THE RELATIONSHIP OF NURSE MANAGER COMPETENCIES, NURSE PRACTICE ENVIRONMENT, AND FRONTLINE NURSES' INTENT TO STAY: A MEDIATION ANALYSIS

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Abstract

The high rate of nurse turnover can have a profound impact on the already diminishing nursing workforce. With the predicted nursing shortage, it is important to mitigate the factors that lead to turnover. Practice environment-related reasons were identified as one of the most frequent determining factors for turnover. Although some contributing factors to nurse turnover are unavoidable, practice environment-related reasons are within the nurse managers' (NMs) control. NMs play an integral role in this regard since their leadership ability and support greatly influence frontline nurses' perception of their practice environment. Furthermore, NMs' ability to create positive practice environments that reduce frontline turnover may depend on their leadership knowledge, skills, and abilities. Thus, it was necessary to explore essential competencies of current NMs.

This study was guided by the NM Learning Domain Framework (NMLDF), which asserts that for NMs to be successful, they must gain expertise in three leadership domains: *art of leadership*; *science of leadership*; and *leader within*. The purpose of this study was to assess essential competencies of current NMs and examine the relationship among NM competencies, frontline nurse perception of practice environments, and frontline nurses' intent to stay (ITS). Moreover, four of its specific aims were as follows: (1) describe the ten essential competencies self-assessed by NMs; (2) evaluate the psychometric properties of Warshawsky's NM Competency Instrument; (3) examine the correlation between NM competencies, nurse practice environment, and frontline nurses' ITS; and (4) examine the direct effect of NM competency on frontline nurses' ITS and examine the indirect effect of NM competency on frontline nurses' ITS, mediated by the nurse practice environment.

To fulfill the aforementioned aims, this study conducted secondary analysis of the NM Competency data and 2017 National Database of Nurse Quality Indicators® Registered Nurse

Survey data gathered from 53 U.S. hospitals. Additionally, a cross-sectional correlational design was used to evaluate the relationships among the study variables, controlling for hospital characteristics (location, size, and teaching status), unit characteristics (unit type), NM characteristics (education and certification), and frontline nurse characteristics (tenure and education).

Data analyses were conducted at the unit level. Descriptive and bivariate data analyses (specific aims 1 and 3) were performed using SPSS Statistics version 24 to further explore the relationships between the variables. Path analysis (specific aim 4) was conducted using Mplus version 8 to test the mediation effect of the nurse practice environment on NM competency and frontline nurses' ITS. Psychometric properties (specific aim 2) were tested using Mplus.

The reliability of Warshawsky's instrument was supported by the results of Confirmatory Factor Analysis (CFA) and Cronbach's alpha test. The results demonstrated that all indicators were significantly loaded onto their respective factors. All possible bivariate relationships between the competencies were significantly correlated.

NMs reported being most competent in diversity management skills, technology skills, and clinical practice knowledge. Conversely, they reported being least competent in financial management, strategic management skills, and performance improvement skills. NM education and certification impacted certain NM competencies. NMs with master's or higher degrees had significantly higher overall composite score and competency in financial management, human resource leadership skills, foundational thinking skills, and strategic management skills than NMs with lower-level degrees. The overall competency, financial management, human resource management skills, performance improvement skills, and foundational thinking skills were significantly higher in NMs who had a leadership certification.

Pearson correlations demonstrated weak but significant positive associations between NM competencies and frontline nurses' practice environments. As NM competencies increased, frontline nurses' perception of their practice environments increased as well. In addition, human resource leadership skills were positively correlated with frontline nurses' participation in hospital affairs, nursing foundations for quality of care staffing and resource adequacy, and the overall Practice Environment Scale Nursing Work Index (PES-NWI). Both relationship management and influencing behaviors were positively correlated with nurses' participation in hospital affairs, nursing foundations for quality of care, and the overall PES-NWI. Diversity management skills was positively correlated with staffing and resource adequacy. Finally, overall competency was positively correlated with nursing foundations for quality of care.

Controlling for hospital, unit, NM, and frontline nurse characteristics, the path analysis showed that the composite NM competency score was significantly associated with the composite PES-NWI score. As NM competency increased, the overall PES-NWI score increased. In turn, the PES score was also significantly positively associated with frontline nurses' ITS. As nurses' perception of their practice environment increased, so did their ITS. Path model coefficients did not show a significant direct association between the overall NM competency score and ITS. However, the indirect effect of NM competency on ITS through PES-NWI was significant, thereby supporting mediation.

This study's findings contributed valuable information for the field of nursing. Knowledge about NMs' self-assessed competency, coupled with the way composite and specific leadership competencies impact the practice environment and frontline nurses' ITS, will help in directing strategic efforts to improve the worsening nursing shortage. Furthermore, identifying gaps in NM competency and understanding how NM competency relates to nurses' perception of

the practice environment and nurses' ITS can lead to the development of policies, resources, and an overall strategy to improve the effectiveness of NMs.

Keywords: nurse manager competency, nurse manager support, nurse practice environment, nurses' intent to stay, nurse retention

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CHAPTER 1

INTRODUCTION

Nurse Managers (NMs) are frontline leaders responsible for the 24-hour operation of one or more units in hospitals (American Organization of Nurse Executives [AONE], 2015). NMs set the tone for the unit culture and the nurses' practice environment, which are essential to an organization's successful performance (Sherman & Pross, 2010). Frontline nurses are the key in detection and prevention of errors and adverse events; thus, they are critical to creating stronger patient safety defenses (Institute of Medicine [IOM], 2004). Leadership and support provided by NMs to frontline nurses at the point of care is integral to a foundation of safe, high-quality, and effective care delivery (AONE, 2015; Kallas, 2014; Sherman & Pross, 2010). NMs' leadership and support enhance nurses' practice environments and, thus, have a positive effect on reducing frontline nurses' emotional exhaustion and job dissatisfaction (Duffield, Roche, Blay, & Stasa, 2010; Friese, 2005; Hanrahan, Aiken, McClaine, & Hanlon, 2010; Van der Heijden et al., 2010; Wieck, Dols, & Landrum, 2010).

Despite the significance of the NM role, an increasing number of NMs are expressing a lack of strong foundational knowledge and leadership experience (Moore, Sublett, & Leahy, 2016). NMs are typically identified as emerging leaders because of their strong clinical skills, not because of proven experience in managing teams (Schuettner, Van Sell, & Sheriff, 2015; Sherman & Pross, 2010). Although they may be expert clinicians for nursing practice, NMs need to acquire leadership competencies and be adequately prepared for them to be successful. Most NMs, however, frequently report lacking a focused orientation and/or receiving inconsistent onboarding as they assume their new role (Kelly, Wicker, & Gerkin, 2014). For this reason, many NMs do not get the opportunity to evaluate their learning needs, and oftentimes, feel unprepared, and lack confidence and competence (Pihlainen, Kivinen, & Lammintakanen, 2016).

NM competencies refer to the knowledge, skills, and abilities that frontline managers must have to thrive in their role (AONE, 2015). When NMs are competent, frontline nurses perceive them to be more effective in advocating for and providing adequate resources (Ducharme, 2017). Hence, NM's leadership ability and support has been considered an important attribute characterizing the nursing practice environment and associated with frontline nurses' satisfaction, morale, and organizational trust (Kallas, 2014; Randazzo & Brown, 2016; Schmalenberg, 2008). Furthermore, positive practice environments that NMs create reduce frontline nurse turnover (Nelson-Brantley, Park, & Bergquist-Beringer, 2018).

Reducing nurse turnover is essential given the projected need for an additional 1,052,600 nurses by 2022 (McMenamin, 2014). More alarming is that nurses' intent-to-leave rates are continuing to rise (Aiken et al., 2012; Chegini, et al., 2019). Given that NMs play a vital role in creating optimal work conditions for frontline nurses, their competency may be a critical factor

in enhancing nurses' perception of their practice environment, reducing turnover, and stabilizing the workforce. However, there is little empirical evidence on NM competencies and how NM competency influences frontline nurses' practice environments and their ITS. Therefore, this study will assess the competencies of current NMs and examine the relationship among NM competency, frontline nurses' practice environments, and their ITS.

