity, regardless of rank, made more decisions. Routine and non-routine decision patterns change in response to tenure, accumulation of experience, and training knowledge (1994). Roberts' findings

are different from the work of Chang, Chou, and Cheng (2006) in terms of tenure related to nurses, a topic discussed later in this chapter. The findings of Chang, Chou, and Cheng bring into question the role longevity plays in collective mindfulness.

The dynamic variation residing within complex organizations challenges Highly Reliable Organizations and their routines. Reliable outcomes are the result of stable processes or routines while mindful acts within complex organizations will uncover unintended consequences before they occur (Weick, Sutcliffe, & Obstfeld, 1999). Only mindful staff with high levels of collective mindfulness can make routines and backup systems within these complex systems highly reliable. Highly Reliable Organizations recognize that success can breed complacency. They reduce the temptation to reduce safety margins and drift into automatic processing (Weick & Sutcliffe, 2007). Highly Reliable Organizations implement safety procedures, yet the improvements are often inconsistent (Leape, 2002). Routines can lead to employees performing mindless acts, and early warning signs can be lost.

Hourly Rounding®, a scripted process used in many healthcare organizations to improve patient safety, represents an example of a routine utilized by the healthcare system being studied. Hourly, the staff members round on their patients, making visits that are focused on each patient's position, the existence of pain, the arrangement of personal possessions, and the need for assistance to the bathroom (Studer, 2003). If Hourly Rounding® becomes a mindless task of automation, the risk of accidents increases, as small signs would not be picked up. However, Hourly Rounding®, done mindfully, has the ability to decrease patient falls and facilitate the discovery of early warning signs of patient conditions.

March and Olsen (1989) studied routines and found that when delivered or re-enacted, each routine unfolded a bit differently. These scholars noted that information could be lost unless continuous mindful awareness of variations existed. Hourly Rounding® can afford such an opportunity when done mindfully. The structure of hourly rounding with the complexity of staff and patients allows for the routine to give information of small changes indicative of early identification of changes in patients' conditions.

Sensitivity to Operations

Weick and Sutcliffe (2007) define sensitivity of operations as the need to monitor and to be mindful. Remaining sensitive to operations may best be achieved with attentive staff on the frontlines. Staff trained to focus on situational awareness make continuous adjustments and prevent errors from accumulating and enlarging. In Highly Reliable Organizations, staff notice anomalies while they are still tractable and isolated; Highly Reliable Organizations maintain close ties between sensitivity to operations and sensitivity to relationships (2007).

Roberts, Madsen, Desai, and Van Stralen (2005) found that introducing high-reliability practices, as previously described, leads to an integrated picture of operations in the moment, early detection of potential threats to safety occurs, and staff who are consistently alert to the possibility that they may have missed something. Mindful states are important to seeing the big picture, and early recognition of small errors can prevent disaster in high-risk places such as hospitals. Organizations must instill mindfulness qualities into an organization. These include reluctance to simplify, sensitivity to

operations, commitment to resilience, and deference to expertise (Weick & Sutcliffe, 2007).

Systems such as hospitals, nuclear power plants, and aircrafts cannot become highly reliable by means of trial and error due to the fact that the causes of errors in such systems are not able to be contained. Either the system must become less complex, or the humans must become more complex (Weick, 1987). In most reliable systems, objectives and corresponding structural elements and relationships are adjusted quickly in the face of changing environmental conditions (Bigley & Roberts, 2001). Weick encourages substitutes for trial and error, including stories, simulations, and imagination, which can create a higher level of mindfulness (1987). By separating the variation and creating stability through routines of process cognition, one can see patterns of activity which can produce reliable outcomes when staff are mindful (Weick, Sutcliffe, & Obstfeld, 1999). With successful training, there is no pattern to the errors, which often are randomly distributed and difficult to predict, creating an additional need for sensitivity to operations (Weick, 1987). Lack of sensitivity can lead to inconsistent patient outcomes. A possible explanation for the inconsistency could be that the organization neglects the informal aspects of procedures and the need to remain mindful (Katz-Navon, Naveh, & Stern, 2005).

Commitment to Resilience

Resilience requires being mindful of errors and working to correct them before they cause serious harm or worsen. Resilient staff mitigate and anticipate using their expanding general knowledge to stop preventable errors (Weick & Sutcliffe, 2007). Blatt et al. (2006) stated that healthcare silence negatively affects resilience, and limited

silence puts High Reliability Organizations at risk. These researchers found the healthcare team's decision to either voice concern or remain silent affected mindful acts during critical moments. Much of the decision to remain silent or to voice concern depends on the social positioning of the person discovering the lapse. Residents, aware of being novices, sometimes self-censor and remain silent. Self-censorship may also take place when a healthcare team member fears retaliation from those who have power within the hierarchy of healthcare. Organizations must be mindful of how relationships guide the team members away from voice to silence (2006).

Blatt et al. (2006) found that professional norms come into play when providing patient care. The nurses are often the voice of the patient, but the hierarchy and the multifaceted nature of the team can lead members of the team to remain silent. Such tactics destroy the focus of resilience in Highly Reliable Organizations.

Blatt et al. (2006) found two competing approaches to achieving reliability. First, an approach focusing on prevention requires organizations to anticipate and identify events, as discussed earlier. Second, an approach focusing on reliance maintains appropriate adjustments under challenging conditions (2006). Highly Reliable Organizations encourage the reporting of errors, independent of rank. They elaborate on near miss experiences and learn from them. A commitment to resilience means one will be surprised every day; therefore, change must be responded to quickly by drawing from previous knowledge and developing new knowledge (Weick & Sutcliffe, 2007).

Programs such as the Speak Up Campaign focus on the need to give voice to patients and any level of employees within healthcare systems; they are encouraged to "speak up" when situations do not seem right (The Joint Commission, 2012). These

programs further enable resilience by drawing attention to small fractures involved in the patient's care. Nurses play a big part in the resilience of hospitals; they remain the only members of the healthcare team that are with the patients 24 hours a day, seven days a week. When mindful nurses identify the small fractures leading to an error, they need to feel safe to monitor and report the fractures. Organizations need to develop a process to stop potentially unsafe practices and assure accuracy. Until the hospital achieves such a process, mindful nurses will not stop untoward events from occurring with their patients (Kemper & Boyle, 2009). While being resilient, staff must remain free to speak up without reprisal, disdain, or shaming even when they are not the highest-ranking team members.

Deference to Expertise

The ability to speak up, irrespective of hierarchy, closely aligns with resilience. This alignment partially exists because hierarchical positioning within organizations fails to align with expertise (Weick & Sutcliffe, 2007). Administrators and other "in–charge" persons must come to understand that the nurses at the bedside are often in the best position to make clinical decisions. The current staff of registered nurses are closest to the decision and have a better set of knowledge to make an informed decision. Healthcare organizations are highly bureaucratic; they are highly structured with areas of standardization, specialization, formalization, and hierarchy that are intended to lead to efficient functioning. While such bureaucracy works well in stable operating conditions, it does not work during times of complex and unstable environmental situations. Due to their bureaucratic nature, Weberian organizational systems become more unreliable as situations become more complex and unpredictable (Bigley & Roberts, 2001). Due to the

complexity of healthcare organizations, no one design presents the safest or the best approach for all organizations at all times (Carol & Rudolph, 2006). To achieve high reliability as an organization, the staff must work mindfully in a collective manner, making adjustments, as needed, at the patient level.

Roberts, Stout, and Halpern (1994) studied two highly reliable military organizations and found that the decision processes in Highly Reliable Organizations change often; important decisions are made by a number of people, even at the lowest levels of the organization. These researchers discovered that organizations believed to be very hierarchical—for example, the United States Navy—utilized decision-making that was not informed from a single set of norms. The findings were in three areas: accountability, routine versus non-routine decisions, and environment. Roberts et al. (1994) found that the level of accountability that emerged from the study differed from their original hypothesis. Prior to the study, the researchers felt that accountability was extreme, and the ability to make a better decision required in-depth consideration of many alternatives before making a decision. Instead, the study revealed that quick decisions were of a higher priority. They had to be made at the point when the problem was found through the collective mindfulness of the group closest to the situation (1994). Imagine a clinical decision made by the manager or director of an area rather than by the staff closest to the patient. The tightly coupled system will see failures if the decisions are made in a hierarchical, bureaucratic manner by a mindless team.

Accountability can become problematic when it leads to feelings of high responsibility. This can cause one to send the decision up the chain of command rather than act upon it. The accountability factor can be a double-edged sword (Roberts, Stout,

& Halpern, 1994). Accountability has importance in health care, just as it does on an aircraft carrier, since decisions must be made in a timely manner and by those closest to the situation. Ignoring small errors or waiting for direction from those with authority may lead to devastating outcomes. Healthcare decisions need to be based on the evidence and are to be as routine as possible. Mindful staff closest to the decision point should make the decisions. In health care, timely evidence-based decisions should be made by mindful registered nurses. Nurses should be able to practice at the top of their license without permission.

Roberts et al. (1994) also studied the healthcare environment and found that when there is political pressure and concerns are high, decisions are made at a higher level. Organizations focused on becoming highly reliable make decisions at the point of problem sensing, with the majority of decisions made at the lower hierarchical level (1994). Therefore, the healthcare system's environment must create a safe, non-hierarchical culture that allows for patient safety and achieves positive outcomes. Input from the patient and those closest to the patient's care are necessary to make this possible. Roberts et al. (1994) stated that efforts to increase performance should be directed at both accountability and empowerment. Healthcare often presents as an uncertain environment. Robert et al. (1994) specifically found that in uncertain environments, those individuals closest to the problem stimuli are better able to react quickly and make informed decisions. Such decisions are best if made by mindful individuals working within a team that has high levels of collective mindfulness.

Summary of Highly Reliable Organizations

According to Roberts et al. (1994), there are four important characteristics affecting organizational decision-making in Highly Reliable Organizations. Such organizations are typically technologically complex; their technologies are highly interdependent; they have high damage potential; and errors happen relatively rarely, as stated in the NAT and HRT (1994). Highly Reliable Organizations have the capacity to produce repeated minimal quality outcomes based on collective mindfulness (Hannan & Freeman, 1984). Hannah and Freeman (1984) found that Highly Reliable Organizations are developed through highly standardized routines, and these routines create reproducible actions or patterns which can then be linked to antecedent of inertial tendencies (1984). Bigley and Roberts (2001) recognized that standard routines—which may need to adapt to current situations—are a part of Highly Reliable Organizations. Improvisation becomes legitimate and supported only to the extent that it is within organizational goals and not likely to cause harm to the provider or anyone else (2001). In healthcare, this improvisation includes staff functioning within their scope of practice and at the level their license allows them to practice. Bigley and Roberts (2001) found freelance behaviors, defined as behaviors not directed or supported by goals objectives and approaches, are at risk of creating increased hazard potential in the situation. Therefore, preventing human errors depends on collective mindfulness.

Studies have suggested a curvilinear relationship between the formal processes of an organization and its performance (Brown & Eisenhardt, 1997). Employees' perceptions of too many detailed procedures interferes with the daily workflow; such procedures can be viewed as bureaucratic complications and seen as a burden they must

carry to do their jobs (Katz-Navon, Naveh, & Stern, 2005). In health care, attempts are often made to simplify, but this practice conflicts with Weick and Sutcliff's findings (Weick & Sutcliffe, 2007). Routines such as Hourly Rounding® and other formal processes may actually be placing an organization at risk because the acts become mindless based on their routine nature—unless mindfulness and collective mindfulness are organizational expectations. When failures are not acted upon, established routines create a state of mindlessness. In such an environment, staff function on automatic pilot, remaining fixated on a single perspective and moving away from a preoccupation with failure (Weick, Sutcliffe, & Obstfeld, 1999).

Complex organizations, such as acute hospitals, present a nearly impossible structure for predicting and defending every hazardous situation. Carol and Rudolph (2006) stated that organizations must defend against interruptions to become Highly Reliable Organizations. Interruptions saturate nursing in acute care hospitals, making mindfulness an important part of the daily routine when ensuring patient safety and becoming highly reliable are the goals. In Highly Reliable Organizations, the front line staff must have the ability to avoid hierarchy and have flexibility while being held accountable. This scenario is best built through culture and mutual respect (2006). Collectively, staff need to work together to achieve the greatest outcomes.

Collective Mindfulness

Numerous definitions of collective mindfulness exist. Collective mindfulness subsists where individuals who work together are acutely aware of the smallest fractures and focus on safety protocols and processes to negate a lapse leading to a catastrophic event or outcome (Chassin & Loeb, 2011). Chassin (2013) described collective

mindfulness as a passionate commitment to excellence, permeating the daily actions of the workers and creating a nearly perfect culture in which safety procedures become the norm. Collective mindfulness can be compared to organizational learning, just as individual mindfulness can be compared to an individual's learning (Butler & Gray, 2006). In complex organizations that are not always predictable, a need exists for continuous interrelated activities which synthesize, construct, or represent a capacity for comprehension in collective action. It is a level of collective comprehension that no one person could possess in his or her individual mind. Highly Reliable Organizations achieve a high level of safety through this collective mindfulness (Bigley & Roberts, 2001). An organization's responsiveness can then be identified as important in the development of collective mindfulness.

Limited research exists on the combined benefits of contextual factors such as hourly rounding and collective mindfulness. A study conducted on reported medication error in hospital nursing units found that safety organizing, also known as collective mindfulness, was key to improving safety on hospital nursing units. When complimented with a supportive safety system, trusted leadership, and care pathways utilized to provide evidence based care, this finding clearly becomes true (Vogus & Sutcliffe, 2007b).

In a quantitative study on mindful organizing (also known as collective mindfulness), Vogus and Sutcliffe (2007a) found that the higher the level of collective mindfulness the fewer the medication errors and patient falls. In a later study, Vogus and Sutcliffe (2007b) found that extensive use of standardized care protocols, paired with high levels of mindful organizing, resulted in fewer medication errors over time, providing evidence in support of Highly Reliable Organizations. As described earlier,

Highly Reliable Organizations' outcomes are collective in complex organizations; collective mindfulness provides a way in which diverse stable processes that are interrelated can discover and correct errors (Weick, Sutcliffe, & Obstfeld, 1999). Vogus and Sutcliffe (2007b) found the higher the level of collective mindfulness, as measured by the SOS, the better the quality and safety, as measured by medication errors and patient falls.

Westrum (1988) found that organizations willing to act on specific hazards are those willing to see them and think about them. Staff can bring these new variables or findings under their control and have the ability to act on them, allowing them to enlarge the range of issues they can manage in a mindful manner. Westrum (1998) noted that if people are blocked from acting on hazards, they quickly feel their findings are useless, and the cumulating findings go unnoticed. Instead, as Westrum (1998) found, a state of mindfulness becomes a state of action when staff are empowered to act on hazards. This leads to the stable and continued development of routines that can further manage unexpected events and can be collectively achieved at the highest level in complex organizations (Weick, Sutcliffe, & Obstfeld, 1999). The five elements of Highly Reliable Organizations can only be achieved through collective mindfulness (Weick & Sutcliffe, 2007). Collective mindfulness occurs at the highest level only when mindful staff support and are supported by the organization.

Mindfulness

Mindfulness, rooted in Buddhism, has evolved in western culture, creating a slightly different meaning as it relates to Highly Reliable Organizations. Mindfulness is best described as being in the moment, preventing accidents by inquiry with

interpretation, and acting on the findings (Weick, Sutcliffe, & Obstfeld, 1999). Mindfulness can also be defined as attention to the present events and experience and awareness of surroundings (Brown, Ryan, & Cresswell, 2007). Dane's (2011) research found that mindfulness research and its effects on the workplace are underdeveloped. The majority of the research has focused on health, well-being, and clinical psychology, but it has not been concerned with individual performance behaviors (2011). Mindfulness exists in the presence of a continuous ability to create and utilize new perceptions and interpretations of a situation's current state (Butler & Gray, 2006).

Not all researchers find routines helpful in moving toward mindful behavior. Miller (1993) found that while mindful people can focus on success, such a focus can lead to oversimplification and exploitation of routines, adherence to routines, and adherence to institutional categories such as job descriptions. This creates a state of mindlessness. Mindless acts through routines place organizations at risk. In contrast, Weick and Sutcliffe (2007) bring the act of mindfulness to light when working in complex organizations. Specifically, Weick and Sutcliffe (2007) found that oversimplification and resilience are necessary for collective mindfulness, which develops through the individuals in the organization.

A developing body of research exists about collective mindfulness—created by individual mindfulness—and its impact on strategic decisions; yet, most researchers focus on the organizational mindfulness without researching the individual level of mindfulness. Individuals need to focus on both external events as well as internal processes, pulling from past experiences. Mindfulness and task performance give wide external attention to breadth with a large number of stimuli and data in the environment

(Dane, 2011). Since nurses work within the complex, stimuli laden environment described by Dane (2011), they must be in the moment to make mindful decisions. In a study of trial lawyers, Dane (2008) found mindfulness was key to making the most effective decisions possible. Trials are filled with unpredictable events, and gaining as much knowledge as possible can be important (2008). Paralleling nursing in an acute care hospital, the study by Dane (2008) mirrored nursing's unpredictable events and the vast amount of knowledge needed to make mindful decisions. This highlights the need for vast external knowledge with a focus on the here and now. Dane's (2011) proposed attention to wide external breadth provides improvement in a dynamic task environment. Task expertise varies within individuals and institutions; therefore, internal breadth improves task performance, which tends to be elevated when there are high task experts. Moreover, Dane (2011) found that a positive relationship between mindfulness and task performance in a dynamic environment would result in improved outcomes. Thus, making a connection between high levels of mindfulness will result in a high level of collective mindfulness and create a Highly Reliable Organization.

Sternberg (2000) identified five components necessary for a person to have individual mindfulness. The first is *openness to novelty*, or the ability to identify and understand new kinds of stimuli. Second, a person must be *alert to distinction*, which means having the ability to compare, contrast, and make judgments on how things are the same and different. Third, a person needs to be *sensitive to different contexts*, which means the ability to see the specifics of whatever situation the individual is facing. Fourth, a person must have an *awareness of multiple perceptions*, which refers to an understanding of the situation that stems from different and opposing points of view.

Finally, a person must have an *orientation to the present*, meaning the ability to focus on the current situation (2000).

A mindful state requires experience as well as presence in the current situation (Brown & Ryan, 2003). Notably, Brown and Ryan (2003) identified longevity as a characteristic contributing to individual mindfulness. This identification of a specific characteristic for improving mindfulness creates the path for further exploration of the characteristics contributing to mindfulness. Brown and Ryan's (2003) assessment using the MAAS measured past and current experiences of individual mindfulness and was found to be a valid and reliable assessment tool. This research explored nurse characteristics to identify those that contribute to a higher level of individual mindfulness and create a higher level of collective mindfulness.

Nurse Characteristics

The most important part of a chief nurse's job involves hiring and retaining high performing nurses who promote safe, high quality patient care. This research addresses nurse characteristics that promote a high level of mindfulness in the staff.

Weick (1987) found that a team of divergent individuals representing different occupational specialties, experience, or genders creates a greater level of collective mindfulness than one homogeneous group could alone. Further, Weick (1987) stated that collective diversity increases *requisite variety,* which improves reliability. This level of collective diversity tends to be higher when people trust others. When there is trust between team members, there is more input into changes before actions occur.

This section will explore the limited research associating nurse characteristics with patient outcomes and safety. Examples of nurse characteristics include education,

longevity on the unit, certification, longevity as a nurse, age, and unit type. McNeese-Smith and Crook (2003) reported nursing characteristics such as career stage, average age, and experience are each unique measures; one cannot predict the other. These characteristics continue to add to the complexity of understanding the effects of nurse characteristics on patient outcomes. Aiken, Clarke, Cheung, Sloane, and Silber (2003) examined the proportion of registered nurses educated at the baccalaureate level or higher and how those levels of education correlate with positive patient outcomes. Since the study by Aiken et al. (2003), only a limited amount of published research has focused on patient outcomes and their correlation with nurse characteristics. For example, one study found that board certification improved patient outcomes for physicians; yet, little evidence exists in the nursing realm (Kendall-Gallagher, Aiken, Sloane, & Cimiotti, 2011). Kelly, McHugh, and Aiken (2011) researched nurse characteristics for Magnet® and non-Magnet® hospitals. Included in the study by Kelly et al. (2011) was an assessment of age, years of experience, level of education, specialty certification, gender, whether or not education was from a United States school, and the effects of these characteristics on patient outcomes. The researchers noted that Magnet® hospitals are known to have better work environments and greater nurse satisfaction, which leads to less burnout (2011). As described earlier, Magnet® hospitals support an environment which makes it easier for the nursing staff to become mindful in their work.

Nursing units are made up of nurses with varying characteristics. Unique to healthcare, the team changes day to day, but the collective mindfulness of the team remains constant (McNeese-Smith & Crook, 2003). In the acute care hospital setting, patients change daily. As described earlier, the complexity in healthcare results from the

changing team, changing patients, and the uncertainty of what the nurse's shift may bring. Prior to the Institute of Medicine's report (2004), there has been little research completed from a nursing prospective. Nursing research remains in its early stages. Less than 1% of nurses have their PhD, a fact that accounts for little nursing specific research (Institute of Medicine, 2011).

Education

Florence Nightingale was the original nurse researcher and the first to establish formalized nursing education. Nightingale equated nursing knowledge with health knowledge and saw health as the central basis to the theory of nursing (Newman, 1992). A brilliant statistician, Nightingale improved care through her data in the areas of sanitation and healthcare. Recognizing the benefits of understanding her statistical analysis on soldiers' survival rates during the Crimean War, Nightingale began the first formal education for nurses (Schyler, 1992). Since Nightingale's original group of formally trained nurses, nursing education has evolved. During times of war, nurses were trained on the job as licensed practical nurses. Nursing education began as hospital based training programs and has morphed over time. Today there are registered nurses graduating from diploma programs that are hospital based; they range from two to three years in length. Associate degree programs require four semesters to complete, and traditional bachelor's degree programs require four years. (American Nurses Credentialing Center, 2005). Controversy has existed over entry-level registered nurses positions for decades. With the backing of the Institute of Medicine, The Future of Nursing Report (IOM) (2011) recommends that by 2020, 80% of all nurses working at patient bedsides should hold bachelor's degrees. This recommendation is identical to the

requirement from the American Nurses Credentialing Center (2013) for Magnet® Certification maintenance.

Following the IOM report in the late 1990s, studies researching the effects of nursing education and patient outcomes began to emerge. The study by Aiken et al. (2003) was the first to measure the effects of bachelor's degree prepared nurses on patient outcomes and compare them to outcomes involving nurses who did not hold bachelor's degrees. According to Aiken et al. (2003), for every 10% increase in the number of bachelor's degree nurses at patients' bedsides, there was a 5% decrease in mortality and failure to rescue patients. The study was limited to surgical patients, often a more predictable population.

A more recent study by Blegen, Goode, Park, Vaughn, and Spetz (2013) supports the findings of Aiken et al.(2003) and the Institute of Medicine (2001). This cross-sectional study of 21 University Health System Consortium hospitals focused on the relationship between education and patient outcomes; the study controlled for nursing staffing and hospital characteristics, making it a more complex assessment of the effects of nursing education. All hospitals in the study were teaching hospitals with a level of nurses with bachelor's degree ranging from 44-84%. The results showed that congestive heart failure mortality, failure to rescue, pressure ulcers, infections, and deep vein thrombosis results were better than expected when the percentage of nurses holding bachelor's degrees was higher. Length of stay (LOS) was decreased as the percentage of nurses with bachelor's degrees increased. These findings supported the study's hypothesis that hospitals with higher proportions of nurses with bachelor's degrees had lower rates in the studies' identified patient outcomes (2013).

The IOM (2011) report, *The Future of Nursing: Leading Change, Advancing Health*, had four key findings. Among the finding were nurses working at the top of license, working as a full partner with physicians, an effective workforce planning and policy achieved through improved information infrastructure (2011). The final recommendation of the report indicated that nurses should achieve higher levels of education and training, and the education track should be seamless as nurses navigate the educational system. The purpose of the study was to help improve seamless, affordable, high quality healthcare for all Americans with the support of the largest segment of the healthcare workforce: nurses.

Certification

At the entry level of nursing, nurses voluntarily obtain nursing certification to validate their competency in the workforce. There was decreased mortality and improved failure to rescue only when a nurse's specialty certification was in combination with a bachelor's degree or higher (Kendall-Gallagher & Blegen, 2009).

Nurses need to feel empowered to speak up about small failures they identify. Fitzpatrick, Campo, Graham, and Lavandero (2010) completed a study measuring the relationship between specialty certification and empowerment. The study found significantly higher scores in empowerment for nationally certified nurses as compared to those who were not certified. As identified in the study, the tendency for nurses to speak up can be attributed to a higher level of mindfulness through resilience.

Longevity

Several nursing theorists have studied nursing expertise, but none of them have quantified knowledge based on years of service. Aiken et al. (2003) found that the means

of experience did not independently predict better outcomes for patients. Benner (1984) and Newman (2002) found that recognition of early warning signs with a patient are the product of expert practice. Neither of these nurse researchers could attach a length of practice to improved or safe outcomes, but both describe expertise as a transforming process based on experience (Bobay, 2004). The study by Benner (1984) relied on the theory that experience involves a transforming process of garnering knowledge and is not based on number of years. Only *practicing* nursing can lead to knowledge. Newman's (2002) theory of gained nursing knowledge relies on pattern recognition, which creates a higher level of knowledge and can only be achieved over time. Benner (1984) and Newman (2002) touched upon what may begin to create collective mindfulness, but both failed to measure the concept. Bobay (2004) found experience to be important, as pattern recognition will not occur without experience. Thus, experience represents a necessary component of improving nursing knowledge that leads to improved mindfulness. But research completed by Kendall-Gallagher et al. (2011) found that years of hospital experience did not improve mortality.

Research by Henderson-Everhardu' (2004) applied Benner's Novice to Expert theory. The study concentrated on accuracy of the vascular assessment of patients with peripheral arterial disease and clustered the nursing staff in categories: Novices had less than one year of experience; advanced beginners and competent nurses had worked between one and two years; and proficient and expert nurses had worked more than two years. Henderson-Everhardus (2004) defined the difference between proficient and expert. Expert nurses were those who had achieved certification in their practice specialty. Interestingly, the expert group in this study showed a higher level of

performance, supporting the argument that a combination of years of service and certification improves outcomes, not longevity alone (Ericsson, Whyte, & Ward, 2007).

Chang, Ying-Chyi, and Cheng (2006) designed professional development programs based on their understanding of nurses' needs throughout their career, stating that "a nurse's career can be divided into the exploration, establishment, maintenance and disengagement stages" (p. 246). Chang et al. (2006) defined the exploration phase as between zero and two years of experience; the establishment phase between two and five years; the maintenance phase between five and 15 years; and the disengagement stage as more than 15 years of experience. There were no studies found on the effects of nurse longevity on patient outcomes.

Unit Specific Longevity

There is an undocumented common discussion within the healthcare industry that longevity on a particular unit creates better quality outcomes and safer care. The literature seems devoid of studies to support such a thought. Units with a high level of nurses with less than two years of experience are thought of as being at risk of having poor patient outcomes and lower levels of patient safety. This cannot be found in the body of research and does not appear to be grounded in quantitative evidence. Nonetheless, based on the theories of Benner (1984) and Newman (2002), it makes sense that spending time with a certain patient population will lead to increased knowledge and pattern recognition. The time spent will lead to a level of increased mindfulness at the individual level and collective mindfulness at the unit level. A Norwegian study of brothers found that environmental factors during childhood and beyond affected intelligence (Sundet, Eriksen, & Tambs, 2008). Therefore, one could conclude that increased time spent on a

certain nursing unit, in a specific environment, with a prescribed group of patients, would lead to a more mindful way of thinking. It helps the nurse over time to identify the patterns described by Newman (2002) and gain the experience defined by Benner (1984).

Age

The nurse's age and its effects on patient outcomes could not be found in previous studies related to patient outcomes and nurse characteristics. There are a large number of second career nurses as well as those who enter the nursing profession later as a first career. But life experience could come into play when measuring mindfulness; therefore, it was a characteristic explored in this study to determine its effect on mindfulness. Not all graduate nurses are in their 20s. In fact, Chang et al. (2006) reported that the age range for new nurses' extends from early 20s to 50s. Career stages, in relationship to age, could affect the expertise of the individual nurse (2006). The number of nurses in the age range of 23 to 26 has increased only 62% during a seven year span. (MacWilliams, Schmidt, & Bleich, 2013).

Gender

Females have made great progress in the medical profession's traditionally male dominated roles. In 2010, females comprised 32% of physicians and 47% of first-year medical students (MacWilliams, Schmidt, & Bleich, 2013). Males, on the other hand, have not made the same gains in the nursing profession. From 2002 to 2009, the nursing profession has experienced growth not seen since the 1970s. Despite such progress, men still make up less than 10% of licensed registered nurses and only 12% of nursing students in bachelor's degree programs. Males considering nursing as a career often report being encouraged by family and friends to pick a different career in healthcare,

such as physician, physical therapist, or physician's assistant (2013). However, family and friends also influence males to become nurses, with many stating they were guided to the nursing profession by close relatives or friends who were nurses (LaRocco, 2007).

Employment Status

Nurses in healthcare systems have the ability to work in many different employment statuses. Many nurses change their employment status throughout their career. Commonly, a nurse will work full-time immediately after graduation. Later, many nurses marry and have children; during the time of child rearing registered nurses often decrease their work time to part-time or per diem. Acute care nurses at the healthcare system, for example, range from 40 plus hours a week, full-time, to 16 hours a month, known as per diem. No research was found on the effects of hours worked on the level of mindfulness.

Nurses who work limited hours—such as part-time and per diem— may have a different level of mindfulness than those who work full-time. Collective mindfulness in the units will be the result of the levels of individual mindfulness.

Purpose of the Literature Review

Increased mindfulness positively affects the quality of patient outcomes and promotes patient safety. Understanding the characteristics that increase or create a higher level of mindfulness will help to promote improved patient outcomes. The literature in nursing and other healthcare career pathways includes only limited knowledge of what creates a high level of mindfulness.

Conceptual Framework

This research was based on the hypothesis that a nurse's characteristics create his or her mindfulness, a concept previously described and pictured in Figure 1.

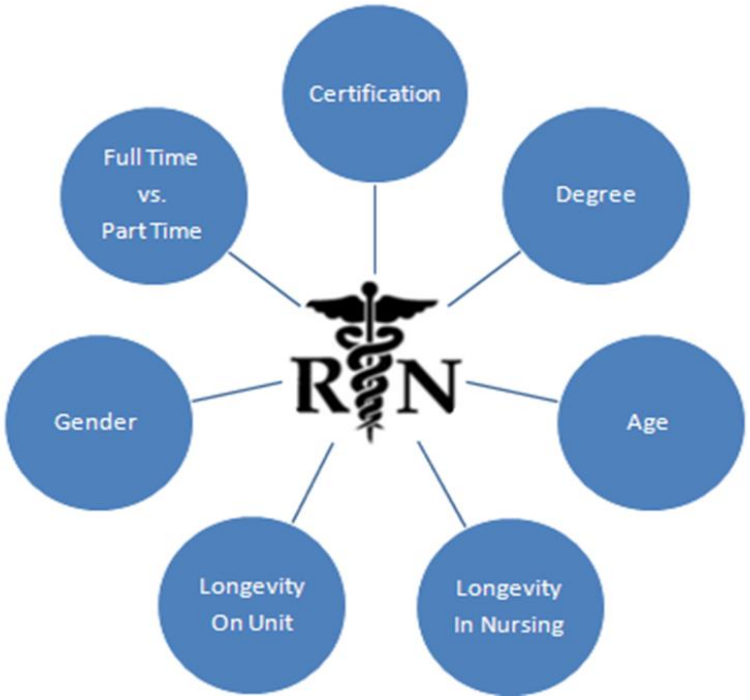

Figure 1. Nurse characteristics

There are many combinations of nurse characteristics, and I have selected a limited number of the vast variety possible. This research focused on education, validation of a skill set through certification, age, gender, and longevity.

Individual registered nurses bring with them specific characteristics that may play a role in the creation of their individual mindfulness. Individuals combine to create a unit level of collective mindfulness. Figure 2 depicts this concept. On a nursing unit, each member of the team plays a role in creating the levels of collective mindfulness. High levels of collective mindfulness are needed to create a Highly Reliable Organization. The focus of this research is on the individual level of mindfulness. Understanding the nurse

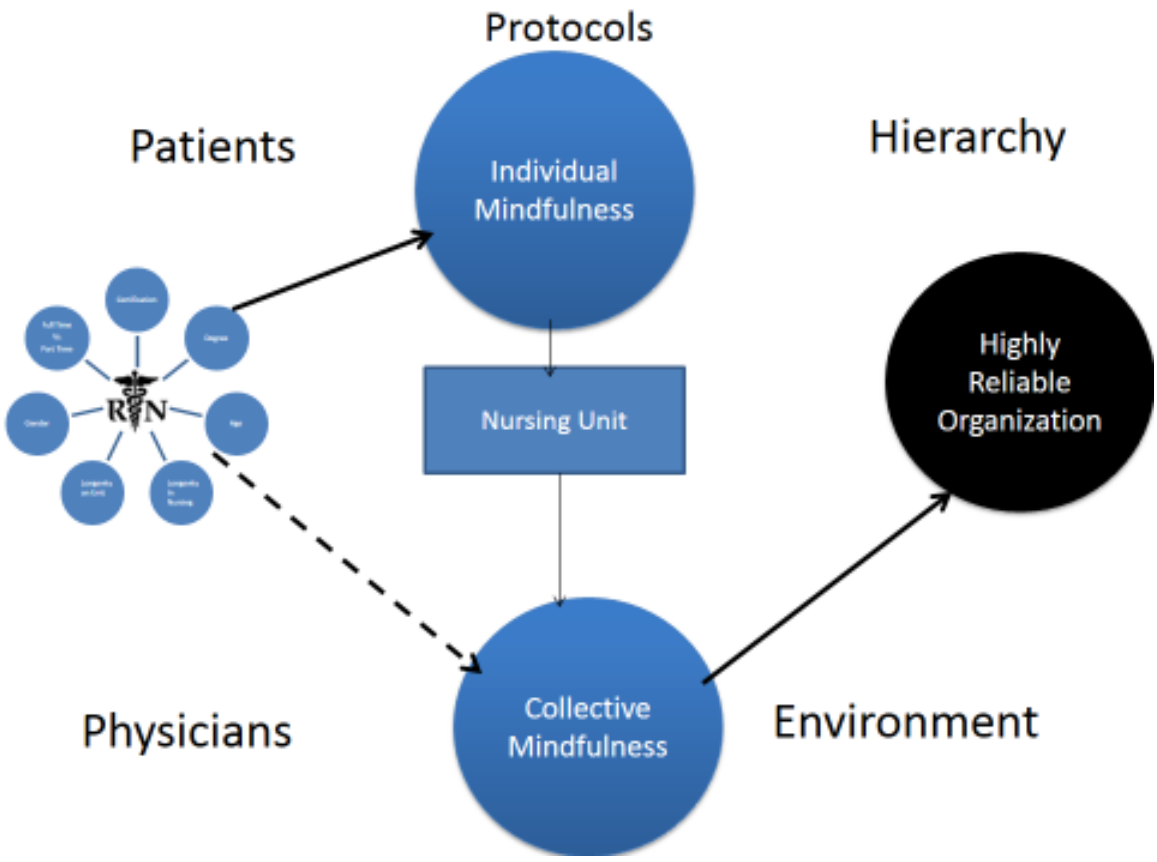

Figure 2. Conceptual framework

specific characteristics that lend themselves to a higher level of individual mindfulness may guide organizations to support appropriate hiring and development of staff to create a Highly Reliable Organization. The work environment of healthcare systems plays a role in the development of a HRO; however, the work environment, including hierarchy, patients, and protocols, was not explored in this research.