Problem Statement and Significance

The U.S. nursing shortage continues to rise due to the increased healthcare needs of the aging population, the aging nursing workforce, the diminishing pipeline of nursing students, and an increased number of nurses leaving the profession (McMenamin, 2014). High turnover rates among new nurses add to the difficulty of closing the gap between the supply and demand for skilled clinicians (Djukic, Pellico, Kovner, & Brewer, 2011). An estimated 17.5% of newly-licensed registered nurses (RNs) leave their first nursing job within the first year, and about one in three (33.5%) leave within two years (Kovner, Brewer, Fatehi, & Jun, 2014).

High nurse turnover is costly and problematic. On average, a hospital incurs approximately $5.2M to $8.1M of avoidable recruitment expenses each year from nurse turnover (Colosi, 2016). An even more critical cost to consider is the negative impact of nurse turnover on patient safety and outcomes because frontline nurses are the foundation for monitoring patients, detecting errors and near misses, and performing other tasks to ensure patients receive high-quality care (Wong & Laschinger, 2015). In addition, new or temporary frontline nurses are less familiar with work processes, and therefore the potential for making errors increases (IOM, 2004). For all these reasons, it is important for hospitals to retain frontline nurses and reduce their turnover.

Although there are unavoidable causes of nurse turnover such as retirement of aging nurses and new positions being created, there also are avoidable causes. Park et al. (2016) showed that practice environment-related reasons were the second most frequent turnover reason, next to seeking a different job experience. Practice environment factors that are within the NM's control, such as staffing, work schedules, managerial support, and NM-staff relationships, can reduce nurse turnover, increase nurses' ITS and minimize avoidable nurse turnover (Choi, Pang, Cheung, & Wong, 2011; Osuji, Uzoka, Aladi, & El-Hussein, 2014).

The success of creating positive practice environments and reducing frontline nurse turnover may be related to NM competency. In *The Future of Nursing: Leading Change, Advancing Health*, the Institute of Medicine (renamed the National Academy of Medicine [NAM] since 2015) highlighted the importance of well-prepared and competent nurse leaders (IOM, 2011). With the transformation of the health care environment, the NAM (IOM, 2011) identified the importance of nurses being prepared and well-positioned to lead change and advance health. It recommended residency training for any nurse transitioning into a new practice setting. Similarly, in *Global Strategy on Human Resources for Health: Workforce 2030*, the World Health Organization ([WHO], 2016) stressed the need for nurses, especially leaders, to possess the required competencies for them to feel empowered to deliver quality care. The WHO (2016) pointed out that effective service coverage requires nurses and nurse leaders who possess the required competencies. In other words, the mere availability and number of health workers should not be the only focus when looking at the nursing shortage.

Despite these recommendations, very few hospitals assess and validate NM competency levels. Few onboarding programs designed specifically for NMs exist (Cziraki, McKey, Peachey, Baxter, & Flaherty, 2014; O'Neil, Morjikian, & Cherner, 2008). Hence, there is a lack

of opportunity to learn and develop leadership skills essential for a smooth transition from a staff nurse into the NM role (Mackoff & Triolo, 2008). In fact, new NMs use the phrase of "being thrown into the fire" and report having to develop their competency on their own (Kelly et al., 2014; Schuettner, Van Sell, & Sheriff, 2015). Considering how critical the NM role is, it is prudent for hospital administrators to assess NM competency levels and provide opportunities to advance the knowledge, skills, and abilities of NMs as leaders (DeCampli, Kirby, & Baldwin, 2010; Lúanaigh, 2016).

Studies have shown the beneficial effect of leaders' self-confidence on their practice of empowering others (Duffield, Roche, Blay, & Stasa, 2010; Friese, 2005; Sherman & Pross, 2010; Van Bogaert, Kowalski, Weeks, Vanheusden, & Clarke, 2013; Weberg, 2010). In addition, more effective leaders who clearly communicate, properly identify expectations, and resolve problems are likely to increase the job satisfaction of frontline nurses (Carter & Tourangeau, 2012; Roche, Duffield, Dimitrelis, & Frew, 2015; Sawatzky & Enns, 2012; Van Bogaert et al., 2013). Most studies examining the influence of NMs on frontline nurses have focused mainly on NM leadership types and individual leader characteristics, not on NM competency (Cowden, Cummings, & Profetto-McGrath, 2011; Mrayyan, 2008; Tourangeau & Cranley, 2006). Further, few studies have assessed which specific leadership competencies NMs lack. NM competency not only affects the NM's confidence and experience in transitioning into the leadership role but also their ability to lead the team and maintain workforce stability (Kallas, 2014). Thus, it was necessary to explore essential competencies of current NMs.

Assessing the competencies of current NMs provide valuable information to hospital administrators trying to support emerging nurse leaders to set them up for success. Examining the association between NMs' competency and frontline nurses' perception of their practice

environment was equally important. Many studies have examined practice environment factors focusing predominantly on opportunities for nurses to participate in decision-making, employee engagement, interprofessional collaboration, and leadership support (Carter & Tourangeau, 2012; Friese & Himes-Ferris, 2013; Kutney et.al., 2016; Roche, Duffield, Dimitrelis, & Frew, 2015; Sawatzky & Enns, 2012; Van Bogaert et al., 2013; Warshawsky, Wiggins, & Rayens, 2016). Lake (2002) characterized the practice environment as having five dimensions: nurse participation in hospital affairs; nursing foundations for quality of care; NM ability, leadership, and support of nurses; staffing and resource adequacy; and collegial nurse–physician relations (see *Appendix A*). NMs are critical in making sure these five practice dimensions are in place (Edwardson, & Irvin, 2013; Nowrouzi et al., 2015). Hence, NMs can positively or negatively influence employment intentions of frontline nurses. Although the relationship between practice environment and its positive impact on nurses' ITS has been documented in the literature, little was known about how NM competency on essential leadership skills influence frontline nurses' practice environment and ultimately their ITS.

This study was the first to link NM competencies to frontline nurses' perception of the practice environment and their ITS while analyzing data at the unit level. Exploring the concepts at the unit level was important given that NMs set the culture on the units they are managing. Identifying specific NM leadership competencies that have the greatest impact on the practice environment and frontline nurses' ITS will help administrators focus their attention and resources on strengthening NM competencies that are most likely to translate into meaningful improvement of retaining nurses. In addition, understanding how frontline nurses' ITS is ultimately impacted by NMs' competency, mediated by the nurse practice environment, fills a knowledge gap and beneficial in addressing the nursing shortage. Findings from this study

strengthen the business case for hospital administrators to invest in formal education and leadership training for their NMs. With a more structured onboarding process, NMs can have a smoother transition to their leadership role, feel more confident in their ability to lead the team, and reduce frontline nurse turnover.

Study Purpose

This study proposed to: (1) assess essential competencies of current NMs; and (2) examine the relationship among NM competencies, frontline nurse perception of the practice environment, and frontline nurses' ITS.

Theoretical Foundation

The theoretical model that was used for this study was an integration of the NM Learning Domain Framework (NMLDF), and empirical research related to practice environments and frontline nurse retention.

Nurse Manager Learning Domain Framework

NMLDF was the result of the work done by the NM Leadership Collaborative (NMLC). NMLC, which consists of the American Association of Critical-Care Nurses (AACN), AONE, and the Association of periOperative Registered Nurses (AORN), was formed in 2004 to identify the skills required to perform the job of the NM (AONE, 2015). According to the NMLDF, in order to be successful, NMs must gain expertise in three leadership domains: Leader Within, Science of Leadership, and Art of Leadership (see Figure 1). The *Leader Within* domain identifies personal mastery of one's self (AONE, 2015). Through reflective practice, it is believed that leadership skills under this domain may be individually developed. The *Science of*

Leadership or Managing the Business domain recognizes financial acumen as essential for NMs to effectively advocate for resources needed to successfully operate their units (Sherman & Pross, 2010). Finally, the *Art of Leadership* or Leading People domain encompasses the skill of managing relationships and the ability to influence others' behaviors. Guiding team members to function as a high-performance work team is critical, especially in healthcare environments where team synergy and collaboration are essential for delivering high quality patient care (Sherman & Pross, 2010).

Guided by the NMLDF, the NMLC developed the AONE NM Competencies Assessment tool. The AONE Competency Assessment tool lists the core competencies required by current and future nurse leaders to be most effective in the role of NM (AONE, 2015). The core competencies include financial management, human resource management, performance improvement, foundational thinking skills, technology, strategic management, clinical practice knowledge, human resource leadership skills, diversity, relationship management and influencing behaviors, personal and professional accountability, personal journey disciplines, and career planning. Warshawsky modified the AONE tool to reduce the number of items by grouping similar topics from the *Art of Leadership* and *Science of Leadership* domains and assessing competencies from the *Leader Within* domain in the demographic section as questions about NMs' education and professional development (*Appendix B*).

The ten core competencies identified in the modified AONE NM Competency Assessment tool are defined as follows. *Financial Management Skills* refers to the ability to effectively manage financial, marketing, and budgeting aspects of the operation (Sinkkonen, & Taskinen, 2003). *Human Resource Management Skills* focus on management of people and knowledge of human resource policies (Paauwe & Boon, 2009). *Performance Improvement*

Skills include competence in continuous quality improvement of processes (O'Neil, Morjikian, Cherner, Hirschkorn, & West, 2008). *Foundational Thinking Skills* include the ability to use critical thinking in decision making (Pihlainen, Kivinen, & Lammintakanen, 2016). *Technology Skills* refer to the knowledge of patient care technologies and the use of data to support safe and quality patient care (American Association of Colleges of Nursing, 2008). *Strategic Management Skills* refer to the ability to motivate staff and keep their work aligned with the organization's mission (Sherman, Bishop, Eggenberger, & Karden, 2007). *Clinical Practice Knowledge* encompasses knowledge and skills of clinical operations (Connelly, Yoder, & Miner-Williams, 2003). *Human Resource Leadership Skills* involve the development and management of personnel (Pihlainen, Kivinen, & Lammintakanen, 2016). *Relationship Management and Influencing Behaviors* are interpersonal skills essential for collaborative relationships (Pihlainen et al, 2016). Finally, *Diversity Management Skills* is the ability to recognize individual differences (Patrick & Kumar, 2012).

The NM's perception of his or her competence on each of the 10 leadership competencies was examined in this study.

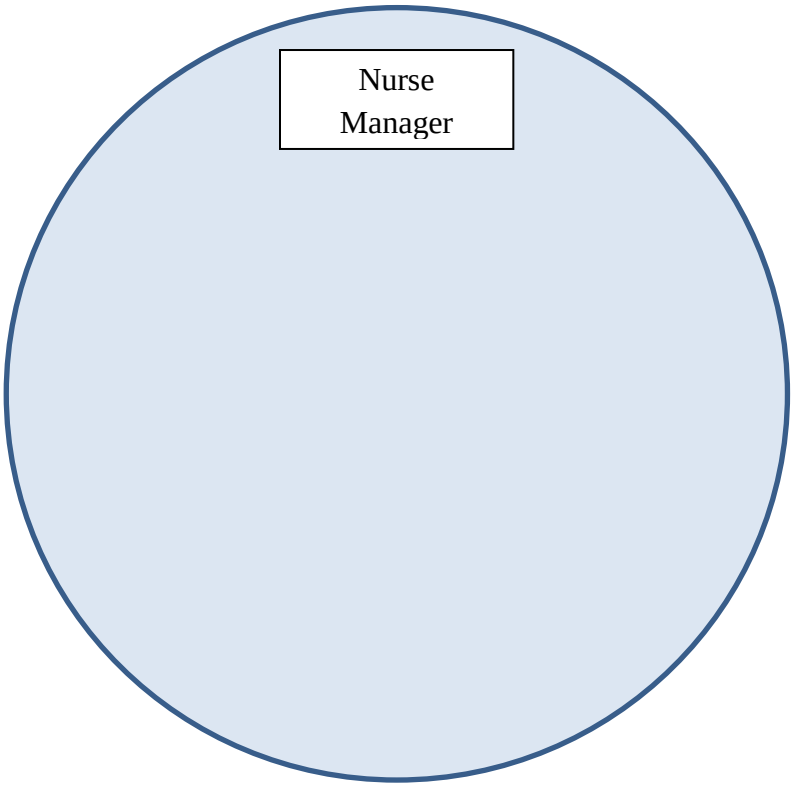


Figure 1 Nurse Manager Learning Domain Framework (AONE, 2015)

Nurse Practice Environment and ITS

A growing body of evidence has shown that the environment in which nurses deliver care influences nurse outcomes such as job satisfaction, morale, and nurse retention (Friese, 2005; Press Ganey, 2017; Van Bogaert, Kowalski, Weeks, Van Heusden, & Clarke, 2013; Weberg, 2010). For practice environments to be healthy, certain elements such as supportive and empowering structures, access to resources and ongoing developmental opportunities for nurses must be in place (Shirey, 2017). Higher nurse participation in practice affairs and empowerment were associated with lower emotional exhaustion, less burnout, higher job satisfaction, and higher ITS (Friese & Himes-Ferris, 2013; Kutney-Lee et. al., 2016; Nowrouzi et. al., 2015). When nurses were satisfied with the training and professional development opportunities provided, nurses reported they were more engaged, had less burnout, had higher job satisfaction, and were more likely to stay in the same unit (Carter & Tourangeau, 2012; Trinchero, Brunetto, & Borgonovi, 2013). Other studies have demonstrated an association with flexible scheduling,

which provides better ability to achieve good work-life balance, higher job satisfaction, and lower intent to leave (Carter & Tourangeau, 2012; Duffield, Roche, Blay, N. & Stasa, 2010; Leineweber, Chungkham, Westerlund, Tishelman, & Lindqvist, 2016). Practice environments that fostered praise and recognition of nurses were also shown to positively impact the nurses' intention to remain employed in the current hospital (Tourangeau & Cranley, 2006). The body of evidence establishes a link between nurses' perception of their practice environment and their job satisfaction, morale, emotional exhaustion, and ITS on their current units, in the same hospital, and in nursing.

NM Influence on the Nurse Practice Environment and ITS

NMs are in the best position to influence the practice environment because they oversee all aspects of patient care, goal setting, resource allocation, and unit operations. They also have firsthand knowledge of issues and challenges most important to frontline nurses (Anthony et al., 2005). Although there is no existing evidence about the relationship of NM competency on frontline nurses' perception of their practice environment and ITS, the importance of NMs' effectiveness has been well-documented. Past studies found that the leadership and support provided by NMs significantly impacts frontline nurses' satisfaction and organizational commitment (Ballard, Boyle, & Bott, 2016; Cowden, Cummings, Patrician, Shang, & Lake, 2011; Hill, 2011; Cline, Reilly, & Moore, 2004; Ribelin, 2003).

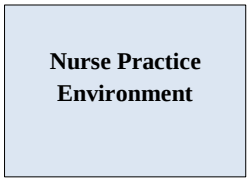
A study conducted by Press Ganey (2017) that analyzed the 2016 National Database of Nursing Quality Indicators® (NDNQI®) data showed statistically significant relationships between frontline nurses' ratings of their NM's ability and practice environment factors (e.g., autonomy, professional development, nurse-nurse interactions, nurse-physician relationships, participation in quality improvement activities, safe handling and mobility practices, appropriate

staffing levels, and unsafe practices). The study, however, did not address NM competency and its ability to affect NMs' leadership and influence on the practice environment. Given that expertise in the three NMLDF leadership domains is essential to the success of NMs, this study hypothesized that NMs' competency scores impact their ability to create supportive practice environments. In addition, frontline nurses' perception of their NMs' effectiveness has a significant influence on their perception of the practice environment and satisfaction; hence, NM competency could be key to improving ITS.

A Model of NM Competencies, Nurse Practice Environment, and Frontline Nurses' ITS

This study was guided by the *Model of Nurse Manager Competencies, Practice Environment Perceptions, and Frontline Nurses' Intent to Stay* shown in *Figure 2*. This model identifies the interrelationships of three factors: NM competency, nurse practice environment, and frontline nurses' ITS. To evaluate these relationships, this study conducted mediation analysis to test the hypothesis that NMs' competency is associated with their ability to effectively cultivate supportive practice environments, thus influencing nurses' ITS.

Based on the *Model of Nurse Manager Competencies, Practice Environment Perceptions, and Frontline Nurses' Intent to Stay,* this study examined NM competency's ability to directly influence frontline nurses' ITS and indirectly influence ITS through nurses' perception of their practice environment (mediating variable), holding hospital, unit, NM, and frontline nurses' characteristics constant. Findings from these analyses will provide opportunities to improve nurse outcomes and identify strategies most valuable in accelerating NM competency development.