Chapter Summary

Weick (1987) believed that accidents occur because humans manage and operate complex systems, and humans themselves are not able to anticipate the problems generated by complex systems. The critical moments in healthcare exist when an error in

patient care occurs, but the consequences of the lapse have yet to be fully realized (Blatt et al., 2006). Safety and quality care are the most important goals within healthcare systems. Theory development, including the NAT and HRT, has evolved as the complexity of systems has increased. The goal of becoming a Highly Reliable Organization must channel through the staff. The staff must collectively create a level of collective mindfulness within nursing units in acute care hospitals, which are complex systems.

Highly Reliable Organizations are created through the five characteristics identified by Weick and Sutcliffe (2007). Individual mindfulness creates a higher level of collective mindfulness. Individual registered nurses possess specific characteristics. But limited research exists on how these nurse characteristics affect patient outcomes. The literature includes little research addressing the role of nurse characteristics in creating Highly Reliable Organizations.

Chapter Three will explain how the study addresses the research question: What characteristics of registered nurses affect their level of mindfulness? An explanation of the research design, unit of analysis, independent and dependent variables, and methods are also included in the chapter. Limitations of the research as well as recommendation for future research will be noted.

CHAPTER THREE

METHODS

This chapter explains the research methods used to address the research question and test the hypotheses. Included are explanations of the methodology, the research design, the survey instruments, the data collection process, and the study's dependent and independent variables. Moreover, the chapter explains the survey's collection methods, the data analysis, and the ethical considerations related to the study.

Research Purpose and Question

The study sought to determine if a relationship exists between the level of individual mindfulness, the level of collective mindfulness, and nurse characteristics. Individual mindfulness leads to collective mindfulness, which creates Highly Reliable Organizations. Understanding the characteristics that lead to individual mindfulness, which in turn creates collective mindfulness, will guide organizations toward becoming highly reliable through the identification and development of those characteristics. Organizations can then develop the characteristics within the current staff, where applicable, and utilize recruitment efforts based on the findings. The study's research question is: What characteristics of registered nurses affect their level of mindfulness?

The Research Design

This was a cross-sectional study, representing a snapshot in time (Monnet, Sullivan, and DeJong, 2011). It was quantitative and utilized a population sample of 1036 registered nurses who worked directly at patient bedsides within the identified healthcare system. Monnet, Sullivan, and DeJong (2011) explained that a population exists when all

of the possible cases in a study are surveyed; therefore, since all of the nurses within the identified healthcare system were surveyed, a population sample was used.

Every nurse in the identified healthcare system was required to go through the same organizational orientation; therefore, quality and safety measures were taught and monitored identically from unit to unit. Safety procedures may be explicit and issued by organizations, yet the perceptions shared may vary across organizational units (Katz-Navon, Naveh, & Stern, 2005). Such variation could be caused by the individual and collective mindfulness of the registered nursing staff. Nursing units differ within organizations and are found to have different levels of specific climates based on the characteristics of their work, interactions, work conditions, or managerial behaviors (Zohar, 2002). The nursing units within this healthcare system varied in size, nurse to patient ratio, and experience, creating the differences described by Zohar (2002). Each nursing unit consisted of registered nurses with varying characteristics and different patient types. Registered nurses worked within a team; therefore, the individual level of mindfulness, creating collective mindfulness, remained the constant variable which ultimately affected the quality of care within each nursing unit. This complex team of registered nurses created the nursing units' levels of collective mindfulness. High levels of collective mindfulness are necessary to create a Highly Reliable Organization.

Unit of Analysis

This study investigated the nursing staff's mindfulness as grounds for the organization's reliability. In healthcare systems, the registered nurse delivers care 24 hours a day, seven days a week. Registered nurses delivering care at the patient's bedside, both full-time and part-time, served as the unit of analysis for this study.

Sample Frame and Size

Twenty-eight acute care, in-patient nursing units and one 55-bed rehab floor were surveyed within the three-hospital healthcare system. One of the three was a 155-bed hospital with a rehab floor. The second was a newly opened acute care hospital that cared for only medical-surgical patients. The third was a 500-bed hospital. The largest facility included women's and children's units and acute patients—such as those receiving open-heart surgery and kidney transplants. As a result, the related group of registered nurses was quite diverse, encompassing full-time, part-time, and per diem employment statuses. The 1,036 registered nurses delivering direct patient care within the healthcare system served as the sample size for the study. Each nurse was asked to complete a blind survey. Their responses were used to identify their individual mindfulness scores.

All of the healthcare system's registered nurses who worked at patient bedsides were asked to complete the survey. An expected 40% rate was nearly reached as 38% or 365 of the surveys were returned. Both the SOS and the MAAS surveys, along with a questionnaire on nurse characteristics, were sent to each respondent. The surveys were sent by an administrative assistant via e-mail, as all nurses within the health care system had a hospital e-mail address. The e-mail included a letter with a brief description of the study, an explanation of the study's importance, and a statement informing each participant that the results would be blinded. The survey results were gathered using Qualtrics®. All of the data, including the surveys and characteristics, were self-reported and blinded at the individual level. The survey included a consent form as the survey was voluntary.

Independent and Dependent Variables

Independent Variables

The nurse characteristics operated as the independent variables in this study and included educational level, specialty certification, longevity as a nurse, longevity on the current unit, gender, and employment status. These nurse characteristics are believed to create the change in a registered nurse's mindfulness score (Monette et al., 2011). Each of the nurse characteristics is described in greater detail, below:

- Education - Nursing education was measured by the highest degree achieved in nursing. The categories included: Associates Degree, Diploma, Bachelor of Science in Nursing, and Masters of Nursing Degree.
- Certification - Nursing certification at the entry level of nursing is a voluntary act completed to validate competency in the workforce (Kendall-Gallagher & Blegen, 2009). Certifications utilized in the study were ANCC recognized. A test taken after completing more than 2,000 hours of work in a specialty area establishes initial certification. Continuing education must be completed to maintain certification.
- Longevity in nursing - This is a measure of time in nursing based on years licensed as a registered nurse. The registered nurses in this study were placed into categories: The exploration phase consisted of nurses having zero to two years of experience; the establishment phase included nurses with two to five years of experience; nurses having between five and 15 years of experience were placed in the maintenance phase; and those with over 15 years of nursing experience were included in the disengagement stage (Chang et al., 2006).

- Longevity on the nurse's current nursing unit - Many nurses begin their careers in other healthcare capacities and later move to other positions, often on the same unit. Also, nurses are transient in their careers and move from unit to unit, often within the same healthcare system. Thus, the measurement for this characteristic was time spent as a nurse on his or her current unit.
- Age - The nurse's chronological age.
- Employment status - Employment status was measured as full-time, part-time, or per-diem, as defined by the healthcare system. According to the healthcare system, full-time status represents 32 hours or more a week; part-time represents a regularly scheduled employee who works eight to 31 hours a week; and per-diem represents a casual employee who works less than eight hours a week (Health System Human Resources, 2013).

The MAAS scale served as both a dependent variable and an independent variable. This scale was used to explore whether a relationship exists between the nurses' individual mindfulness and their individual scores of collective mindfulness. Self-reporting via surveys and nurse characteristics was the method of data collection. The independent variable was used to address the underlying question: What are the characteristics of registered nurses that affect their level of mindfulness? These characteristics address the hypotheses, as described in chapter one.

Dependent Variable

The study's dependent variables were the registered nurses' levels of mindfulness as measured by the MAAS and the SOS. Individual and collective mindfulness scores are passive dependent variables affected by the independent variables (Monette et al., 2011).

Each nurse's individual scores were averaged for each of the surveys measuring their individual and collective mindfulness.

Surveys

The measure of mindfulness was collected via the MAAS and the SOS. The MAAS, a 15-question survey which assesses the core characteristics of mindfulness, was designed and tested by Brown and Ryan (2003). The survey, which uses a Likert Scale for questions one through six, was confirmed as a single factor scale structure with undergraduates, community and nationally sampled adults, and adult cancer patients. It has a Cronbach's alpha ranging from .80 and .90 (2003). A factor analysis was performed due to the fact that nurses have not been studied as a group with this survey. The MAAS's reliability was established in the areas of discriminant and convergent validity, known-groups validity, and criterion validity (2003).

Vogus and Sutcliffe (2007a) created the SOS as a measure of mindfulness on nursing units. The tool passed all tests for validity and reliability. Confirmatory factor analysis proved a single underlying factor; it demonstrated fit in all indices with a P value of < 0.001 (2007a). The SOS's reliability was strongly supported by a Cronbach's alpha of 0.88 (Vogus & Sutcliffe, 2007b). Cronbach's alpha tests internal consistency reliability (Monette et al., 2011). Kathleen Sutcliffe granted permission via email to utilize the SOS, as shown as Appendix A.

Responses to the nine questions on the SOS were collected using a Likert Scale of one through seven. The SOS questions measure the level of collective mindfulness at an individual level (Vogus & Sutcliffe 2007b). The mindfulness scale focuses on the five domains of collective mindfulness described in Chapter Two. These domains include

tracking small failures, resistance to oversimplification, remaining sensitive to operations, resilience, and taking advantage of shifting expertise (Weick & Sutcliffe, 2007).

The questionnaires collected the nurse characteristics to identify which affect their levels of individual and collective mindfulness. At the unit level, the individual's mindfulness creates the unit level of mindfulness. As a result, that nursing unit becomes highly reliable through collective mindfulness. This research identified the characteristics that help to build the highest level of reliability through mindfulness.

Data Collection

Anonymous electronic surveys were delivered to all registered nurses via the healthcare system's email. Every bedside registered nurse within the healthcare system had a hospital issued e-mail account. Since these nurses were required to remain current with hospital updates, they had frequent access to the e-mail system. E-mail reminders, sent weekly for three weeks, helped to achieve the 38% return rate.

Only registered nurses participated in this study. Each nurse had the opportunity to complete the surveys and questionnaire. Each acute care and rehab nurse was included because of the diversity and specialty of the nursing units. Weick (1987) stated that a team of individuals differing in occupational specialties, experience, gender etc., create a higher level of collective mindfulness than one homogeneous group. Further, Weick stated that "collective diversity increases requisite variety,", and this improves reliability (Weick, 1987, p. 122). Staff diversity creates a higher level of collective mindfulness.

Qualtrix, an industry-leading provider of online software, delivered the surveys that included nurse characteristics and a combination of the MAAS and SOS survey questions to each of the registered nurses in the study. An e-mail letter accompanying the

survey explained the survey's purpose and assured participants that the findings will remain anonymous at the individual level and unit level. However, the study's findings would be shared—at the hospital level—with all registered nurses. Included in the data collection were the nurse characteristics of education, longevity as a nurse, longevity on their current unit, employment status, and specialty certification.

Data Analysis

I first display the collected data in a descriptive format. This format has the advantage of categorizing individual nurses and summarizing staff characteristics in mathematical figures, tables, and charts (Ritchey, 2008). This descriptive format also enables the researcher to discover facts and describe the reality of the registered nurses completing the survey (Monette et al., 2011). I kept records of the number of observations, the anonymous score of each individual nurse's level of mindfulness using the MAAS, and each nurse's individual score for the SOS. Descriptive statistics from the nurse characteristics questionnaires were used to identify patterns and percentages of respondents in each characteristic: age, gender, education, and longevity as a nurse. A factor analysis was performed on the MAAS to determine if the nurses' results had a correlation of each variable with every other variable (Monette, Sullivan, & DeJong, 2011).

I used multiple regression to analyze the data from the survey and to identify any relationships between the independent and dependent variables. The research question sought to identify the relationship, if any, between a nurse's level of mindfulness and his or her characteristics. I separately tested the scores in regards to individual characteristics and MAAS scores to gain an understanding of the individual characteristics on

mindfulness and collective mindfulness. Then, the SOS and MAAS scores were analyzed to determine if there was a relationship between individual mindfulness and collective mindfulness. All of the data were examined using STATA 13, a statistical software package.

Hierarchical multiple regression analysis, also known as nested-model strategy, was used to analyze the data from the survey. The hierarchical multiple regression tested whether the MAAS improved the less complex model utilizing only the SOS (Hamilton, 1992). The hierarchical multiple regressions were tested in order to identify whether the MAAS significantly predicted the SOS score.

This research represented a snapshot—a sample—of what was occurring at one organization at one point in time. Future research will be necessary to identify what happens over time, based on a team. This study can be a basis for future analysis.

Limitations and Weaknesses

The study had several limitations. First, participants were from one healthcare system. Second, the data were collected through email accounts within the healthcare system being studied and were self-reported. Third, because nurses who are new to their specialty cannot become certified until they complete one to two years of experience in their specialty, measuring certification can become a bit skewed depending on the specific certification. Fourth, certification wait time could lead to multi-collinearity. Nurses cannot sit for their certification examinations until they have two years of experience in their specialty area, creating multi-collinearity with this characteristic and others. Fifth, only those who feel empowered become certified.

Although a limitation of the study involved the use of data from only one healthcare system. However, one may view this limitation as a positive due to the healthcare system's complexity and comprehensiveness; and given the difficulty in comparing organizations and nursing units due to different roles in delivering care. Notably, there were more than 1000 bedside nurses at three hospitals within the healthcare system, accounting for a great diversity of staff characteristics and types of nursing units.

Ethical Considerations

Approval from the institutional review boards (IRB) of the healthcare system being studied and the Indiana University of Pennsylvania was obtained prior to the release of the survey.

Individual anonymity of the results was accomplished via use of a numerical code for each participant to protect the individual nurses and their responses. There was no mandated survey completion, as participation was strictly voluntary. Some questions related to the use of the data may arise due to the fact that I served as the Chief Nurse of the organization being studied. As the Chief Nurse, I had previously reviewed individual and unit based data. For example, the Chief Nurse reviews details related to every fall that occurs within the organization, including the staff member involved. The Chief Nurse also reviews and creates action plans based on the National Data Nursing Quality Indicators (NDNQI) staff nurse assessment, completed annually. This assessment includes information on each nurse's degree and years of service, as well as their assessment of safety on their unit and their view of the effectiveness of the manager. Therefore, the data collected for this study was similar to the data the Chief Nurse was

already able to access and utilize for decision-making. Most importantly, the ability to improve patient care based on the data was an important reason for the research.

Summary

As organizations strive to become highly reliable, as recommended by the Joint Commission (2013), this study served the purpose of assessing individual and collective mindfulness as the foundation of Highly Reliable Organizations. Routines partnered with high levels of collective mindfulness create a higher level of safe patient care and avoid negative outcomes. Replicating this study throughout healthcare systems will increase understanding of how individual characteristics affect mindfulness and help to make these systems Highly Reliable Organizations. The findings of this study will be helpful in creating development plans. The work of Weick and Sutcliffe (2007) can be used to improve the individual mindfulness that positively affects collective mindfulness. Future reassessment can determine whether the enhancement of the characteristics identified in the plan actually improved the individual levels of mindfulness and resulted in a higher level of collective mindfulness.

The study's methodology has portability. Health care organizations can utilize the findings as well as the process to create a higher level of understanding of their own organization. Moreover, this research will be shared at national conferences.

This research sought to create a user-friendly process of assessing mindfulness at the individual and collective levels within healthcare organizations. Helping administrators understand collective mindfulness will assist them in the development of a plan to improve patient safety and to become highly reliable. Improving the overall safety by creating a Highly Reliable Organization can be furthered by this assessment of

mindfulness and the characteristics affecting mindfulness. This research will improve understanding of nurse characteristics and their effect on individual mindfulness.

CHAPTER FOUR

RESULTS

The purpose of this study was to establish if a relationship exists between nurse characteristics and individual and collective mindfulness. The research question asks what characteristics of registered nurses affect their level of mindfulness. Data collection occurred in June 2014 using Qualtrics software. Descriptive data pertaining to the subjects in the study were collected, as well as survey responses related to individual and collective mindfulness. A summary of the descriptive statistics was completed, followed by an analysis of the relationship between nurse characteristics and mindfulness. The analysis included both collective and individual mindfulness in a community based hospital system utilizing STATA 13. This study involved the use of a quantitative exploratory design.

Exploratory factor analysis of the surveys was performed, followed by a Cronbach's alpha to establish reliability. The dependent variables consisted of the MAAS scale (a measure of individual mindfulness) and the SOS scale (a measure of collective mindfulness). The independent variables were the nurse characteristics. Regression analysis was performed to understand which nurse characteristics influenced the individual and collective mindfulness of the registered nurses. Analysis was conducted to identify the best fitting model to address the research question. Nested regression, a test of joint significance, was completed by nesting individual mindfulness in collective mindfulness (STATA, 2015).

Description of the Sample

The survey population for this study consisted of registered nurses who worked at patient bedsides at three hospitals within one healthcare system in Central Pennsylvania.

The surveys were distributed via the healthcare system's email, to which all registered nurses had access. The respondents self-identified their individual characteristics and completed two surveys anonymously. An initial email was sent, followed by three reminder emails to encourage all registered nurses to complete the survey.

One thousand thirty-six questionnaires were sent out. Three hundred and ninety-five surveys were returned, creating a return rate of 38%. Three hundred sixty-five of those who participated in the survey completed the informed consent. This represented 35% of the possible participants. Unsigned informed consents were deleted from the results. Surveys that were started but had limited results were also eliminated from the data.