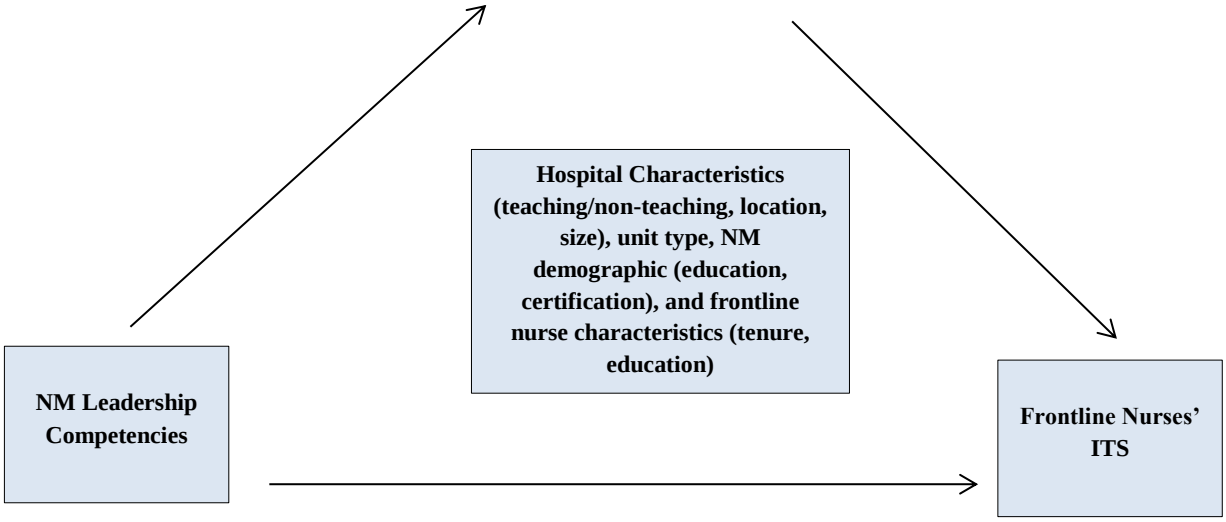


Figure 2 Model of Nurse Manager Competencies, Practice Environment Perceptions, and Frontline Nurses' Intent to Stay

NM (education and certification), frontline nurse (education and unit tenure), unit (unit type), and hospital (location, size, and teaching status) characteristics were used as covariates. Selection of these control variables was based on evidence indicating that the nurse leader's level of formal education influences NM competency. There was improved overall leadership practices and behaviors as education level increased (Kelly et al., 2014). Similarly, there was a positive association between certification and increased competence (Kleinpell, 2009; Straka et al., 2014). For frontline nurses, differences in practice environment perceptions exist with different levels of education and years of experience in nursing. Nurses with a baccalaureate degree in nursing reported more positive perception of the practice environment, unit support, workload, and had overall better nursing satisfaction compared to associate degree nurses (Sexton, Hunt, Cox, Teasley, & Carroll, 2008). Nurses with more than 15 years of experience also had better perceptions of the practice environment (Nowrouzi et al., 2016; Sexton et al., 2008). Different types of units also have varying staffing levels, patient acuity, and practice

environment structures (NDNQI, 2013). Finally, location, size and teaching status were controlled. Urban hospitals, larger hospitals and academic centers typically have more access to resources and advanced technology (Brown et al., 2014; Lutfiyya et al., 2007). In contrast, small and rural hospitals in general have greater financial constraints (Brown et al., 2014; Lutfiyya et al., 2007).

Specific Aims

This study had three specific aims:

Aim 1: To describe the 10 essential competencies self-assessed by NMs. The 10 competencies described in this study include financial management, human resource management, human resource leadership, performance improvement, foundational thinking, technology, relationship, diversity, strategic management, and clinical practice knowledge.

RQ_1: What are the competency scores self-assessed by NMs?

RQ2: Do NM competencies differ depending on hospital characteristics?

RQ3: Do NM competencies differ depending on unit characteristics?

RQ4: Do NM competencies differ depending on NM characteristics?

Aim 2: To evaluate the psychometric properties of Warshawsky's NM Competency Instrument. Item analysis, dimensionality, validity and reliability of the NM Competency Instrument were evaluated.

Aim 3: To examine the correlation between NM competencies, nurse practice environment, and frontline nurses' ITS. The 10 essential NM competencies listed previously were examined. Practice environment was examined in five dimensions: Nurse Participation in Hospital Affairs; Nursing Foundations for Quality of Care; Nurse Manager Ability, Leadership,

and Support of Nurses; Staffing and Resource Adequacy; and Collegial Nurse-Physician Relations.

RQ_5: Are the 10 NM competencies correlated with practice environment subscales?

RQ_6: Are the 10 NM competencies correlated with frontline nurses' ITS?

Aim 4: To examine the direct effect of NM competency on frontline nurses' ITS and to examine the indirect effect of NM competency on frontline nurses' ITS, mediated by the nurse practice environment.

H_1: Higher NM competency scores will be associated with better practice environments (path *a*), controlling for hospital location, size, teaching status, unit type, NM education and certification, and frontline nurse unit tenure and education.

H_2: Better practice environments will be associated with higher rates of frontline nurses' ITS (path *b*), controlling for hospital location, size, teaching status; unit type; NM education and certification; and frontline nurse unit tenure and education.

H_3: Higher NM competency scores will be associated with higher rates of frontline nurses' ITS (path *c*, direct effect), controlling for hospital location, size, teaching status; unit type; NM education and certification; and frontline nurse unit tenure and education.

H_4: Higher NM competency scores will indirectly affect higher ITS through nurses' perception of their practice environment (path *a***b*, indirect effect), controlling for hospital location, size, teaching status; unit type; NM education and certification; and frontline nurse unit tenure and education.

Definitions

For the purposes of this study, the following terms are defined:

Frontline Nurses

Frontline caregivers perform the most basic tasks and interact directly with patients (Frontline, n.d.). Frontline nurses are responsible for working with patients and families to optimally manage their care or experience (Sofaer & Schumann, 2013). The American Nurses Credentialing Center (2017) defines direct care or frontline nurses as those who have direct patient care responsibilities and carry out nursing activities in the presence of the patient.

Intent to Stay (ITS)

Intent to stay is defined as a nurse's decision to stay in their area of practice (Lake, 2002).

Nurse Manager (NM)

NMs are frontline leaders responsible for the 24-hour operation of one or more units in hospitals (AONE, 2015). NMs have oversight of all activities in the unit(s), including patient care, professional nursing practice, continuous quality improvement, human resources (HR), fiscal needs, personnel selection, evaluation, and resource management (Edwardson & Irvin, 2013).

NM Competencies

NM competencies are defined as the knowledge, skills, and abilities that guide the practice of NMs (AONE, 2015).

Nurse Practice Environment

Practice environment is defined as the organizational characteristics of a work setting that facilitate or constrain professional nursing practice (Lake, 2002).

Turnover

Nursing turnover is the event whereby nursing staff leave their positions, transfer within the hospital environment, or leave the nursing profession entirely (O'Brien-Pallas et al., 2006).

CHAPTER 2

REVIEW OF LITERATURE

This chapter presents a review of the literature on NM competency. It includes the existing body of knowledge and gaps in the literature relating to the influence of NM competency on frontline nurses' perception of the practice environment and their ITS.

Description of Search Methods

A literature review was conducted using the Cumulative Index to Nursing and Allied Health Literature (CINAHL®), PubMed®, and Google Scholar databases. Primary search terms included *nurse manager competence, nurse manager competency, nurse manager preparation, professional development needs of nurse managers, nurse manager influence on the work environment, nurse manager influence on the practice environment, nurse manager competenc* and work environment, nurse intent to stay, and nurse manager competency and nurse intent to stay.*

Each search included peer-reviewed research articles as well as seminal expert reports from the NAM, formerly IOM, and WHO on competency and workforce recommendations. Instead of limiting the search of peer-reviewed research articles to 10 years, articles that were published after the influential document by NAM (IOM, 2004) *Keeping patients safe: Transforming the work environment of nurses*, were included. Research articles were limited to those published between 2004 and 2017 in English and for acute care hospitals. Sources that provided definitions of NM competency and related concepts even prior to 2004 were included. Finally, the reference lists in articles reviewed were scanned to identify other relevant articles for consideration.

This literature review encompassed the following major topics: NM competency, NM's influence on the unit practice environment of nurses, and frontline nurses' ITS.

Nurse Manager Competency in Acute Care Hospitals

This section reviewed the literature on the definitions of NM competency, assessment of NM competency, attributes and skills of NM competency, and measures and evidence of NM competency.

Definitions of Nurse Manager Competency

The terms *competence* and *competency* are often used interchangeably in the literature. *Competence* refers to abilities or set of skills possessed by an individual in general, while *competency* refers to skills, knowledge, experience, and other attributes that are necessary to perform a task or job (McConnell, 2001). The term competency is more appropriate for this study; thus, it will be used throughout the proposal. The Agency for Healthcare Research and Quality (2011) defined NM competency as the knowledge and technical skills necessary to perform the role of NM. NM competency was also referred to as the ability of nurse leaders to use the nursing process to evaluate the efficiency and effectiveness of patient care delivery by the nursing staff to support optimal patient outcomes (Hawkins, Carter, & Nugent, 2009). Some researchers have used managerial competency to describe the tasks necessary for NMs to fulfill their roles (what to do) as well as the essential skills that NMs must possess to fulfill the role (Scoble & Russell, 2003). Managerial competency refers to a set of employee behaviors that must be used to proficiently perform the tasks and address challenges that arise in the position (Woodruff, 1991). AONE (2015) addressed inconsistencies in the definitions of NM competency and managerial competency within the literature. The AONE conducted role delineation studies and reviewed existing evidence on NM competency. Based on this work, the

AONE (2015) defined the concept of NM competency as the knowledge, skills, and abilities that guide the practice of NMs. This study examined NM competencies based on AONE's definition because it synthesizes all existing evidence and reflects essential elements for NMs to be successful in their role.

Attributes and Skills for Nurse Manager Competency

Table 1 summarizes various essential attributes and skills that researchers have identified in the literature. Essential competencies for present and future success of NMs that were identified varied over time. Dubnicki and Sloan (1991) emphasized the multifaceted role of NMs and identified nine essential leadership competencies: directing others, managing groups, having interpersonal sensitivity, being self-confident, influencing, thinking analytically, taking initiative, being achievement oriented, and using direct persuasion. Dubnicki and Sloan (1991) conducted a pilot study of NMs in the 1990s and found that, of the nine essential leadership competencies, self-confidence and high achievement orientation were important determinants of success among NMs. As the role of the NM evolved, the list of essential competencies evolved as well. In the decade following Dubnicki and Sloan's work, recognition grew of the importance for NMs to be agile in managing healthcare structure changes (Mathena, 2002). NMs also had to help staff thrive and provide support to retain them. Accordingly, Mathena (2002) identified the ability to effectively communicate, negotiate, think critically, find the balance between work and home, and manage conflicts as critical skills for NMs. Furthermore, Donaher (2004) found that leaders who were successful in evolving and developing themselves were also successful in recruiting, developing others, and retaining staff.

With NMs increasingly expected to assume accountability for unit performance, business-related competencies have become as essential as managing human capital. As the

impact of unit performance (patient outcomes) on the overall financial performance of the organization became apparent with changing reimbursement models, Scoble and Russell (2003) predicted that NMs by 2020 would need the following 13 competencies to be successful: leadership behaviors and skills, financial acumen, business knowledge, management skills, communication skills, change management, human resource and labor relations, team-building skills, clinical knowledge, relationship building, thinking skills, integrity, and informatics. Building on Scoble and Russell's work, DeOnna (2006) stated that it was important for NMs to be able to perform supervisory responsibilities; ensure patient safety and quality care; conduct daily unit operations; manage fiscal planning; facilitate interpersonal, group, and organizational communication; lead quality improvement initiatives; and promote the professional practice model. Pillay (2008) added that managing legal and ethical issues were also important. Administrators need to invest in the development of these competencies, especially relational and communication skills, given that all studies identified NMs' ability to effectively communicate and manage people as being essential (Donaher, 2004; Shirey, 2008; Zwink et al., 2013).

Conducting periodic role delineation studies is important because role expectations for NMs are quickly evolving. Guided by subject matter experts (expert NMs) representative and knowledgeable of the NM role, AONE (2015) conducted role delineation studies to define the competencies needed for NMs to be effective. In addition, AONE (2015) reviewed all existing evidence on NM competency. In collaboration with experts in the nursing leadership field and based on the NMLDF (*Figure 1*), AONE identified essential NM competencies in three leadership domains: (1) *Science of Leadership*, which includes financial management, human resource (HR) management, performance improvement, foundational thinking skills,

technology, strategic management, and clinical practice knowledge; (2) *Art of Leadership*, which includes human resources, leadership skills, relationship management and influencing behaviors, diversity, and shared decision making; and (3) *Leadership Within*, which includes personal and professional accountability, career planning, personal journey disciplines, and optimizing the leader within. According to the NMLDF, NMs must gain expertise in the three leadership domains in order to be successful. The AONE competencies encompass all aspects of leadership, are most up-to-date and comprehensive, and relate to the current health environment needs and, therefore, was used for this study.

Table 1
Evolution of Nurse Manager Core Competencies

Author	Nurse Manager Core Competencies
Dubnicki and Sloan (1991)	Ability to direct others and manage groups, interpersonal sensitivity, self-confidence, influence, analytical thinking, initiative, achievement oriented, and ability to use direct persuasion
Mathena (2002)	Effective communicator, negotiator, critical thinker, ability to find balance between work and home, and manage conflicts
Scoble and Russell (2003)	Leadership behaviors and skills, financial/budgeting, business acumen, management skills, communication skills, change management, human resource and labor relations, collaboration and team skills, clinical skills and knowledge, relationship building, thinking skills, integrity, and informatics
Donaher (2004)	Developing self, recruiting, developing others, using, and retaining staff
DeOnna (2006)	Staff recruitment and retention; staff development; supervisory skills; patient safety and quality care; daily unit operations; fiscal planning; interpersonal, group, and organizational communication; quality improvement initiatives; professional practice model promotion; self-development
Pillay (2008)	Health care skills, planning, organizing, leading, control, managing legal and ethical issues, and managing self
AONE (2015)	

	Management of clinical nursing practice and patient care delivery; management of human, fiscal, and other resources; development of personnel; compliance with regulatory and professional standards; strategic planning and fostering of interdisciplinary, collaborative relationships within unit(s) or areas(s)

Assessment of Nurse Manager Competencies

Knowing NMs' baseline leadership knowledge, skills, and abilities can help administrators identify what to focus on during their onboarding (Batcheller, 2011; Shirey, 2007). In the concept of novice to expert, Benner asserted that nurses proceed through different stages of learning and skill acquisition (Benner, 1982). The theory hypothesized that nurses move through five stages of competency while gaining and developing skill through experiential learning: novice, advanced beginner, competent, proficient, and expert. Novice NMs may require more developmental support that focuses on basic skills whereas a more experienced NM may need support on more advanced competencies such as strategic planning and vision setting.

Science of Leadership. Competencies included in the *Science of Leadership* domain are those identified as necessary for NMs to manage the business aspect of the role (AONE, 2015). A descriptive study conducted by Terzioglu (2006) in Turkey using a Turkish version of the 70-item Social Problem-Solving Inventory (SPSI) tool showed that NMs perceived themselves as having inadequate problem-solving skills. Almost a third (30.6%) of NM respondents had difficulties addressing operations-related problems and 25.8% reported difficulties with HR management issues. Sixty-nine percent of the 62 NMs surveyed were promoted without leadership-related education, resulting in self-perceptions of an inadequate level of problem-solving skills (Terziglou, 2006). In contrast, NMs who received leadership education and management training perceived their problem-solving skills to be more adequate than the others ($p < .05$).

In three focus groups with 20 NMs convened by Miltner and colleagues (2015) to understand their professional development needs, NMs expressed frustration with their inability to garner support from their administrators and to successfully provide basic resources for their units. They shared that their lack of foundational management skills and refined problem-solving skills led to difficulties advocating for resources and fulfilling role expectations. The findings from Miltner et al. (2015) and Terziglou (2006) support the importance of strengthening skills in the *Science of Leadership* domain for NMs.