Personal Characteristics

The mean age of the respondents was 40.25 years old. They ranged in age from 22 to 65. The majority (91%) of those responding were female. Eight percent of the respondents were in their first year of employment. Twenty-two percent of the registered nurses responding had been working for one to five years. Nurses with six to 10 years of experience represented the largest group (17%) within the study. The second largest group (10%) had 31-35 years of experience, while two additional groups—those with 16-20 years of experience and those with 21-25 years—each represented 9% of the study participants. Nurses with 11-15 years of experience represented 7%, as did those with 26-30 years. The group with the greatest longevity in nursing (36-39 years) represented 4% of the study participants.

Three percent of the nurses had worked on their current unit for less than a year. Sixteen percent of the nurses worked a year on their current unit; 12% were in their

second year; and 9% were in their third year. Nurses with five to seven years on their current unit accounted for 15% of the staff responding. Those with eight to 10 and 11-13 years each accounted for 8%. Six percent of those in the study had spent 14-15 years on their current units, while those with 16-20, 21-25, and 31-38 years on their current units each represented 5% of the overall population in the study. Twenty-nine percent of the nurses in the study were on their current unit three years or less.

Sixty-eight percent of the respondents reported that they were married and 64% had children. Thirty percent of those with children had children under the age of 6, and 30% had children between 6-12 years of age. Twenty-four percent had children between the ages of 13 to 18, and 17% had children between the ages of 19 to 22 living at home. Forty-one percent had elderly parents, and 36% of the respondents reported that they were the primary care givers for their elderly parents.

Retirement was within the next five years for 14% of the respondents. Twenty percent of the respondents were projected to retire in 6-10 years and 11-20 years, respectively. Forty-four percent of the respondents were projected to retire in more than 20 years. Table 1 addresses these personal characteristics.

Table 1

Descriptive Table Personal Characteristics

Variable	**Population**	**Percentage**
Gender	**343**	**100%**
Male	32	9.33%
Female	311	90.67%
Age	**345**	**100%**
22-29	99	28.7%
30-39	80	23.19%
40-49	57	16.52%
50-59	78	22.61%
60-65	31	8.99%

Variable	Population	Percentage
Years as a Nurse	**345**	**100%**
0-1	29	8.4%
1.5-2	26	7.53%
2.5-3	19	5.5%
3.5-4	17	4.92%
4.5-5	14	4.05%
6-10	59	17.1%
11-15	26	7.54%
16-20	33	9.56%
21-25	32	9.27%
26-30	24	6.96%
31-35	35	10.14%
36-39	14	4.05%
How Long Worked on Current Unit	**340**	**100%**
0 < 1 Year	9	2.65%
1 Year	56	16.47%
2 Years	41	12.05%
3 Years	29	8.53%
4 Years	16	4.7%
5 Years	15	4.41%
6 Years	23	6.76%
7 Years	14	4.12%
8-10 Years	28	8.23%
11-13 Years	26	7.64%
14-15 Years	20	5.88%
16-20 Years	18	5.29%
21-25 Years	17	5%
26-30 Years	11	3.23%
Married	**347**	**100%**
Yes	236	68.01%
No	111	31.99%
Have Children	**343**	**100%**
Yes	220	64.14%
No	123	35.86%
Children At Home	**218**	**100%**
Yes	169	77.52%
No	49	22.48%

Variable	Population	Percentage
Ages of Children at Home	**229**	**100%**
0-5	68	29.69%
6-12	68	29.69%
13-18	54	23.58%
19-22	39	17.03%
Have Elderly Parents	**347**	**100%**
Yes	142	40.92%
No	205	59.08%
Primary Care Giver for Elderly Parents	**141**	**100%**
Yes	51	36.17%
No	90	63.83%
Years to Retirement	**303**	**100%**
1-5	43	14.19%
6-10	63	20.79%
11-20	63	20.79%
>20	134	44.22%

Unit Type

As reported in Table 2, a majority of the responding nurses were working in the acute care areas of the healthcare system. Nineteen percent worked on step down, or telemetry units; 17% worked in the medical-surgical and rehabilitation units; and nearly 16% worked in an intensive care unit. The previously mentioned units account for the unit type reported by 52% of the respondents to the survey.

Education and Training

As indicated in Table 3, 61% of nurses in the study held a bachelor's degree, followed by 19% with an associate level degree. Nine percent of the registered nurses were at the diploma level, and 11% held master's degrees. Thirty-three percent of the respondents were still in school at the time of the study. Fifty percent of the nurses still in

Table 2

Descriptive Table Unit Type

Variable	Population	Percentage
Unit Type	**375**	**100%**
Step Down, Telemetry	69	19.33%
Medical-Surgical, Rehabilitation	62	17.37%
Intensive Care Unit	57	15.97%
Emergency Department	43	12.04%
Operating Room, Procedural Areas	36	10.08%
Women's and Children's	34	9.52%
Intravenous Therapy, Dialysis, Wound Care	21	5.88%
Pre and Post Anesthesia	20	5.6%
Float Pool	15	4.2%

school were working on their bachelor's degree; 47% were pursuing their master's; and nearly 3% were completing their PhDs. Eighty-two percent of the respondents had completed a course to prepare them for their current area of work. Fifty-six percent of the courses were two months or less.

Seventy-eight percent of the respondents were eligible to become certified. Fifty-three percent of the respondents were certified in the specialty area in which they worked. Fourteen percent of the respondents were members of the clinical ladder. Only registered nurses who are certified and have their bachelors can participate in the clinical ladder.

Outside conferences were attended by 65% of the nurse, and 73% of them had attended only one conference. Seventy-four percent of the staff attended grand rounds three times a year or less; 22% attended three to six times a year, and 4% attended eight times or more a year.

Work Schedule

A majority of the respondents (80%) worked a 0.8 full-time equivalent or above. Twelve percent worked 0.6-0.7, and 9% worked 0.5 or less. Sixty percent of the respondents

Table 3

Descriptive Table Education and Training

Variable	Population	Percentage
Highest Level of Education	**346**	**100%**
Diploma	30	8.67%
Associate	67	19.36%
Bachelor	211	60.98%
Masters	38	10.98%
Currently Attending School	**341**	**100%**
Yes	114	33.43%
No	227	66.57%
What Degree Pursuing	**114**	**100%**
Bachelors	57	50%
Masters	54	47.37%
PhD	3	2.63%
Special Training for Current Unit	**371**	**100%**
Yes	306	82.48%
No	65	17.52%
Training Provided by Employer	**288**	**100%**
Yes	271	94.1%
No	17	5.9%
Course Length	**280**	**100%**
2 Months or Less	156	55.71%
3-6 Months	105	37.50%
>6 Months	19	6.79%
Eligible to Become Certified	**157**	**100%**
Yes	123	78.34%
No	34	21.66%
Certified Nurse	**344**	**100%**
Yes	183	53.2%
No	161	46.8%
Attend Outside Conferences	**345**	**100**
Yes	222	64.35%
No	123	35.63%

Variable	Population	Percentage
Annual Attendance Of Outside Conferences	**196**	**100%**
0-1	143	72.96%
2-3	49	25%
>3	4	2.04%
Annual Attendance of Grand Rounds	**346**	**100%**
0-3	255	73.70%
3-6	77	22.25$
8-10	13	3.76%
>10	1	0.29%
Member of the Clinical Ladder	**300**	**100%**
Yes	43	14.33%
No	257	85.67%

reported that they worked overtime. Of those, 80% worked four to eight hours of overtime per week. Fifteen percent worked 9-12 hours of overtime a week, and 4% worked more than 13 hours per week.

There was a mix of shift length reported by the nurses. Thirty-eight percent worked eight hour shifts, 16% worked 10 hour shifts, and 46% worked 12 hour shifts. Fifty-seven percent of the nurses responding worked a consistent shift. Of those who worked a consistent shift, 66% worked days, and 79% worked weekends. Five percent of the respondents worked every weekend, 30% worked every other weekend, thirty-eight percent worked every third weekend, and 26% worked less than every third weekend, as shown in Table 4.

Call was required by 26% of the staff, and 40% were called in less than once a month. Four percent, when on call, were never called in. Twenty percent were called in once a month, and 26% were called in two to three times a month. Nine percent were called in at least once a week. Forty-five percent of the respondents signed up for voluntary call. Of those, 10% were never called in, 47% were called in less than once a

Table 4

Descriptive Table Work Schedule

Variable	Population	Percentage
Current Full-Time Equivalent	**350**	**100%**
0.8 to 1.0	279	79.71%
0.6 to 0.7	41	11.71%
0.4 to 0.5	6	1.71%
0.1 to 0.3	7	2%
Per Diem	17	4.80%
Work Overtime	**349**	**100%**
Yes	208	40.4%
No	141	59.6%
If You Work Overtime How Many Hours a Week	**203**	**100%**
4-8 Hours	163	80.3%
9-12 Hours	31	15.27%
13-16 Hours	4	1.97%
>16 Hours	5	2.46%
Length of Normal Shift	**350**	**100%**
8 Hours	133	38%
10 Hours	56	16%
12 Hours	161	46%
Work a Consistent Shift	**347**	**100%**
Yes	197	56.77%
No	150	43.23%
If You Work a Consistent Shift What Shift	**196**	**100%**
Days	129	65.82%
Evenings	23	11.73%
Nights	44	22.45%
Work Weekends	**348**	**100%**
Yes	276	79.31%
No	72	20.69%
If Work Weekends How Often	**312**	**100%**
Every Weekend	18	5.77%
Every Other Weekend	94	30.13%
Every Third Weekend	120	38.46%
Less Than Every Third Weekend	80	25.64%

Variable	Population	Percentage
Required to Take Call	**347**	**100%**
Yes	90	25.94%
No	257	74.06%
Required Call Times Called In	**89**	**100%**
Never	4	4.49%
Less Than Once a Month	36	40.45%
Once a Month	18	20.22%
2-3 Times a Month	23	25.84%
Once a Week	2	2.25%
2-3 Times a Week	3	3.37%
Daily	3	3.37%
Take Voluntary Call	**347**	**100%**
Yes	156	44.96%
No	191	55.04%
How Often Called in For Voluntary Call	**154**	**100%**
Never	15	9.74%
Less Than Once a Month	73	47.40%
Once a Month	24	15.58%
2-3 Times a Month	33	21.43%
Once a Week	6	3.90%
2-3 Times a Week	2	1.3%
Daily	1	0.65%
Work Another Job	**340**	**100%**
Yes	290	14.71%
No	50	85.29%
Other Job as a Nurse	**48**	**100%**
Yes	34	70.83%
No	14	29.17%
Other Job Within the Same Healthcare System	**50**	**100%**
Yes	3	6%
No	47	94%
Majority of Hours in this Healthcare System	**50**	**100%**
Yes	36	72%
No	14	28%

Variable	Population	Percentage
Total Hours Worked a Week in All Jobs	**50**	**100%**
<=16	6	12%
17-32	8	16%
33-40	8	16%
41-56	19	38%
>56	9	18%

month, and 16% were called in once a month. Twenty-one percent were called in two to three times a month, and 6% get called in once a month or less.

Fifteen percent of the respondents worked another job. Of those, 71% worked as registered nurses in their other jobs. Ninety-four percent worked the majority of their hours in other jobs within another healthcare system. Seventy-two percent worked a majority of their hours in other jobs within the surveyed system. Of those who worked in more than one system, 12% worked less than 16 hours total, 16% worked 17-40 hours, 18% worked 41-56 hours, and 18% worked more than 56 hours per week.

Dependent Variables

This study contained two dependent variables created in previous studies on individual and collective mindfulness, respectively. Individual mindfulness was measured by the Mindful Attention Awareness Scale (MAAS), a 15 item Likert scale that was created and tested by Brown and Ryan (2007). The Safety Organizing Scale (SOS) is the second dependent variable. The SOS is a nine item Likert scale created by Vogus and Sutcliff (2007a) to test the collective mindfulness of nursing unit personnel.

Mindful Attention Awareness Scale

The MAAS was used in its original format. No changes were made to the survey, which consisted of a fifteen item Likert scale that measures a person's level of individual mindfulness. The higher the score, the higher the level of individual mindfulness. The

survey had been tested nationally on samples of adults, cancer patients, and college undergraduates (Brown & Ryan, 2003). The MAAS had not been focus tested on nurses or healthcare professionals. Brown & Ryan tested the survey and found a high level of reliability as demonstrated by test-retest, and was found to be valid by discriminant convergent validity. The Cronbach's alpha for internal consistency, as measured by Brown and Ryan, ranges between 0.80 and 0.90.

A factor analysis, performed to analyze survey results, supported the survey as being retained on one factor. Imputation was completed prior to performing the analysis of the results. Missing variables were addressed using the mean of all values and performing imputation of the variables. The imputed results were tested for relationship of the survey to the population. The factor analysis showed that 93% of the variance is explained by the presence of one factor. Results of the factor analysis can be seen in the table below. The mean MAAS score was 66.63 (SD=0.810) and ranged from 15 to 90.

Table 5

Factor Analysis of MAAS

Factor	Eigenvalue	Difference	Proportion	Cumulative
Factor 1 |	7.217100	6.75255	0.9280	0.9280
Factor 2	0.51844	0.15729	0.0662	0.9942
Factor 3	0.36116	0.13732	0.0461	1.0403
Factor 4	0.22383	0.10715	0.0286	1.0689
Factor 5	0.11669	0.04145	0.0149	1.0838
Factor 6	0.07524	0.02860	0.0096	1.0934
Factor 7	0.04664	0.04145	0.0060	1.0993
Factor 8	0.00519	0.02789	0.0007	1.1000
Factor 9	-0.02270	0.02591	-0.0029	1.0971
Factor 10	-0.04861	0.03975	-0.0062	1.0909
Factor 11	-0.08835	0.03408	-0.0156	1.0796
Factor 12	-0.12243	0.01706	-0.0113	1.0640
Factor 13	-0.13949	0.03876	-0.0178	1.0462
Factor 14	-0.17825	0.00539	-0.0228	1.0234
Factor 15	-0.18364	.	-0.0234	1.0000

The scree plot in Figure 3 illustrates the findings of the Factor Analysis. There was little variation in the survey results, indicating that the survey measured what it was intended to measure within the current population. A large eigenvalue supports the questions landing on one idea of individual mindfulness as illustrated in the scree plot in Figure 3. The Cronbach's alpha coefficient of the survey was very strong at 0.9258.

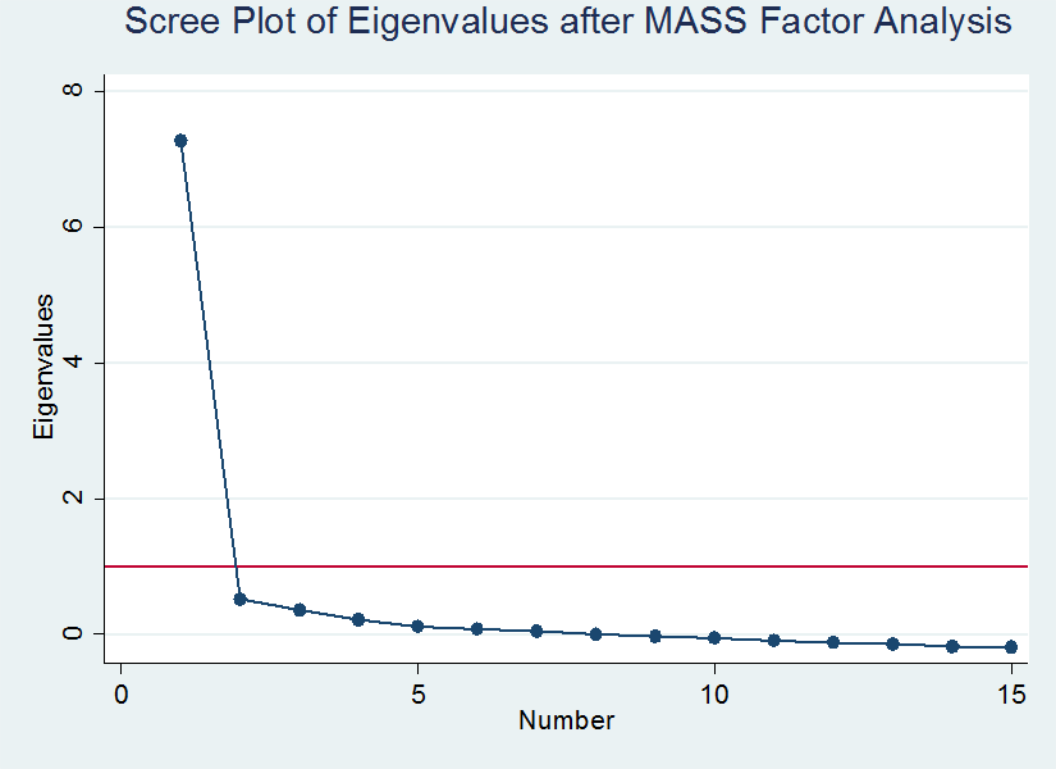

Figure 3. Scree plot for MASS

Safety Organizing Scale

The Safety Organizing Scale (SOS) was used in its original format, and there were no changes to the survey questions. The SOS survey tested the five characteristics of Highly Reliable Organizations (Vogus & Sutcliffe, 2007a). Previously, the survey was used with both nurses and nursing assistants. However, for the purposes of this research study, only registered nurses were surveyed. The SOS uses a nine item Likert scale to

measure each individual's level of collective mindfulness. A higher score indicates a higher level of collective mindfulness. This survey had been previously tested on nurses in 125 nursing units within 13 hospitals (Vogus & Sutcliffe, 2007b). Testing showed the SOS to have a high level of reliability and strong convergent validity, meaning that it measured what it was intended to measure (2007b). The Cronbach's alpha for internal consistency was found to be strong at 0.88, as measured by Vogus and Sutcliff (2007b).

A factor analysis was performed which supported that the survey was retained on one factor with the current survey population. The factor analysis showed that 98% of the variability is explained by one factor. Results of the factor analysis are shown in Table 6. The results were imputated prior to performing the analysis. Imputation of the missing variable used a mean of all existing values. The mean score was 44.08 with a standard deviation of 0.594 and ranged from 9 to 63.

Table 6

Factor Analysis of SOS

Factor	**Eigenvalue**	**Difference**	**Proportion**	**Cumulative**
Factor 1 |	5.43576	5.15157	0.9756	0.9756
Factor 2	0.28419	0.07355	0.0510	1.0266
Factor 3	0.21063	0.12618	0.0378	1.0644
Factor 4	0.08445	0.10199	0.0152	1.0796
Factor 5	-0.01754	0.03721	-0.0031	1.0764
Factor 6	-0.05475	0.02269	-0.0098	1.0666
Factor 7	-0.07744	0.06207	-0.0139	1.0527
Factor 8	-0.13951	0.01465	-0.0250	1.0277
Factor 9	-0.15415	.	-0.0277	1.0000

The scree plot in Figure 4 illustrates the findings of the factor analysis. There is little variation in the survey, indicating that the survey measured what it was intended to measure, supporting a one factor solution. The Cronbach's alpha remained strong at 93%, which accounts for the variability supporting a cohesive model that relates well to the

studied population. The horizontal line at the eigenvalue indicates that the principle components are landing on one value supporting one underlying factor in the survey (Hamilton 2009).

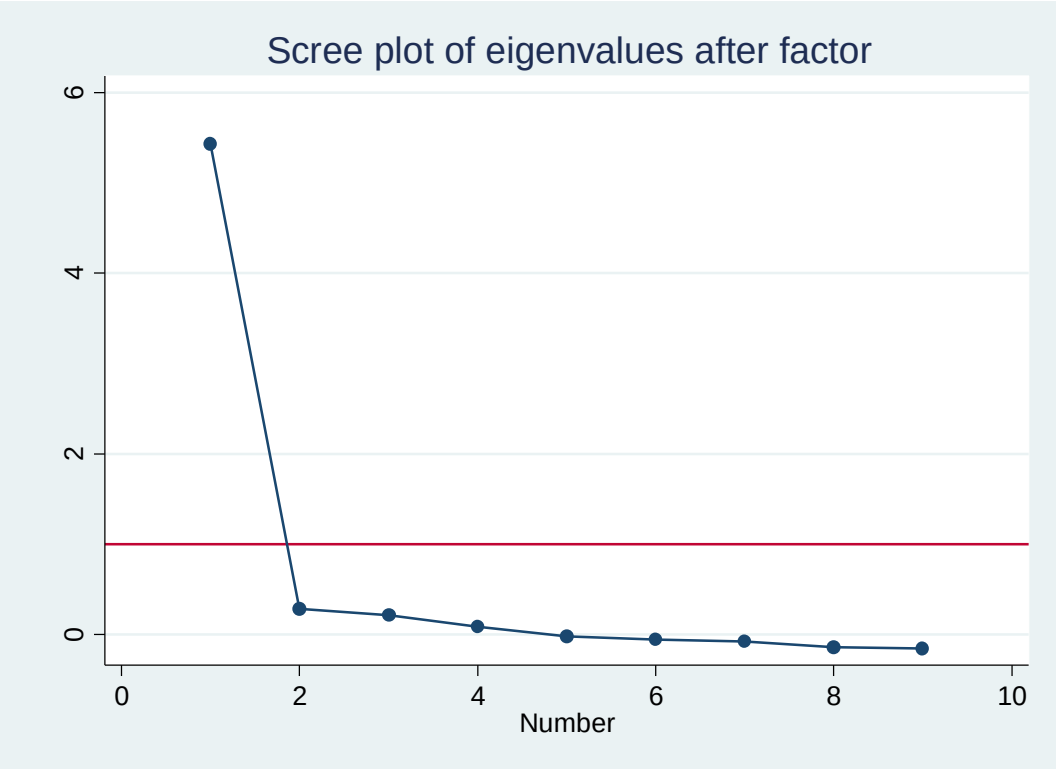

Figure 4. Scree plot of SOS

Independent Variables

The independent variables for the study were the nurse characteristics described in the beginning of this chapter in the descriptive statistics. The two independent variables eliminated from the model due to narrow cells were gender and training provided by the employer. Several independent variables were transformed, as described in the analysis of data due to the existence of thin cells, which were then collapsed or transformed into new categories. Other variables were kept in their original format. Table 7 is a chart of the independent variables that were used in the data analysis.

Table 7

Variable Explanation

Variable	Description	Measure	N	%	Comments
unit_type	Type of nursing unit	Categorical	375	95%	Some categories collapsed
Training	Special training for current unit	Yes/No	371	94%	
emp_trng	Training at the current system	Yes/No	288	73%	
len_cour	Length of current for special training	Categorical	280	71%	
Age	Age	Continuous	345	87%	
Tim_nur	Time worked as a nurse	Categorical	345	87%	
Tim_uni	Time worked on unit	Categorical	340	86%	
Fte	Full-time equivalent	Yes/No	350	89%	Transformed from categorical
Overtime	Do you work overtime?	Yes/No	349	88%	
Hr_ot	Do you work over 40 hours a week?	Categorical	203	51%	
Con_shif	Do you work a consistent shift?	Yes/No	347	88%	
Shif_typ	What shift if you work a consistent shift?	Categorical	196	50%	
Shif_hrs	What is your normal shift hours 8, 10, or 12 hours?	Categorical	350	89%	
Wor_we	Do you work weekends?	Yes/No	348	88%	
We_fre	How frequent to do you work weekends?	Categorical	312	79%	
Call_req	Are you required to take call?	Yes/No	347	88%	
Call_freq	How often take call?	Categorical	89	23%	
Call_vol	Do you take volunteer to take call?	Yes/No	347	88%	
Call_in	How often are you called in when on call?	Categorical	154	39%	
Only_job	Is this your only job?	Yes/No	340	86%	
Othjob_nur	If yes is your other job as a nurse?	Yes/No	48	12%	
Othjob_sys	Is the other job different employer?	Yes/No	50	13%	
Othjob_pnur	Is your other job as a nurse?	Yes/No	50	13%	
Othjob_hrs	How many hours do you work at the other job?	Categorical	50	13%	
Married	Marital status	Yes/No	347	88%	
Children	Do you have children?	Yes/no	343	87%	
Eld_par	Do you have elderly parents?	Yes/No	347	88%	
Eld_resp	Are you responsible for the care of your elderly parents?	Yes/No	141	36%	
Ed	Highest level of education?	Categorical	346	88%	Narrow cell
Ed_Cat	BSN or Master Yes/ No	Yes/No	346	88%	Transformed to BSN and above yes
Sch	Currently attending school?	Yes/No	341	86%	
Cert	Do you have a certification?	Yes/No	344	87%	
Cert_elig	Are you eligible for certification?	Yes/No	157	38%	

Variable	Description	Measure	N	%	Comments
Grd_rds	Do you attend grand rounds?	Categorical	346	88%	Four categories transformed to Grd_rds2
Grd_rds2	Do you attend three or more?	Yes/No	346	88%	Three or more
Out_conf	Do you attend outside conferences?	Yes/No	196	92%	
Yr2_wk	How many years to retirement	Continuous	303	78%	Transformed to four categories
Clin_ladd	Do you participate in the clinical ladder?	Yes/No	300	76%	

Data Analysis

Regression Preparation

The full regression model was not significant with an F-test of 0.4766. There was multicollinearity as indicated by a high mean variance inflation factor (VIF) of 2.75. Independent variables had fatally low numbers, as low as 1/VIF of 0.09. A low number indicates only a small portion of the variable is independent of all other variables (Hamilton, 2009 p 225). As I note and discuss below, some of the variables were transformed. Others were eliminated from the model to reduce multicollinearity, and some were removed due to narrow cells. Theory produced a reason to keep some of variables to build the final model. The independent variables were placed in the model using statistics, theory, and logic. The best fitting model was developed.

Age, years as a nurse, and *time on unit* created a high level of multicollinearity. Therefore, only *time on unit* as a nurse was kept in the final model. Weick and Sutcliffe (2007) stated that time spent together in a working unit helps to develop collective mindfulness. This was the best fitting variable of the three, supported by Weick and Sutcliffe's (2007) work and the model fit. *Taking call* created multicollinear results with *working weekends*, so it was removed in the final model. *Attending grand rounds* and

attending outside conferences also created multicollinearity. *Grand rounds* was removed, which improved the fit of the model.

Several independent variables were categorically transformed due to the existence of unusually thin cells. *Highest level of education* was transformed from the previous *diploma, associate, bachelor* and *masters* to *bachelor— yes/no*. *Full-time equivalent,* which was categorical, was transformed to a yes/no variable: *yes* for 32 hours a week or more and *no* for 31 hours and below. These transformations following re-categorization were completed due to the existence of narrow cells within the variable. Also, within the hospital system in which the survey was distributed, 32 hours or more per week was considered full-time, further supporting the transformation of this variable.

The three variables that were not transformed and were kept in the model were *work a consistent shift*, *working weekends*, and *special training*. *Special training* was a better fit for the model than *unit type*. Even after transforming the small cells of *unit type* into larger categories, the two variables in the model created multicollinearity, and *special training* was maintained. *Grand rounds* was transformed from four categories to two. Two categories of *grand rounds* did not change the fit in the dependent variable and did not relate to the independent variable.

Multiple Regression

An initial analysis was run to investigate if the type of unit was a clustering variable based on the observation that nurses tended to work on their same units and that units had their own characteristics that might affect outcomes. To conduct this analysis I fit a multi-level mixed effects model with unit type as a random component to the data.

Results indicated accepting the H_o that the model with a random component was no better than a fixed model (p >.99). I then continued the analysis using OLS regression.

Table 8 shows the multiple regression output of the best fitting model for the dependent variable of individual mindfulness. All of the variables were tested at the 95% confidence level.

Table 8

Ordinary Least Squares Regression Analysis for Individual Mindfulness

Variable	Coefficient	Standard Error	t	P	Beta
Work Overtime	-.24	.119	-2.05	0.042	-.132
Consistent Shift	.19	.114	1.62	0.106	.104
Work Weekends	.17	.140	1.21	0.227	.081
Attending School	-.18	.116	-1.51	0.132	-.094
Certified	-.07	.112	-0.63	0.528	-.040
Outside Conferences	-.002	.123	-0.02	0.984	-.001
Training	-.10	.140	-0.68	0.495	-.042
Clinical Ladder	.05	.167	0.29	0.795	.019
Full-Time	.22	.140	1.57	0.117	.102
Time on Current Unit	-.01	.006	-1.35	0.177	-.091
Education	-.37	.128	-2.91	0.004	-.190
N=276					

R-Squared	0.075
Adjusted *R*-Squared	0.036
Prob > F	0.036
Root MSE	0.867

The *F*-test indicates that the model rejects the null hypothesis (p = .036). Two of the nurse characteristics were shown to be significant on predicting individual mindfulness. The variables that were significant were *working overtime* and *having a bachelor's degree or above*. Both showed a negative relationship to individual mindfulness. The *R*-squared is low at 7.5%, indicating the model only explains a small amount of variation.

Regression criticism. The mean variance inflation factor of 1.20 shows the model has a minimal degree of multicollinearity, as indicated in Table 9. Tolerance scores showed excellent values over .77, indicating variables are independent of others due to their individual high levels (Hamilton, 2009).

Table 9

Variance and Inflation Factors

Variable	**VIF**	**1/VIF**
Time on Unit	1.30	0.77
Work Weekends	1.26	0.79
Attend Outside Conferences	1.26	0.79
Clinical Ladder	1.25	0.80
Level of Education	1.22	0.82
Work Fulltime	1.19	0.84
Work Overtime	1.18	0.85
Consistent Shift	1.17	0.86
Certified	1.16	0.86
Attending School	1.10	0.90
Training	1.07	0.93
Mean VIF	**1.20**	

Further assessment of the model was completed by graphing the residuals versus fitted values as seen in Figure 5. The scatter in Figure 5 shows a slight heteroskedastic pattern and a few outlying cases. I then generated a leverage versus squared residuals plot to determine the existence of potential outliers and influential cases. This graph is shown in Figure 6 below, which identifies the existence of a few outliers, but shows them as having only minor influence on the model.

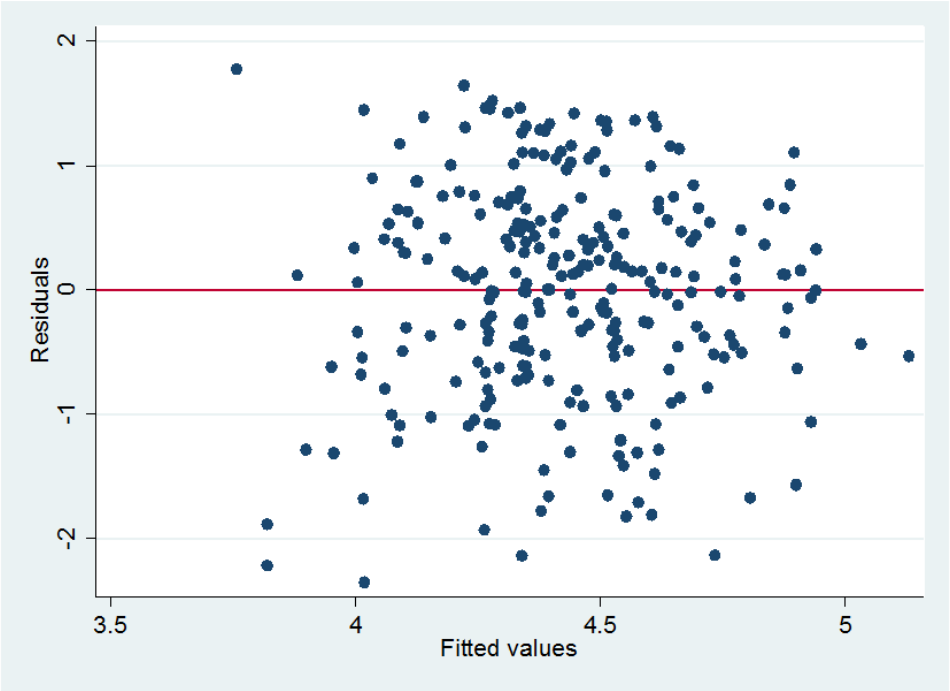

Figure 5. Residuals versus fitted values plot

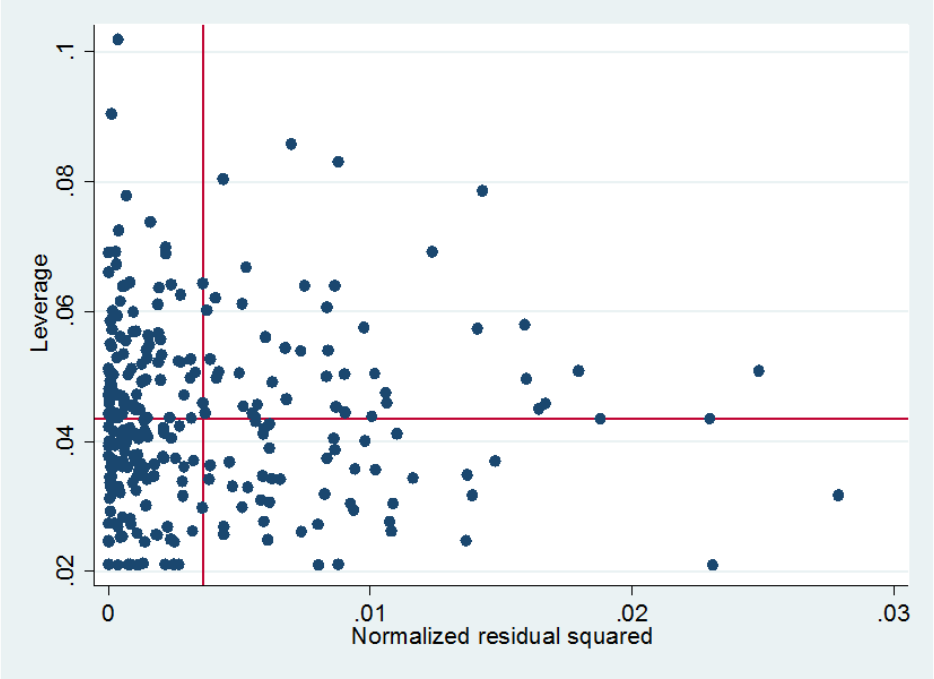

Figure 6. Leverage versus squared residual plot

Due to having observed outliers in the model, I performed a robust regression. The results of the robust regression did not change alter the initial OLS outcomes. Then, after investigating each outlier, I determined that none of the cases appeared uniquely unusual. This, along with the robust regression results, led me to retain these cases in the analysis. Given that I found the outliers not to exert unusual influence on the model, I was confident that the ordinary least squares model was reasonably sound. The OLS regression model was then used in a nested model thereby enabling further assessment opportunities.

Nested Regression

Nested regression, a hierarchical test of collective mindfulness, was completed based on an expansion of the findings from the regression model of individual mindfulness (see Table 8 above), which showed negative effects of working overtime and of education on individual mindfulness irrespective of the other variables. The nested regression was used to first identify if these same nursing characteristics had an effect on collective mindfulness and then to investigate if individual mindfulness significantly added to this effect.

When predicting the confidence level of the independent variables, the 95% level was used. The first block within the nested regression was a regression of the characteristics that predict collective mindfulness. The *F*-test indicates that the model rejects the null hypothesis ($p = 0.030$). Three of the nursing characteristic variables were significant in the model for predicting collective mindfulness. The variables that were significant were *working weekends* ($p = 0.015$), *currently attending school* ($p = 0.007$), and *special training* ($p = 0.050$). All things being equal, the two that had a significant

negative effect were *working weekends* and *attending school to further their education*, while *Special training* showed a significant positive relationship. The *R*-squared is low at 7.8%, indicating the amount of variation that explained by the model is minimal. The *R*-squared was slightly higher than the individual mindfulness model shown in Table 8 above. Due to an additional six incomplete surveys with respect to the collective mindfulness multi-item scale, the N in the nested model was reduced from 276 to 270.