Art of Leadership. Competencies included in the *Art of Leadership* domain are those identified as essential in leading the people NMs are managing (AONE, 2015). Some studies identified a subset of competencies that might affect social relationships and communication skills, which Shirey (2008) referred to as "soft skills" or relational skills. They may be more difficult to develop and take longer to acquire; however, developing relational skills is important since they are essential for promoting staff engagement, building relationships with the team, and developing nurses' organizational trust (Shirey, 2008). A focus group study with 21 nurses in Ireland emphasized the importance of NMs' relational skills, especially skills for conflict resolution and team building when handling issues on the unit (Rani, Brennan, & Timmons, 2010). Another focus group study in a Magnet hospital found that proficiency in relational skills that enable effective communication contributed to NMs' success (Zwink et al., 2013). NMs also identified the importance of skills required in leading teams, including the ability to effectively communicate to align and motivate employees, manage conflicts, and set the organizational culture (Pillay, 2008). Those are the exact same skills that the NMs cited, however, as requiring further development. In addition to being valuable for NM effectiveness, relational skills also significantly impact staff nurses' perception of their NM's leadership ability (Rani et al., 2010).

Past studies on skills in the Art of Leadership domain were mostly focus groups from one hospital which limits the generalizability of findings (Pillay, 2008; Rani et al., 2010; Zwink et al., 2013). Collectively, however, the studies illustrated the importance of relational skills to both the NMs and the frontline nurses.

Leadership Within. Competencies included in the Leadership Within domain are those that address leadership development to optimize the leader within NMs. Several themes emerged in the studies reviewed. First, competencies identified both by NMs and frontline nurses as essential to NMs' success are also those that they perceived needed further development. A study by Pillay (2008) in Africa with 404 public and private hospital NMs showed that NMs who responded to the questionnaire perceived knowledge of legal and ethical issues as essential; however, NMs also felt that these were areas in which they lacked knowledge and skills. Second, because NMs lacked leadership competency, they focused on managing instead of leading. A qualitative study of NM stories conducted by Miltner et al. (2015) reported that NMs primarily involved themselves with the day-to-day unit operation such as staffing instead of leading the team. This finding is consistent with NM stories from a previous study conducted in Australia (Paliadelis, Cruickshank, & Sheridan, 2007). Paliadelis et al. (2007) described NMs taking refuge in their clinical roles, in which they excelled, while avoiding their managerial responsibilities because they did not feel adequately prepared. Third, studies showed that NMs' ability to cope with challenges was negatively impacted by the lack of formal training and the lack of opportunities to develop as a leader. Being inadequately prepared made NMs more insecure and increased their stress levels (Aiken & Harper-Harrison, 2012; Moore et al., 2016; Zwink et al., 2013). Stepping up to a NM position can be a daunting experience for nurses

and the transition from peer to supervisor becomes more stressful and overwhelming when NMs do not feel they have the necessary skills and knowledge.

Past studies in the Leadership Within domain had limitations in terms of generalizing about NMs in U.S. settings because they were conducted in different countries. However, the studies provide evidence that both formal orientation to leadership roles and ongoing organizational support are lacking and need to be strengthened for NMs who step up to the role. Through the voices of NMs in their own words, previous studies in this area have provided vivid descriptions adding depth and helping to illustrate the NM's experiences.

Measures and Evidence of Nurse Manager Competency

Several instruments are available for assessing NMs' leadership knowledge, skills and abilities. The Social Problem-Solving Inventory (SPSI) is a 70-item tool that uses self-reported assessment of social problem-solving ability (D'zurilla & Nezu, 1990). The SPSI consists of two major scales (Problem Orientation Scale and the Problem-Solving Skills Scale) and subscales under each major scale. The Problem Orientation Scale includes the Cognition, Emotion, and Behavior subscales. The Problem-Solving Skills Scale is divided into four subscales: Problem Definition and Formulation, Generation of Alternative Solutions, Decision Making, and Solution Implementation and Verification subscales. Response options are on a 5-point Likert scale ranging from *not at all true of me* to *extremely true of me* with high scores for the positively worded items indicating more constructive orientation toward problem solving, and vice versa for the negatively stated items. The tool has been translated into different languages, and the different versions of SPSI have sound psychometric properties, presenting internal consistency of 0.69 to 0.95 and adequate to high test-retest reliability of 0.68 to 0.91 (D'zurilla & Nezu, 1990; Siu & Shek, 2005). The SPSI has been valuable in measuring social problem-solving ability.

The Human Capital Competencies Inventory (HCCI), a 58-item instrument was developed to be used by new and aspiring NMs to self-assess human capital competencies (Donaher, Russell, Scoble, & Chen, 2007). The human capital competencies consist of five domains: self-development (16 items), recruitment (11 items), developing others (15 items), utilization (8 items), and retention (8 items). Response options include: 1 = not done; 2 = done; 3 = done often; and 4 = done a lot, to assess how often the particular skills-based activity has been performed by the NM. Results are then reported as the total scores, with higher values indicating higher competency in the skill. The tool has established reliability (Cronbach's α = 0.95) and content validity (inter-rater agreement of 0.82 from 61 content experts).

A self-administered questionnaire derived from Scoble and Russell's (2003) 13 key NM competencies was developed by researchers in Taiwan and administered to NMs in 16 acute care hospitals (Kang et al., 2012). The questionnaire consists of demographics information, the managerial competency rating scale, associated competencies, and perception of workload and work stress. The managerial competency rating scale includes 13 questions asking participants to rate themselves on their leadership behaviors and skills, budgeting, business acumen, management skills, communication skills, change management, HR and labor relations, collaboration and team skills, clinical skills and knowledge, relationship building and interpersonal, thinking skills, integrity, and informatics and technology competencies. Participants rated themselves on each managerial competency on a 10-point scale with higher scores indicating greater self-reported levels of managerial competency. The questionnaire includes additional questions relevant to NM roles such as research capability, time management, and executive power. The questionnaire has only been used in one study in Taiwan and

psychometric analyses have not been comprehensively done (Lin, Chiang, & Chen, 2011). Further item testing and reliability and validity studies are recommended.

AONE's NM Competency Assessment Tool, developed in 2005 and based on previously identified essential NM competencies, has gone through revisions with the 2015 version of the tool reflecting current evidence-based knowledge, skills, and abilities in the three leadership domains: Leader Within, Science of Leadership, and Art of Leadership (AONE, 2015). Periodic job analysis and role delineation studies conducted by AONE supported the validity of the competency tool. However, no psychometric testing or empirical studies using the tool was found in the literature.

The 74-item Nursing Informatics Competency Assessment for the Nurse Leader (NICANL) instrument was initially developed because the rapid advancement of health information technology requires nurse leaders to have greater competency in informatics (Yen, Phillips, Kennedy, & Collins, 2017). The instrument was later reduced to 26 items with six domains: (1) strategic implementation management; (2) advanced information management and education; (3) executive planning; (4) ethical and legal concepts; (5) information systems concepts; and (6) requirements and system selection. The NICANL instrument has established reliability and validity (Cronbach's α ranged from 0.81- 0.96) and allows evaluation of nurse leaders' informatics and technology competencies.

HCCI, SPSI and NICANL are useful for quantifying specific leadership skills related to human resource management, problem-solving ability, and informatics and technology respectively. All are extremely valuable leadership skills; however, each of these tools has a narrow focus and does not address NM leadership competency comprehensively. Scoble and Russell's (2003) questionnaire has not been widely used and further psychometric testing was

recommended. Comparing the five tools, AONE's NM Competency Assessment Tool stands out for addressing diverse aspects of NM competencies, which are essential in the current healthcare environment. It was also the tool most aligned with the aims of this research and, thus, was used to measure NM competency in this study.

Nurse Practice Environment

The IOM's 2004 report *Keeping Patient's Safe: Transforming the Work Environments of Nurses* identified problems in management practices, employee deployment, work and workspace design, and the basic safety culture of health care organizations as factors that place patients at risk. The report recommends improving the working conditions of nurses as it has been shown to impact patient safety. Practice environments also affect healthcare providers' satisfaction and the patient experience (Laschinger, 2008). Hospitals perceived to have positive practice environments are more successful in attracting and retaining nurses (Ma, Lee, & Yang, 2009; Van Bogaert, Clarke, Vermeyen, Meulemans, & Van de Heyning, 2009). In contrast, undesirable work conditions result in nurse turnover (Kleinman, 2004). Considering the significant impact of practice environments on ITS, NMs' competency in creating a positive practice environment is essential. This section will discuss the essential elements of a positive practice environment, measures of the nurse practice environment, and the influence of NM competency on the practice environment.