In the second block of the nested regression, the *F*-test was significant (p = 0.0005) resulting in rejection of the null hypothesis. At the 95% confidence level, *working weekends*, *going to school*, and *special training* each remained significant; and both *working weekends* and *going to school* continued to have negative relationships. However, *individual mindfulness*, which was added in this block, also proved significant and had a positive relationship.

In block two, the *R*-squared improved to 0.125, indicating that 12.5% of the variance can be explained by the model. The adjusted *R*-squared is lower ($_aR^2$ = 0.085) due to the complexity of the model.

Table 10

Block One of the Nested Regression with Collective Mindfulness as the DV

Variable	Coefficient	Standard Error	t	P	Beta
Work Overtime	.14	.148	0.96	0.339	.062
Consistent Shift	.05	.146	0.34	0.737	.021
Work Weekends	-.44	.180	-2.34	0.015	-.165
Attending School	-.41	.149	-2.74	0.007	-.171
Certified	-.01	.143	-0.04	0.971	-.002
Outside Conferences	.22	.159	1.38	0.169	.093
Training	.36	.180	1.97	0.050	.122
Clinical Ladder	-.03	.215	-0.13	0.896	-.009
Full-Time	.15	.180	0.87	0.387	.057
Time on Current Unit	.01	.008	-1.06	0.290	-.072
Education	-.08	.165	0.48	0.630	-.032

R-Squared	0.078
Adjusted *R*-Squared	0.039
Prob > F	0.030
Root MSE	1.103

Block 2 Nested Regression

Variable	Coefficient	Standard Error	t	P	Beta
Work Overtime	.21	.146	1.45	0.149	.093
Consistent Shift	-.01	.144	-0.04	0.966	-.003
Work Weekends	-.49	.176	-2.79	0.006	-.184
Attending School	-.36	.146	-2.46	0.015	-.151
Certified	.01	.141	0.10	0.922	.006
Outside Conferences	.22	.155	1.40	0.164	.092
Training	.38	.176	2.17	0.031	.131
Clinical Ladder	-.06	.210	-0.21	0.836	-.013
Full-Time	.09	.176	0.51	0.612	.032
Time on Current Unit	-.01	.008	-0.75	0.452	-.050
Education	.03	.163	0.18	0.855	.012
Individual Mindfulness	.285	.077	3.72	0.00	.226

R-Squared	0.125
Adjusted *R*-Squared	0.085
Prob > F	0.0005
Root MSE	1.077

Test of Change in the R-Square from Block-1 to Block-2

Block	F	PR > F	*R*-Squared	Change in R-Squared
1	1.99	0.0297	0.078	
2	13.87	0.0002	0.1254	0.0472

Regression criticism. I explored the appropriateness of the final model used in block-2, which used collective mindfulness as the dependent variable and included individual mindfulness as an independent variable. I initially checked for multicollinearity and did not find any evidence of this condition as noted in Table 11 below.

Table 11

Variance and Inflation Factor

Variable	**VIF**	**1/VIF**
Time on Unit	1.31	0.77
Work Weekends	1.28	0.78
Attend Outside Conferences	1.27	0.79
Clinical Ladder	1.26	0.80
Level of Education	1.25	0.80
Work Fulltime	1.21	0.83
Work Overtime	1.21	0.83
Consistent Shift	1.17	0.85
Certified	1.15	0.87
Attending School	1.11	0.90
Training	1.08	0.92
Individual Mindfulness	1.08	0.93
Mean VIF	**1.20**	

I then proceeded to plot the residual-versus-fitted values for determining adherence to normal i.i.d. errors. The scatter in Figure 7 does not show signs of a heteroskedastic pattern, but there appears to be a couple of outlying cases. To determine if any of the cases were exerting undue influence on the model I ran a leverage versus residuals-squared plot (see Figure 8). In this plot the horizontal line indicates the mean of the leverage, and the vertical line is the mean of the squared residuals (Hamilton 2009). There are cases with poor fit and cases with high leverage, but none with both; indicating that the observed outliers are exerting only minimal influence on the model.

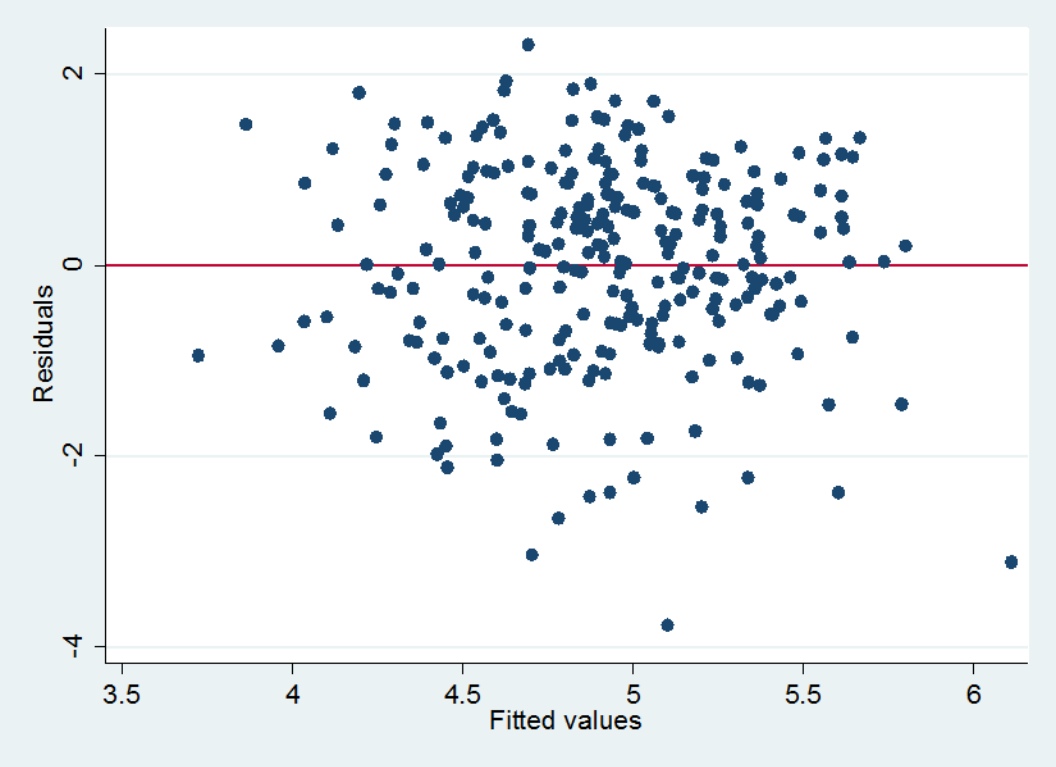

Figure 7. Residual versus fitted plot y-line 0

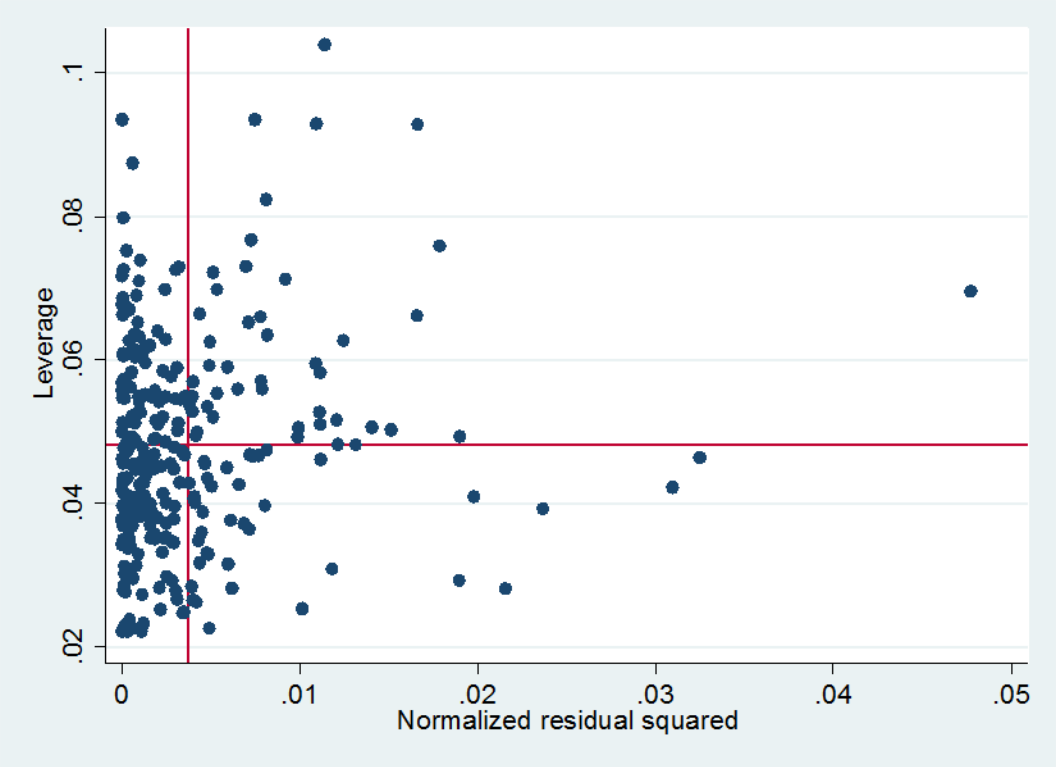

Figure 8. Leverage versus residual squared

For the final regression criticism, I constructed an added-variable plot to more closely observe outlying effects on the primary relationship of interest between collective and individual mindfulness. Observations horizontally distant from the rest of the data could indicate problems misleading results (Hamilton, 2009). Figure 9 illustrates the added-variable plot. No one case appears to be significantly leveraging the partial regression line.

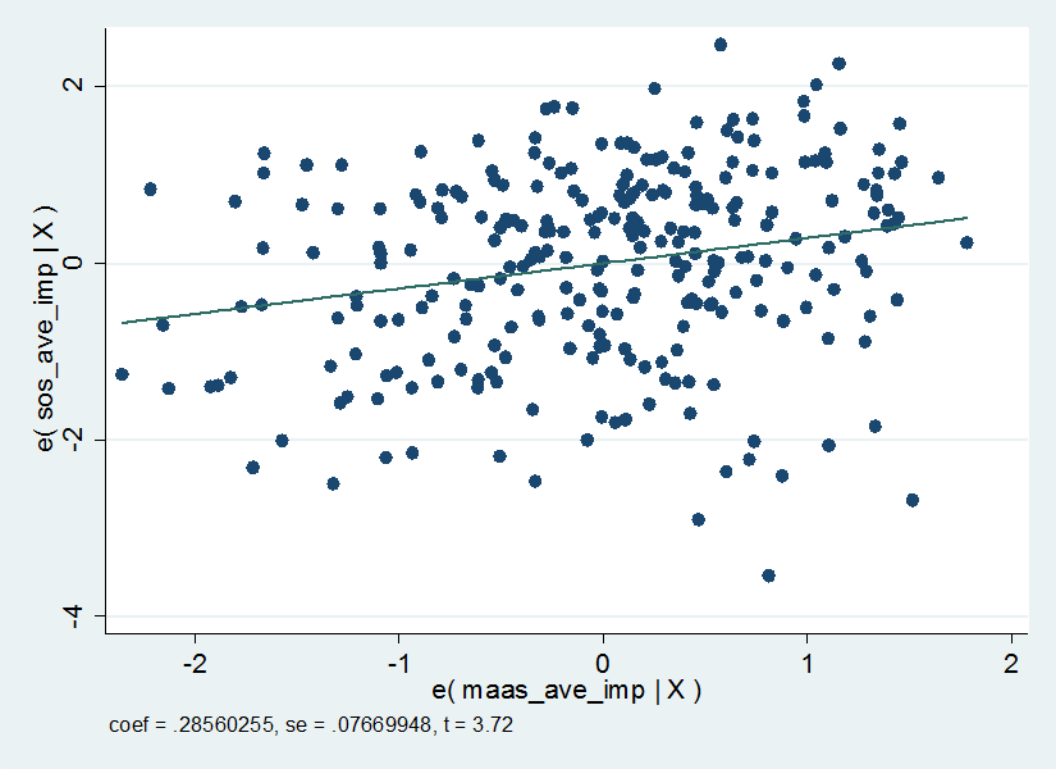

Figure 9. Added variable plot

Chapter Summary

The purpose of this study was to determine what relationship exists between nurse characteristics and mindfulness, both collective and individual. An organization's level of high reliability is dependent on its mindfulness (Weick & Sutcliffe, 2007). Several nurse characteristics were found to be significant in predicting individual and collective mindfulness. The nested regression indicated that individual mindfulness is predictive of

collective mindfulness. It therefore follows that in order to have collective mindfulness, it is important to have individual mindfulness more so than the other nurse characteristics addressed in this study. However, individual mindfulness was an intervening variable as noted in Figure 10, which shows the path for significant relationships.

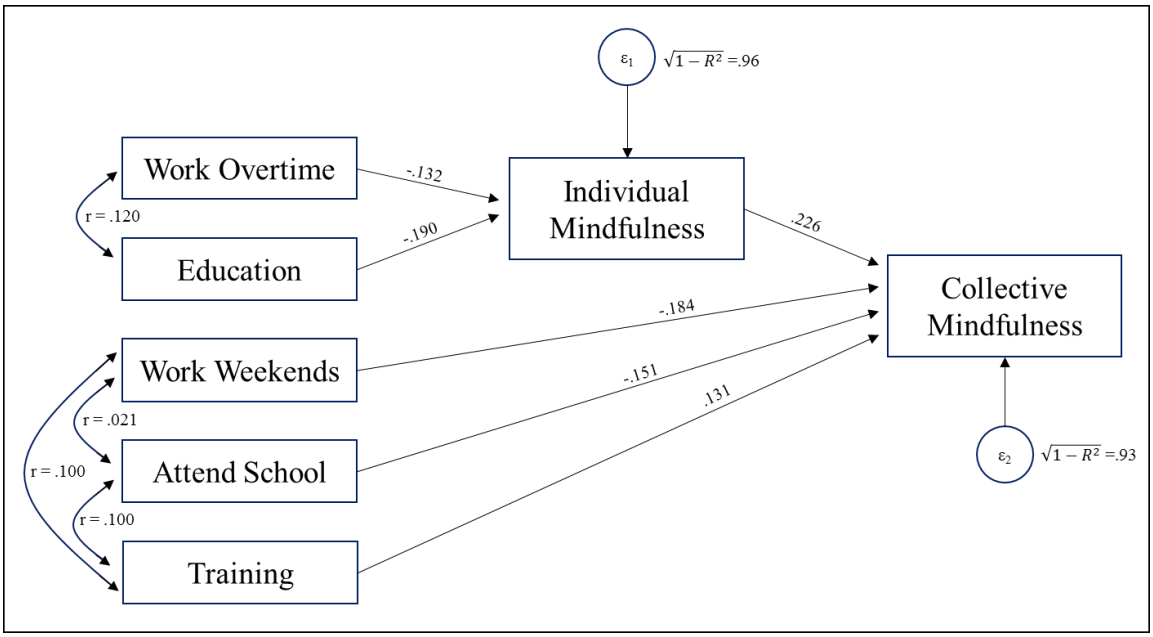

Figure 10. Causal model with standardized regression coefficients

The variables that had a direct positive effect on collective mindfulness were *training* that the respondents deemed necessary for their current job and *individual mindfulness*, which had the greatest effect on collective mindfulness with a beta of .226. The variables that had direct negative effects were *attending school* to further their education, and *working weekends*. The variables that affected individual mindfulness (*work overtime* and *education*) had minimal but negative effects on collective mindfulness when mediated through individual mindfulness (standardized regression coefficients of .030 and .043 respectively). These findings are illustrated in the *Figure 10* above in the causal model. This statistical analysis created path coefficients, which indicate estimates of the strength of the effects of the variables (Hamilton, 2008). The

advantage of causal modeling is that the diagram can be clarifying and allow for improved communication of findings (Hamilton, 2008).

All of this suggests that increased training, decreased weekend work, reduced school activity; and to a lesser degree, decreased overtime and educational level will all increase collective mindfulness. However, the overall strength of the model remains low suggesting that other measures besides the nurse characteristics assessed in this study may have a much more significant bearing on collective mindfulness.

The findings did not support several of the hypotheses. I will provide additional discussion of the research question, the hypotheses, findings, and interpretations in the next chapter. I will also address limitations, key findings, implications of the findings, and suggestions for further research.

CHAPTER FIVE

DISCUSSION AND CONCLUSION

This chapter will review the findings and implications of the study in relationship to mindfulness, both individual and collective. In pursuit of becoming highly reliable, an organization must have collective mindfulness, according to Weick & Sutcliffe (2003). The findings of this research study indicated that individual mindfulness supports a higher level of collective mindfulness. This chapter presents a review of the research question and hypotheses as tested with the nested regression analysis. I will also discuss key findings, limitations of the study, recommendations for further research, and study conclusions.

The purpose of this research was to explore nurse characteristics that might affect individual and collective mindfulness, which in turn contribute to the search for health systems that strive to become Highly Reliable organizations. The study results showed that individual mindfulness has a significant positive relationship with collective mindfulness. Special training in a registered nurse's area of work was the only other variable that had a positive relationship with collective mindfulness. Going to school, working weekends, working overtime, and advanced education (e.g. MSN versus BSN) had negative effects on mindfulness.

Research Question and Hypothesis

Chapter One presented one research question and six hypotheses. In this chapter, I present the research question and related hypotheses within a discussion bounded by the findings reported in Chapter Four.

Research Question

The overarching research question asked, if a relationship existed between nurse characteristics and individual mindfulness and collective mindfulness? The nested regression provided evidence to support that a relationship between several nurse characteristics and individual and collective mindfulness exists. Individual mindfulness was further noted as a significant predictive measure and source for increasing a registered nurse's collective mindfulness. Similarly, a positive relationship was uncovered between special unit training and collective mindfulness suggesting that training may offer one way to improve mindfulness. This indicates that a team who attends the same training may think in a collective mindful manner.