Essential Elements of a Positive Practice Environment

Despite the nursing shortage in the early 1980's, several hospitals were successful in attracting and retaining their nurses (referred to as the "magnet" hospitals). To better understand the phenomenon, the American Academy of Nursing appointed a taskforce to examine hospital nursing practice and workplace characteristics of those "magnet" hospitals that were able to

retain their current workforce and recruit additional nurses (McClure & Hinshaw, 2002). The magnet hospital research was conducted to identify the organizational variables that helped to create hospital environments that increased nursing staff's personal and professional (job) satisfaction. Forty-one hospitals from across the United States that had demonstrated success in recruiting and retaining nurses were included in the study.

Several themes emerged that were congruent despite the differences in hospital size and location: administration; professional practice; and professional development. Administration included all levels of leadership: executive nurses, directors of nursing and the NMs. Positively-perceived management style demonstrated by all levels of nursing leadership was participative in nature. Engaging and listening to staff at all levels in committees and decision-making was a common thread. Nursing executives promoted the shared decision-making culture. In turn, the nursing directors had a voice at the top decision-making level, often serving on board committees. Having a seat at the decision-making table enabled them to have greater advocacy for nurses. Professional practice was about the quality of the practice environment which included factors such as the caliber of nursing staff (competency and education preparation), nurse autonomy and professional recognition. The final theme, professional development, focused on the hospital's commitment to improving the quality of nursing by focusing on nurses' orientation, continuing education, and career development. The magnet study's findings have stimulated ongoing research which has created knowledge about practice settings that attract and retain nurses.

The American Nurses Credentialing Center (ANCC) launched the Magnet Recognition Program® (Magnet) in 1990, based on findings of the magnet study, to recognize organizations that demonstrate excellence in nursing practice. The Fourteen Forces of Magnetism which were

based on the common themes that emerged from the study included: nursing leadership, organizational culture, management style, personnel policies and programs, professional models of care, continuous quality improvement, quality of nursing care, resources, nurse autonomy, community involvement, nurses as teachers, the image of nursing, interdisciplinary collaboration, and professional development. Evolving over the years, the current Magnet Model has five components: transformational leadership, structural empowerment, exemplary professional practice new knowledge, innovations and improvements, and empirical outcomes (ANCC, n.d.). Environmental factors under the five components of the Magnet Model ensure the presence of leaders that foster shared governance and collegial working relationships (ANCC, n.d.). With Magnet's evolution to its existing state with more than half of the requirements focused on empirical outcomes, a complementary ANCC program was developed to look more at the structures and processes of organizations. ANCC's Pathway to Excellence Program®, recognized widely as the premiere recognition for positive practice environments, includes six essential elements of a positive practice environment in its program criteria: shared decision making, effective leadership at the organization and unit level, emphasis on quality, focus on safety, protection of workforce well-being, and opportunities to develop professional competency and growth of the frontline staff (ANCC, 2017).

The ANCC Magnet Recognition and Pathway to Excellence programs highlight the importance of empowerment structures that include access to information, support, resources, and opportunity for advancement. Empowerment structures positively impact nurse satisfaction and perception of the practice environment (Larkin, Cierpial, Stack, Morrison, & Griffith, 2008; Spence-Laschinger, Gilbert, Smith, & Leslie, 2010). A cross-sectional study by Choi and Boyle (2014) was conducted on 5,322 nursing units in 519 U.S. acute care hospitals to examine

differences in nursing practice environments among 11 unit types (critical care, step-down, medical, surgical, combined medical-surgical, obstetric, neonatal, pediatric, psychiatric, perioperative, and emergency) and by Magnet status. The Practice Environment Scale of the Nursing Work Index (PES-NWI) was used to measure the nursing practice environment. Significant differences in the nursing practice environment were seen in Magnet-recognized hospitals on all PES-NWI subscales and consistently on all unit types.

The ANCC recognition programs also foster environments that empower nurses to implement evidence-based practices (EBP) that contribute to both patient and nurse outcomes. A descriptive cross-sectional study invited 2,441 nurses from one U.S. healthcare system to complete a modified version of the Information Literacy for Evidence-Based Nursing questionnaire (Wilson, et al, 2015). The analysis of responses showed that nurses employed by facilities designated as Magnet® or Pathway to Excellence® reported significantly fewer barriers to EBP than those RNs employed by non-designated facilities. Nurses have better perceptions of their practice environment when they feel empowered to practice at their full capacity and make a difference (Wilson, et al, 2015). The Magnet and Pathway program criteria also require organizations to support lifelong learning. Studies conducted over time and in a number of different countries show professional development opportunities are a driver of nurses' satisfaction and perception of their environment (AMN, 2017; Bjørk, Samdal, Hansen, Tørstad, & Hamilton, 2007; Herrin & Spears, 2007; Swiger et al., 2017; Valizadeh, Zamanzadeh, Habibzadeh, Alilu, & Shakibi, 2015; Warshawsky & Havens, 2011; Yarbrough, Martin, Alfred, & McNeill, 2016).

The American Association of Critical Care Nurses' (AACN) (2005) landmark publication, *Standards for Establishing and Sustaining Healthy Work Environments*, also

identified six dimensions for creating and sustaining healthy practice environments that advance nursing practice and enhance patient care quality and safety: skilled communication, true collaboration, effective decision making, appropriate staffing, meaningful recognition, and authentic leadership. It was noted that all the standards must coexist and not one standard is more important than the other. Authentic leadership has been identified as the glue that holds together the healthy work environment (Shirey, 2009). Shirey (2009) adds that authentic leadership behaviors are enhanced when leaders engage in a personal journey of self-discovery, self-improvement, reflection, and renewal.

Both the Pathway to Excellence and Magnet standards were developed based on published and experiential evidence from nurses and other health care experts worldwide. Standards are periodically updated based on current literature and environmental scans. AACN is an association that represents critical-care nurses; however, the standards they identified are relevant in any setting. Comparing the three sets of standards, AACN standards for a healthy work environment do not address empowerment structures and professional development. A common element that emerged in the Magnet, Pathway, and AACN standards is leadership, which further supports this study's hypothesis that positive practice environments may be influenced by NM competency.

Measures of the Nurse Practice Environment

The Nursing Work Index (NWI), a 65-item scale, was developed by Kramer and Hafner (1989) to assess work environment characteristics based on the findings of the American Academy of Nursing Magnet Hospital study (McClure, 1983). Aiken and Patrician (2000) revised the original instrument, reducing the number of items from 65 to 55. Items retained in the Nursing Work Index - Revised (NWI-R) instrument addressed nurse autonomy, control over

nursing practice settings, nurse relations with physicians, and organizational support. Lake (2002) conducted a factor analysis of the 57 NWI-R instrument which yielded five subscales characterizing the practice environment: (1) Nurse Participation in Hospital Affairs; (2) Nursing Foundations for Quality of Care; (3) Nurse Manager Ability, Leadership, and Support of Nurses; (4) Staffing and Resource Adequacy; and (5) Collegial Nurse-Physician Relations.

The Practice Environment Scale Nursing Work Index (PES-NWI), a 31-item instrument developed by Lake (2007), was based on the ideal characteristics reported in the Magnet study, her previous factor analysis, and evidence from other practice environment studies. The PES-NWI has enabled nurses' practice environments to be measured in a consistent way across various health systems (Li et al., 2007; Roche & Duffield, 2010). The PES-NWI has been demonstrated to be a reliable and valid tool, with Cronbach's α ranging from 0.91– 0.96 and item-total correlation coefficients ranging from 0.37 to 0.90 (Swiger et al., 2017; Warshawsky & Havens, 2011). It has also been translated and used in several countries (Lopez, 2005; Parker, Tuckett, Eley, & Hegney, 2010).

The Essential of Magnetism (EOM) tool that uses a four-point Likert scale with weighted responses is intended to measure eight characteristics of a productive and satisfying work environment. These work environment characteristics were considered by staff nurses in magnet hospitals to be important to their job satisfaction and essential to quality patient care: (1) building and maintaining good nurse–physician relationships; (2) clinical autonomy; (3) a culture in which concern for the patient is paramount; (4) working with clinically competent co-workers; (5) control of nursing practice; (6) perceived adequacy of staffing; (7) support for education; and (8) nurse manager support . To obtain the differential item weights, 392 nurses in seven magnet hospitals rank-ordered the items based on how important each item affected the nurses' ability to

provide quality patient care (Kramer & Schmalenberg, 2004). The psychometric properties of the EOM tool were then established in a study involving 3602 staff nurses in 16 magnet and 10 nonmagnet hospitals (Kramer & Schmalenberg, 2004). Changes were later made to the "perceived adequacy of staffing" and "nurse manager support subscales of the EOM, and the 58-item tool was re-named the Essentials of Magnetism II Scale (Kramer & Schmalenberg, 2005). Internal consistency reliability for EOMII range from .83 to .97.