There was a negative relationship between collective mindfulness and working weekends and attending school, which suggests that certain extracurricular activities, personal desire, or other depleting and distracting involvements may interfere with collective mindfulness. This was further reinforced through indirect findings, which showed that overtime work and higher educational levels had a negative effect on collective mindfulness as mediated through individual mindfulness. Working greater than forty hours per week can affect the nurses work-life balance in a negative manner, which may be affecting their mindfulness.

Education's negative effect on individual mindfulness seems more difficult to explain. It may be that the higher-educated nurses are not engaged or mindful at the bedside therefore they may be better utilized in managerial and educational roles. They may also be less individually mindful if in fact they have more insight into nursing practice and other nurses interrupt them more frequently with questions. Another

possibility could rest with the application of MSN educational curriculum to unit practices. Future qualitative research into this phenomenon would help to shed more light on these results.

Hypotheses

Below I introduce the presumed hypotheses in relation to the results. While evidence supported some of the hypotheses, others were not supported and some had unexpected results.

Hypothesis 1: The higher the level of education of a registered nurse, the higher the level of mindfulness. Referring to the individual mindfulness regression model, education had a negative effect on the nurse's individual mindfulness. In the nested regression model, education did not have a relationship with collective mindfulness. That is, its indirect effect on collective mindfulness was not significant, yet it did exist in terms of slightly offsetting the positive effects produced by individual mindfulness. As discussed above, this result presents a bit of a conundrum and strongly indicates a need for further research.

Hypothesis 2: Certification in a registered nurses' area of practice will result in a higher level of mindfulness. Certification in the nurses area of practice did not improve mindfulness at the individual or collective level as indicated through the regression analysis. Although it did not have a negative effect on their mindfulness, as with further education, it also did not have a positive effect. I was surprised with this finding because special training by the organization did improve mindfulness, therefore I belived that certification would have the same effect. However, certification leans more

on the passing of exams and less on training knowledge, which applies more to the practice. Frequently, training for certification involves training to take the exam.

Hypothesis 3: The nurse's age will affect the level of mindfulness. Age was not significant as a factor affecting mindfulness in the full regression model. Due to multicollinearity, where age and time on unit proved fairly correlated, dropping age improved the regression model overall as time on unit was the best fit in the full regression model. Since nurses enter the work force at many different ages, time on the unit also seemed to provide a more logical fit. However, removing the age of the nurse and leaving the measure as time on current unit still did not reveal a significant relationship with mindfulness. I had anticipated that employee age would have had a greater impact. Older nurses, I believed, would be less sensitive to the small fractures. Their many life experiences would interfere with their focus on the "minor" errors. As a result, they would tend to go through the motions and be less engaged in minor details. I believed that the younger staff would exhibit more engagement and surmised that less experienced nurses would pay closer attention to details be and more likely to catch the small fractions. From a positive perspective, the fact that time on unit and age of nurse had no effect suggests that nurses similarly engage in mindfulness irrespective of their characteristics.

Hypothesis 4: The nurse's longevity in the nursing profession will affect the level of mindfulness. Longevity as a nurse was not significant in the full regression model. Time on the unit was highly correlated with time in the nursing profession. Therefore, I ran the model independently for each variable dropped the longevity variable

from the model and used the better fitting time on the unit variable. As noted in Hypothesis 3 above, the variable did not have a significant relationship with mindfulness.

Hypothesis 5: A nurse's employment status, defined as either full-time or part-time, will affect the level of mindfulness. The hours that a nurse worked did not affect his or her level of mindfulness. There was not a level of significance in the model when measuring full-time versus part-time work. I had hypothesized that more time spent on the job would assist a nurse in identifying small factures and achieving a mindful state. Because those working part-time would be so focused on learning their new patients and keeping up with the ever changing world of healthcare I presumed that small fractures would be missed. Also part-time staff are not consistent members of the team, a factor which appears to affect collective mindfulness. One reason that employment status may not have been significant is that people work part-time to achieve a better work-life balance. It appears that part-time status does not have a negative effect because it creates that balance, enabling the staff to be more mindful while at work.

Hypothesis 6: Nurses with high levels of individual mindfulness have higher levels of collective mindfulness than those with lower levels of individual mindfulness. The findings in the regression analysis indicate that nurses with high levels of individual mindfulness are predictive of higher levels of collective mindfulness. This was the largest finding in the study. It could indicate that organizations and their management teams should create a culture in which work-life balance is valued, and staff are free to develop their individual mindfulness. This will, in turn, lead to a higher level of collective mindfulness. Teams comprised of staff who are stressed and have difficulty focusing on specific tasks related to their individual patients may be challenged to

collectively keep those patients safe thereby reducing the probability of creating a Highly Reliable organization.

In summary, several of the nurse characteristics such as age and certification were found to have no relationship to predicting mindfulness. Education was hypothesized to have a positive effect, had an indirect negative effect. This raises a question regarding the relationship between education and mindfulness. The IOM report of (2011) found that increased education was important for patient safety, as mindfulness is important for patient safety. This indicates that there are more independent variables that affect the creation of a Highly Reliable Organization. The low degree of explained variability also supports this notion.

Further study is needed to fully understand the nurse characteristics and other factors that have the most profound effects on mindfulness. This research question and related hypothesis found that individual mindfulness has a significant effect on collective mindfulness. While the other independent variables did not weigh as heavily on predicting mindfulness, independent variables with the greatest effect on the dependent variable have yet to be discovered.

Key Findings and Recommendations

This study focused on the nurse characteristics that increase an organization's level of collective mindfulness. Healthcare systems strive to be Highly Reliable Organizations, as achieved in the nuclear and aviation industries; but in the case of healthcare systems patient safety is the goal (Weick & Sutcliffe 2003). Collective Mindfulness, in turn, creates high reliability in complex organizations (2003). Based on the studies identified in Chapter Two, it seemed reasonable to assume that the exploration

of nurse characteristics would uncover relationships between these characteristics and mindfulness. There were several key findings from this study that support the recommendations discussed in the next several pages. Focusing on a nurse's level of individual mindfulness will support organizations becoming Highly Reliable.

Higher levels of individual mindfulness lead to higher levels of collective mindfulness. Nurses who lack individual mindfulness may not contribute to collective mindfulness. Hence, assessment tools could be utilized during the hiring process that identify individual mindfulness may be helpful in identifying nurses with low levels of individual mindfulness. Specifically, assessment of the registered nurse's individual mindfulness as represented by their MAAS score may assist in the on boarding process. Then, developing individual mindfulness after hiring could result in improved desired outcomes through collective mindfulness.

Assessment of unit based Collective Mindfulness could guide developmental programs similar to those created by Weick & Sutcliffe (2007). Units with low collective scores should be the focus of the developmental plan. Employees that feel like or are viewed as "outsiders" appear less connected to team culture. With this in mind, social integration would prove important when introducing or engaging in collaborative care practice. The development of individual mindfulness should be developed first before the group work of collective mindfulness development.

The results in Chapter Four also indicated that education negatively related to individual mindfulness. The IOM report (2011) identified education as one of the key components for increasing patient safety. The gold standard for improving patient safety often points to increasing the education level of the nurse (2011). Mindfulness, while

important, is only one aspect associated with increasing patient safety. Education and training increases knowledge and skills making education an important component of patient safety as identified in the IOM (2011) report. However, this study found that education may have a negative effect on mindfulness, which also affects patient safety. Education as a nurse characteristic was found not to lend itself to creating a nurse with high individual and collective mindfulness. Education had a negative effect on individual mindfulness, the variable that had the most effect on collective mindfulness. Education is just one of the many nurse characteristics within those who fill the role as a nurse that promote positive outcomes within the nursing role (Aiken et. el 2003). Mindfulness could be affected by the role that the more advanced degree nurses are filling; they may need to work in leadership or educational roles to exercise mindfulness.

Nurses who were actively furthering their education were also found to have a negative relationship with collective mindfulness. Pursuing one's next level of education may be placing the work-life balance at risk. Working and going to school places many demands on the nurse. Organizations may need to rethink their demand for nurses to pursue a bachelor's degree within a defined period. Hiring nurses that have already completed their degree, or changing the organizations desired degree, may be a better practice. Another recommendation would be to support nurses working part-time through tuition reimbursement and maintaining benefits at a full-time rate. Because the balance of work and school appears to create a negative relationship with mindfulness, allowing registered nurses the ability to work part-time with limited weekend commitment could prove beneficial for increasing mindfulness. Providing benefits such as paying for their education and healthcare while allowing nurses to work part-time may assist

organizations in nurturing mindfulness. Further exploration of nurses working part-time and going to school verses working fulltime and going to school would be necessary to empirically support the previous statements.

Working overtime likewise predicted a direct negative relationship with individual mindfulness. Hours of work are often limited in organizations; research indicates that long work hours lead to a decrease in patient safety and untoward outcomes (Bae, S., Brewer, C., & Kovner, C., 2011). Working more than 40 hours a week was shown to have a negative relationship to individual mindfulness. Many states have imposed legislation to stop mandatory overtime and limit hours of work to protect patients from negative outcomes (2011). The findings of this study support the use of policy to limit hours of work. Healthcare organizations can enact policy outlining levels of work when not limited by state legislation.

Similarly, working weekends had a negative and direct relationship on collective mindfulness. Hours varied more for nurses who worked weekends than for those who worked Monday through Friday shifts. Nursing teams experience variability at a higher level due to the variability of the schedules; in this light, weekend work may disrupt the ability to form a collective team. Collective mindfulness may be easier to develop when working with a consistent group of people. Understanding the rotation of teams and its effect on mindfulness should be explored so managers can make informed decisions on how schedules affect mindfulness.

Special training for specific work within the unit increases collective mindfulness. A team attending the same specialized training experiences a collective way of thinking. Critical care areas and neonatal intensive care units are examples of units that receive

special training. These types of training courses are offered in didactic classroom settings. Because nurses graduate from varying levels of education and schools with different educational plans, proper baseline orientation for each nurse is important as they begin to work on a new nursing unit. This potentially explains specialized training achieving a higher level of collective mindfulness. The specialized training may work to bring the group to a collective mindfulness and a collective way of thinking.

Many organizations are working on ways to shorten their orientation for new graduates. However, findings suggests that a longer orientation could help to develop collective mindfulness. Shortening orientation may result in brief financial gain with a long term negative effect. In this study, prolonged didactic group orientation showed a positive relationship with collective mindfulness, suggesting that the cost saving measure of shortening orientation for new employees may have a negative effect on developing the nursing unit's level of collective mindfulness. Further study of the length of orientation and the nurse's level of individual and collective mindfulness would be beneficial to understanding what the appropriate length of orientation should be in an organization.

Summary of Recommendations

A focus on work-life balance is something that managers and hospital administration should focus on based in the findings of this study. Schedule creation, the push for further education, education level are all areas of focus for the balance assessment. Orientation activities should be evaluated for appropriateness in developing mindfulness, and specialty orientation programs should be considered. An assessment of individual mindfulness should be part of the interviewing or onboarding process.

Additionally, a similar assessment should be utilized to foster a unit-based understanding of collective mindfulness. Organizations can use the data from these assessments to target staff members who may need some assistance in developing their individual mindfulness. Finally, hospital administrators should carefully explore the most logical placements for nurses who hold bachelor's or master's degrees. Bedside nursing may not keep these staff members engaged a factor that reduces the level of mindfulness exhibited on the job.

Limitations and Delimitations

Organizational delimitations

This study focused on the findings from a single healthcare system. While this limits the generalizability of the study, it is a factor that provided more control over the random errors that occurs across multiple organizations. Additionally although the healthcare system used in the study comprised three distinct hospitals, a consistent organizational culture spanning those facilities was evident.

Another limitation concerned the fact that one of the hospitals opened only six weeks before the survey was administered to the nursing staff. This may have created a lower collective mindfulness score for those participating nurses, due to the brief time they had to work together.

Measurement limitations

There were small cells among some of the independent variables which caused a limitation of assessment due reduced variability in the measures. For example, there was an inability to study males, due to their low response rate, therefore gender could not be analyzed. A larger study would have increased the pool of information, making it possible to address the small cells.

Sampling limitations

This study used a convenience sample, adding to the level of limitations. Relying on self-reported data also placed limitations on the study. In order to protect the units from discovery, eliminating unit specific data created a weakness in identifying unit type and level of mindfulness. This also limited the ability to connect the data with unit culture.

In a similar fashion, expectations on work-life balance differ from organization to organization. Hours of work, shift rotation, call time, attending school, and overtime differ within each organization, creating the different levels. This study did assess certain aspects of work-life balance yet it lacked assessment of its cumulative effects on mindfulness. A larger sample including more organizations would create the ability to assess multiple cultures and the effect of healthcare work culture on mindfulness. Culture of the organization sets the expectations for work/life balance.

Understanding the effects of culture and staffing

This study leads one to believe that the culture of an organization plays a role in mindfulness, both individual and collective. Just Culture® organizations would be an area to assess for the effects of culture on mindfulness. Organizations that embrace Just Culture® encourage staff to look for small fractures; staff are praised for reporting "near misses" and actual untoward events (Just Culture Training for Healthcare Managers, 2008). Organizations and staff learn from mishaps and near misses (2008). Staff who practice in fear and not in the Just Culture® style are likely to be less mindful. They may fail to identify small fractures, paving the way for negative outcomes.

Culture, and employee engagement were not studied in this research. This is certainly a subject for further research. This could be achieved through assessment of employee engagement to identify organizational culture. At the time of the study, the system surveyed did not conduct employee engagement surveys; it was a process that this organization did not promote. Assessment of employee engagement needs to be investigated for developing an understanding of the relationship between culture and mindfulness.

Delimitations further include the lack of an assessment on staffing levels. Inappropriate levels create stress on nurses working within the system. Staffing patterns also differ from system to system. The California mandated ratios were grounded in improving patient safety (Burnes Bolton et al., 2007). This study noted that working overtime as well as attending school had a negative effect on nurse mindfulness. This calls the researcher to question if inappropriate staffing levels create an environment difficult to foster mindfulness. Staffing patterns based on evidence of staffing ratios may prove beneficial to assess in future research.

This study provided some informative findings and also exposed opportunities for future research. There appear to be unexplored variables that affect both individual and collective mindfulness. The limitations and delimitations of this study provide a gateway for future research, which I present in the following section.

Conclusion and Recommendations for Future Research

This exploratory study focused on identifying the nurse characteristics leading to mindfulness and the creation of a Highly Reliable Organization. While some studies address nurse characteristics and other studies address mindfulness, there appears to be a

gap in the literature related to studies that address both nurse specific characteristics and mindfulness.

Collective mindfulness plays a vital role in the High Reliability Theory (Weick & Sutcliffe, 2003) and research based programs exist to develop collective mindfulness. For example, Weick and Sutcliffe (2007) created prescriptive programs to improve collective mindfulness. I would suggest exploring the use of their programs or similar developmental programs to increase unit based collective mindfulness.

Individual Mindfulness is shown as a variable that improves collective mindfulness. I would suggest that staff take the individual mindfulness assessment to increase awareness of their personal levels of mindfulness. Staff with low scores could be given the tools to improve their individual mindfulness. Through their development of individual mindfulness, improved collective mindfulness would be gained, and overall reliability in the organization would improve.

I have several suggestions for future research that may offer further exploration into the research question. Initially, there should be an assessment of role identification and education level in relation to mindfulness. This would help to gain an understanding of the negative effect identified on individual mindfulness and bachelor and above prepared nurses. Mindfulness is only one of the many components involved in moving organizations toward becoming Highly Reliable. Education certainly plays a role in patient safety through knowledge of how to care for patients. There is a need to better understand how education may negatively affect individual mindfulness thereby increasing the level of High Reliability.

Beyond education, conducting a focused study on the time that one team of nurses works together may prove beneficial to further understand the effects of variability of schedules on collective mindfulness. This study indicated that the greater the variability in the schedule, the lower the collective mindfulness. It may be beneficial to have a group of staff working together as a consistent team, rather than following the current practice of daily varying the members of a team. Building team consistency may help to develop increased collective mindfulness. Indications exist that suggest standardize training for the group should be practiced as well. From this perspective, it would be beneficial to measure length of orientation as part of a standardized training study. It seems possible that increased orientation would actually lay the groundwork for improving Individual and collective mindfulness.

There are several factors that affect work-life balance that deserve more in depth study. One area would include having a greater understanding of why staff nurses work overtime. Do they work overtime because they cannot get their work completed within their normal work hours, or is it because they want the personal financial gain? The two justifications may have different answers when investigating effects on collective mindfulness.

There appear to be contributing factors such as work-life balance and culture of the organization that lead one to become individually mindful a state that contributes to collective mindfulness. A focused qualitative study of nurses who demonstrate high and low levels of individual and collective mindfulness could be informative. There are certainly additional independent variables affecting mindfulness that were not captured in this study or hypothesized prior to the study. A qualitative investigation would help to

gain insight for further independent variables, which in turn would prove helpful in understanding the effects on levels of individual and collective mindfulness.

Another recommendation for future research would involve an assessment of culture. The organizational culture could change how nurse characteristics affect their level of mindfulness. Fear based cultures verses Just Culture® organizations should be assessed. Based on a multi-system assessment, comparisons of mindfulness levels across to cultures may show the importance of a Just Culture® in developing Highly Reliable Organizations. Assessing nurses' relationships with their managers might play a role in viewing the culture of the organization. Along these lines, one avenue for assessment may be involve the use of the National Data Nursing Quality Information (NDNQI) survey on nurse satisfaction. The NDNQI highlights not only organizational culture, but it also explores the relationship nurses have with their direct managers. Unit level culture is important to assess. Further relationship exploration should also include nurses' relationships with physicians and assistive personnel. Physicians can be supportive members of the nurse's team, or they can be a cause of great stress. Assistive personnel can do the same. While dependable assistive personnel would intuitively allow for a higher level of mindfulness, those who lack dependability may have a negative effect on mindfulness.

Beyond differing organizational cultures and nurse relationships, nurses' individual coping strategies my play a role in their level of mindfulness. A qualitative investigation designed to uncover coping oriented variables that may affect mindfulness would help gain insight into what support systems may prove effective for staff. Specifically it may move to better understand what coping mechanisms lower the

negative effects on a nurse's mindfulness. Such a study may help to identify certain nurse characteristics that support a higher level of mindfulness while work-life balance poses challenges.

The current study suggests that coping and work-life balance appeared strained when nurses were going to school. Another study could focus on what decreases the negative effects of going to school. Working part-time, or full-time, having children, or having a supportive spouse may negate the negative effects of going to school.

Better understanding what affects nurse's individual and collective mindfulness will allow for organizations to become more Highly Reliable. Registered Nurses, the focus of this study, play a large role as healthcare systems work to become Highly Reliable Organizations. Understanding their own level of individual and collective mindfulness may shed light on how various characteristics and phenomena affect an organization's quality outcomes. Nurses want to provide a high level of care and not harm patients. I would recommend sharing individual and collective mindfulness scores with the nurses themselves. This, in addition to understanding the negative effects of lower levels of mindfulness, would give them the opportunity for awareness and motivation for developing and maintaining acceptable levels of mindfulness.

Conclusion

Management can learn a lot from this study. Adjustment of hiring practices should include an assessment of mindfulness. Not to shy away from hiring nurses with lower scores, but to identify an opportunity to create individual and system-wide learning plans for those who do not have high scores of mindfulness.

It is important that managers understand that going to school can place the organizations overall level of mindfulness as risk. Also, working weekends can affect levels of mindfulness. For organizations desiring to become Highly Reliable, these circumstances require innovative proactive interventions.

Special training has a positive effect on mindfulness and it is recommended that orientation of new employees on the unit be increased rather than shortened. Evaluation of training courses should address assessments of individual and collective mindfulness.

At a broader level, policy makers have been focusing on the effects of working overtime. Many states have legislated mandatory overtime as only available during times of crisis. This study supports that legislation noting that working overtime has a negative effect on mindfulness thus creating a less reliable organization. Some states are also mandating entry level of Bachelor's prepared nurses. This study does not support such legislation. Rather it the results suggest further investigation into the effects of entry levels educational requirements.

Organizations need to maintain a certain level of vigilance over work-life balance. This study indicated that going to school, working overtime, and working weekends individually negatively affected a registered nurse's level of mindfulness. Other work-life imbalances may have the same or more severe consequences. During my nursing career, I witnessed many registered nurses who struggled to further their education and juggle family life, often while dealing with the guilt of missing many family events and children's firsts. Organizations desire full-time work for full-time benefits, but fail to consider the unintended consequences that occur due to nurses who have competing demands. Similarly, organizations should focus on decreasing distractions in nurses' lives

and creating an improved work-life balance. Such a balance allows the nurse to be in a mindful state while performing in one of society's most honored professions.

The IOM report (2008a) stated that injuries due to preventable human errors are the eighth leading cause of death in the United States. Creating a Highly Reliable Organization will decrease the number of injuries and deaths. Creating Collective Mindfulness through staff engagement and development will move healthcare organizations in the direction of becoming Highly Reliable Organizations and saving countless lives and preventing injury.

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Appendix A

Permission to Use SOS

CenturyLink Webmail **smatter13@embarqmail.com**

Re: Collective Mindfulness

From : Kathleen Sutcliffe <ksutclif@umich.edu> Fri, Feb 01, 2013 02:50 PM
Subject : Re: Collective Mindfulness
To : Sheri Matter <smatter13@embarqmail.com>

Yes Sheri. You may use it. Kathleen

On Fri, Feb 1, 2013 at 1:54 PM, Sheri Matter <smatter13@embarqmail.com> wrote:

> Dr Sutcliffe,
>
> Do I have permission to use your SOS survey as published in the Journal of Medical Care entitled The Safety Organizing Scale Development and Validation. of Behavioral Measure of Safey Culture in Hospital Nursing Units? I plan to use the questions as shown in appendix of the article.
>
> Thanks
>
> Sheri

Appendix B

Permission to Use MAAS

VCU

Monroe Campus

Virginia Commonwealth University

Department of Psychology

White House
806 West Franklin Street
P.O. Box 842018
Richmond, Virginia 23284-2018

804 828-6754
Fax: 804 828-2237
TDD: 1-800-828-1120

Dear Colleague,

The trait Mindful Attention Awareness Scale (MAAS) is in the public domain and special permission is not required to use it for research or clinical purposes. The trait MAAS has been validated for use with college student and community adults (Brown & Ryan, 2003), and for individuals with cancer (Carlson & Brown, 2005). A detailed description of the trait MAAS, along with normative score information, is found below, as is the scale and its scoring. A validated state version of the MAAS is also available in Brown and Ryan (2003) or upon request.

Feel free to e-mail me with any questions about the use or interpretation of the MAAS. I would appreciate hearing about any clinical or research results you obtain using the scale.

Yours,

Kirk Warren Brown, PhD
Department of Psychology
Virginia Commonwealth University
806 West Franklin St.
Richmond, VA 23284-2018
e-mail kwbrown@vcu.edu

Appendix C

Copy of the Mindful Attention Awareness Scale

Day-to-Day Experiences

Instructions: Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what *really reflects* your experience rather than what you think your experience should be. Please treat each item separately from every other item.

1 Almost Always	2 Very Frequently	3 Somewhat Frequently	4 Somewhat Infrequently	5 Very Infrequently	6 Almost Never

I could be experiencing some emotion and not be conscious of it until some time later.	1	2	3	4	5	6
I break or spill things because of carelessness, not paying attention, or thinking of something else.	1	2	3	4	5	6
I find it difficult to stay focused on what's happening in the present.	1	2	3	4	5	6
I tend to walk quickly to get where I'm going without paying attention to what I experience along the way.	1	2	3	4	5	6
I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	1	2	3	4	5	6
I forget a person's name almost as soon as I've been told it for the first time.	1	2	3	4	5	6
It seems I am "running on automatic," without much awareness of what I'm doing.	1	2	3	4	5	6
I rush through activities without being really attentive to them.	1	2	3	4	5	6
I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	1	2	3	4	5	6
I do jobs or tasks automatically, without being aware of what I'm doing.	1	2	3	4	5	6
I find myself listening to someone with one ear, doing something else at the same time.	1	2	3	4	5	6
I drive places on 'automatic pilot' and then wonder why I went there.	1	2	3	4	5	6
I find myself preoccupied with the future or the past.	1	2	3	4	5	6
I find myself doing things without paying attention.	1	2	3	4	5	6
I snack without being aware that I'm eating.	1	2	3	4	5	6

Appendix D

Copy of the Safety Organizing Scale

APPENDIX Means, Standard Deviations, and Missing Values for the 9 SOS Items

Item*	Mean†	SD	Percent Missing	Number Missing	Alpha if Item Deleted‡	Total n
Q1 We have a good "map" of each other's talents and skills	5.05	1.20	1.10	18	0.87	1685
Q2 We talk about mistakes and ways to learn from them	4.95	1.28	1.18	20	0.86	1685
Q3 We discuss our unique skills with each other so we know who on the unit has relevant specialized skills and knowledge	4.76	1.41	0.65	11	0.86	1685
Q4 We discuss alternatives as to how to go about our normal work activities	4.29	1.41	0.53	9	0.86	1685
Q5 When giving report to an oncoming nurse, we usually discuss what to look out for	5.55	1.20	1.37	23	0.87	1685
Q6 When attempting to resolve a problem, we take advantage of the unique skills of our colleagues	5.46	1.17	0.42	7	0.86	1685
Q7 We spend time identifying activities we do not want to go wrong	4.87	1.23	1.01	17	0.86	1685
Q8 When errors happen, we discuss how we could have prevented them	5.16	1.15	0.65	11	0.86	1685
Q9 When a patient crisis occurs, we rapidly pool our collective expertise to attempt to resolve it.	5.86	1.10	1.01	17	0.87	1685

Q1 through Q9 indicates the question number associated with the scale.

*The instructions read "The following questions ask you to assess the degree to which you and the other RNs with which you currently and primarily work engage in certain behaviors and practices. By work unit, we mean your current hospital unit (eg, Cardiac Intensive Care Unit)." The stem question asks "To what extent do the following characterize your current work unit?"

†Scale: 1 = not at all, 2 = to a very limited extent, 3 = to a limited extent, 4 = to a moderate extent, 5 = to a considerable extent, 6 = to a great extent, 7 = to a very great extent.

‡These values are offered to those who might be interested in developing a short-form version of the SOS. We encourage use of the full-scale to capture the richness of all behaviors described.

SOS indicates Safety Organizing Scale; SD, standard deviation; n, the number of registered nurse respondents.

Appendix E

The Researcher's Survey in Qualtrics

Q1 Consent Informed Nurse Consent Email Web Survey

Do you think you work for a safe organization? Are you mindful in your day to day work? Does your unit have a high level of collective mindfulness? Is the organization's level of reliably affected by your level of mindfulness? Are your outcomes affected by the level of mindfulness? Does the makeup of your characteristics and the characteristics of the nurses on your unit affect the collective mindfulness on your unit? Here is your chance to participate in a survey that explores nurses' characteristics and their relationship to the organization becoming Highly Reliable. This is a study being conducted toward fulfillment of a dissertation by Sheri A. Matter and will be completed in conjunction with the Indiana University of Pennsylvania under the direction of John A. Anderson, PhD, as the dissertation committee chair. In addition, the healthcare system supports this research project. If you accept you will be directed to a web-based questionnaire, which well take approximately 10-15 minutes to complete. Participation in this study is voluntary and the information collected will remain confidential. If you participate, your responses will be recorded anonymously. Results that become public will have no identifiers of individuals, nursing units, or the organization. The individual and unit based data will be blinded from the main researcher and will be stored in a secure password protected computer.

Questions about the survey or issues completing the survey can be directed to Suril Amin by phone at 717-623-8601 or by e-mail at samin@pinnaclehealth.org. Answering yes below implies that you have read this information and that you consent to participate.

- ❍ Yes, I agree to participate.
- ❍ No

Q2 Select unit type that best describes the area that you work in the majority of your time.

- ❍ Cardiac Telemetry
- ❍ Medical Surgical, Rehab
- ❍ Step Down
- ❍ ICU
- ❍ Emergency Department
- ❍ Peri-Anesthesia
- ❍ Operating Room, Procedural Department, or Interventional Department
- ❍ Maternity
- ❍ Labor and Delivery
- ❍ Pediatrics
- ❍ IV Therapy, Wound Care
- ❍ Dialysis
- ❍ Float Pool

Q3 Did you require special training or a course to work on your current unit?

- ❍ Yes
- ❍ No

Q4 Was your course offered by your employer?

- ❍ Yes
- ❍ No

Q5 How long was the course?

- ❍ 2 months or less
- ❍ 3-6
- ❍ > 6 months

Q6 What is your age?

Q7 How many years have you worked as a nurse?

Q8 How many years have you worked on your current unit?

Q9 What is your current FTE?

- ❍ 0.8-1.0
- ❍ 0.6-0.7
- ❍ 0.4-0.5
- ❍ 0.1-0.3
- ❍ Per Diem

Q10 Do you work overtime shifts?

- ❍ Yes
- ❍ No

Q11 On average, how many hours of overtime do you work a week?

- ❍ 4-8 hours
- ❍ 9-12
- ❍ 13-16
- ❍ >16

Q12 Do you work a consistent shift?

- ❍ Yes
- ❍ No

Q13 What shift do you consistently work?

- ❍ Days
- ❍ Evenings
- ❍ Nights

Q14 What is the length of your normal shift?

- ❍ 8
- ❍ 10
- ❍ 12
- ❍ 16

Q17 Do you work weekends?

- ❍ Yes
- ❍ No

Q18 How frequently do you work weekends?

- ❍ Every weekend
- ❍ Every other Weekend
- ❍ Every third weekend
- ❍ Less than every third weekend

Q19 Are you required to take call?

- ❍ Yes
- ❍ No

Q20 How often are you called in?

- ❍ Never
- ❍ Less than Once a Month
- ❍ Once a Month
- ❍ 2-3 Times a Month
- ❍ Once a Week
- ❍ 2-3 Times a Week
- ❍ Daily

Q21 Do you take voluntary call shifts?

- ❍ Yes
- ❍ No

Q22 How often are you called in?

- ❍ Never
- ❍ Less than Once a Month
- ❍ Once a Month
- ❍ 2-3 Times a Month

- ❍ Once a Week
- ❍ 2-3 Times a Week
- ❍ Daily

Q23 Do you work at another job?

- ❍ Yes
- ❍ No

Q24 Is your other job as a nurse?

- ❍ Yes
- ❍ No

Q25 Is your other job at this same healthcare system?

- ❍ Yes
- ❍ No

Q26 Do you work the majority of your hours as a nurse in the system?

- ❍ Yes
- ❍ No

Q27 How many hours a week do you work in all of your jobs?

- ❍ <17
- ❍ 17-32
- ❍ 33-40
- ❍ 41-56
- ❍ >56

Q28 Are you married?

- ❍ Yes
- ❍ No

Q29 Do you have children?

- ❍ Yes
- ❍ No

Q30 Do your children live at home?

- ❍ Yes
- ❍ No

Q31 What are their ages?

- ❑ 0-5
- ❑ 6-12
- ❑ 13-18
- ❑ 19-22

Q32 Do you have elderly parents?

- ❍ Yes
- ❍ No

Q33 Are you their primary care giver?

- ❍ Yes
- ❍ No

Q34 What is your sex?

- ❍ Male
- ❍ Female

Q35 Highest level of education completed.

- ❍ Diploma
- ❍ Associate's Degree
- ❍ Bachelor's Degree
- ❍ Master's Degree
- ❍ PhD/DNP

Q36 Are you currently in school?

- ❍ Yes
- ❍ No

Q37 What degree are you currently pursing?

- ❍ Bachelors
- ❍ Masters
- ❍ PhD

Q38 Are you a certified nurse?

- ❍ Yes
- ❍ No

Q39 Are you eligible to become certified?

- ❍ Yes
- ❍ No

Q40 How many times a year do you attend grand rounds?

- ❍ 0-3
- ❍ 4-6
- ❍ 8-10
- ❍ >10

Q41 Have you attended a conference outside of the healthcare system?

- ❍ Yes
- ❍ No

Q42 How many times a year?

- ❍ 0-1
- ❍ 2-3
- ❍ >4

Q43 How many more years do you plan to work as a nurse?

- ❍ 0-5
- ❍ 6-10
- ❍ 11-20
- ❍ >20

Q44 Are you a member of the systems clinical ladder (clinical development program)?

- ❍ Yes
- ❍ No

Q45 **Day to Day Experiences**

Below is a collection of statements about your everyday experience. Using the 1-6 scale below, please indicate how frequently or infrequently you currently have each experience. Please answer according to what really reflects your experience rather than what you think your experience should be. Please treat each item separately from every other item.

	Almost Always	Very Frequently	Somewhat Frequently	Somewhat Infrequently	Very Infrequently	Almost Never
I could be experiencing some emotion and not be conscious of it until some time later.	❍	❍	❍	❍	❍	❍
I break or spill things because of carelessness, not paying attention, or thinking of something else.	❍	❍	❍	❍	❍	❍
I find it difficult to stay focused on what's happening in the present.	❍	❍	❍	❍	❍	❍
I tend to walk quickly to get where I'm going without paying attention to what I	❍	❍	❍	❍	❍	❍

experience along the way.						
I tend not to notice feelings of physical tension or discomfort until they really grab my attention.	❍	❍	❍	❍	❍	❍
I forget a person's name almost as soon as I've been told it for the first time.	❍	❍	❍	❍	❍	❍
It seems I am "running on automatic," without much awareness of what I'm doing.	❍	❍	❍	❍	❍	❍
I rush through activities without being really attentive to them.	❍	❍	❍	❍	❍	❍
I get so focused on the goal I want to achieve that I lose touch with what I'm doing right now to get there.	❍	❍	❍	❍	❍	❍
I do jobs or tasks automatically, without being of what I'm doing.	❍	❍	❍	❍	❍	❍
I find myself listening to someone with one ear, doing something else at the same time.	❍	❍	❍	❍	❍	❍
I drive places on automatic pilot and then wonder why I went there.	❍	❍	❍	❍	❍	❍

I find myself preoccupied with the future or the past.	❍	❍	❍	❍	❍	❍
I find myself doing things without paying attention	❍	❍	❍	❍	❍	❍
I snack without being aware that I'm eating.	❍	❍	❍	❍	❍	❍

Q46 **Safety Organizing Scale**

The following questions ask you to assess the degree to which you and the other RNs with which you currently and primarily work engage in certain behaviors and practices. By work unit we mean your current hospital unit.

	Not at All	Very Limited	To a Limited Extent	To a Moderate Extent	To a Considerable Extent	To a Great Extent	To a Very Great Extent
We have a good "map" of each other's talents and skills.	❍	❍	❍	❍	❍	❍	❍
We talk about mistakes and ways to learn from them.	❍	❍	❍	❍	❍	❍	❍
We discuss our unique skills with each other so we know who on the unit has relevant specialized skills and knowledge.	❍	❍	❍	❍	❍	❍	❍
We discuss alternatives as to how to go about our normal work activities.	❍	❍	❍	❍	❍	❍	❍

When giving report to an oncoming nurse we usually discuss what to look for.	❍	❍	❍	❍	❍	❍	❍
When attempting to resolve a problem, we take advantage of the unique skills of our colleagues.	❍	❍	❍	❍	❍	❍	❍
We spend time identifying activities we do not want to go wrong.	❍	❍	❍	❍	❍	❍	❍
When errors happen, we discuss how we could have prevented them.	❍	❍	❍	❍	❍	❍	❍
When a patient crisis occurs, we rapidly pool our collective expertise to attempt to resolve it.	❍	❍	❍	❍	❍	❍	❍