Another tool identified in this literature search was the Conditions for Work Effectiveness Questionnaire (CWEQ), which is based on Kanter's (1977) structural empowerment theory. According to Kanter (1977), organizational empowerment structures within the work environment have a greater impact on employee work behavior than personal characteristics. The instrument was adapted for nursing (CWEQ-I) in 1986, and the final version of the instrument (CWEQ-II) contains 19 items that address six components of structural empowerment (Bernardino et al., 2013). The six components include access to opportunity, information, support, resources, formal power, and informal power. Studies have demonstrated reliability and validity of the CWEQ-II (Bernardino et al., 2013; Sun et al., 2014). Although the CWEQ-II has been translated, tested, and used in several countries, it only addresses empowerment structures. It does not address leadership and interprofessional collaboration, which are important elements of nurses' practice environment. This may explain why only four studies were found that used the tool since 2004 (Manojlovich & DeCicco, 2007; Purdy et al., 2010).

The PES-NWI has been more widely used to measure the concept of work environment in nursing as compared to the CWEQ-II (Lee & Scott, 2018). As of 2012, there were 26 studies using the PES-NWI to evaluate the relationship between practice environments and nurse

outcomes (National Quality Forum, 2012). National and international studies using the PES-NWI provide extensive evidence that practice environments influence nurse burnout, satisfaction, ITS, and turnover (Laschinger, 2008; Li et al., 2007; Nantsupawat et al., 2011; Tourangeau, Coghlan, Shamian, & Evans, 2005; Walker, 2010; You et al., 2013). The PES-NWI is endorsed by the National Quality Forum, a U.S.-based non-profit membership organization that promotes patient protections and healthcare quality through measurement and public reporting (Warshawsky & Havens, 2011). Given the reliability and validity of the PES-NWI in measuring practice environments, PES-NWI will be used for this proposed study.

Influence of Nurse Manager Competency on the Practice Environment

NMs are well positioned to influence the practice environment because they have the ability to remove obstacles that lead to staff dissatisfaction and frustration. NMs must have essential competencies to be able to support their nurses and ensure adequate resources are available (AACN, 2005; Van Bogaert et al., 2009). Creating positive practice environments requires NMs to be knowledgeable and skilled to create those structures.

A convenience sample of 12 NMs and a random sample of 132 of their respective nursing staff participated in one descriptive study to assess the relationship between NM's critical thinking and the nurses' perception of their practice environment (Zori, Nosek, & Musil, 2010). The California Critical Thinking Disposition Inventory (CCTDI), an instrument with established reliability (Cronbach's α ranged from 0.71 to 0.80), was used to measure NM's critical thinking, and the PES-NWI was used to measure nurses' perceptions of the practice environment. There were significant differences between NM's CCTDI scores compared with their respective nurses' mean subscale and overall PES-NWI scores ($p < .001$), indicating that NMs with stronger critical thinking skills had higher ability to create positive practice environments. The12 NMs,

however, came from different unit types, which was not controlled in the study and potentially had confounding effects of unit types on outcomes.

Perception of the practice environment is also highly influenced by nurses' relationships with and trust in their NMs (Perlo et al., 2017). The ability of NMs to have frank conversations and hear of nurses' frustrations builds trust. However, not all NMs are proficient in this skill. The ability of NMs to effectively communicate has been identified as an area of need for most NMs (Rani et al., 2010; Zwink et al., 2013). A recent survey showed that almost half of 3,347 nurses did not trust their leaders and felt they were not getting adequate support from their NMs (AMN Healthcare [AMN], 2017). Some felt their leaders did not listen, value their ideas and feedback, care about them as individuals, or support their development (AMN, 2017). Thus, Shirey (2017) emphasized that NMs' leadership competency is equally vital as their leadership style.

A study by Ulrich et al. (2014) that examined nurse leaders' understanding of AACN's essentials of a healthy work environment supported the importance of the NM's role in creating empowering and supportive structures for nurses as addressed in Shirey (2017). The study revealed that 70% of the nurse leaders were familiar with the AACN's essentials of healthy work environment standards; however, less than 30% of the same leaders fully implemented the standards in their own units. In addition, results indicated a decline in the perception of the 8,444 nurses surveyed that NMs fully embrace the concept of a healthy work environment. Only AACN members were invited to participate; thus, findings are not generalizable to NMs in other types of units outside of critical care. Further, the results emphasized the need to further explore which specific NM competencies impact NMs' ability to improve the practice environment.

The literature supports that NM competency may be an important contributor to frontline nurses' perception of their practice environment. The proposed study will contribute important knowledge in this area by providing empirical evidence directly examining the association between NM competency and nurses' perception of the practice environment. This knowledge will be valuable given the practice environment's impact on retaining nurses.

Frontline Nurses' Intent to Stay

ITS is defined as a nurse's intent to remain employed in their area of practice (McCarthy, Tyrrell, & Lehane, 2007). ITS has been identified as a predictor of decreased voluntary turnover (McGilton, Tourangeau, Kavcic, & Wodchis, 2013). Reducing the turnover rate of nurses to 2% annually would reduce the projected nursing shortage by half by the year 2022 (Murphy, Birch, & Alder, 2009). Therefore, it is critical to examine factors affecting ITS.

A focus group of seven nurses from two of Nevada's largest acute care hospitals provided insight on reasons for why nurses stay and leave their work setting (Cline, Reilly, & Moore, 2004). Next to staffing, NMs' practices emerged as the most common predictor of nurse satisfaction and employment intention. NMs' inability to address and follow through on issues negatively affected nurses' trust and ITS. Nurses' stories in Cline et al.'s (2004) study provided greater understanding of nurses' perception of their leaders. It was the first study to capture nurses' perception of their NM's inadequate training on basic human resources and leadership competencies that impact their NM's ability to be effective. A limitation in any focus group study, however, is that the sample is self-selecting and typically, individuals may have chosen to participate because they felt strongly about their work environment, either positively or negatively. In this focus group, participants were more inclined to talk about their negative experience and not the positive factors that influence their ITS. In addition, the small sample

may not be representative of all the reasons why nurses voluntarily left employment and results may not be applicable to smaller, rural hospitals that face challenges different from those in Nevada.

A cross-sectional study in Taiwan surveyed 524 nurses from four hospitals who completed questionnaires including the Chinese Nursing Practice Environment Scale (Lin, Chiang, & Chen, 2011). The study compared nurses' perceptions of the practice environment and whether it differed between nurses with intent to leave and those with ITS in their current work setting. Lin et al. (2011) found that nurses who intended to stay perceived the practice environment more favorably than those who intended to leave. Although this study was conducted in Taiwan, results supported evidence that creating a positive nursing practice environment, which is highly influenced by NMs, is a cornerstone for increasing ITS and nurse retention.

As Cline et al.'s (2004) study pointed out, NM effectiveness is associated with frontline nurses' trust, job satisfaction, and commitment. A mediation analysis study was conducted with 660 nurses at age 45 years and above, from hospitals across Ontario, Canada, to find the effects of NMs' HR practices on nurses' ITS (Armstrong-Stassen et al., 2015). They found that when NMs were perceived to administer HR practices fairly, nurses had higher satisfaction and trust with their NM and, in turn, also had higher ITS. Their findings are consistent with those from past studies (Ballard, Boyle, & Bott, 2016; Cowden, Cummings, Patrician, Shang, & Lake, 2011; Hill, 2011; Cline, Reilly, & Moore, 2004; Ribelin, 2003). Armstrong-Stassen et al. (2015) had a large sample and participants were recruited from several hospitals and different units; however, the study focused on older nurses which limited the generalizability of results to different age groups.

Another study conducted by Atiyeh and AbuAlRub (2017) with 260 nurses from government and university affiliated hospitals in Jordan explored the relationship of nurses' trust with their immediate supervisor and ITS. Findings also demonstrated that when the level of trust in their NM increased, nurses' ITS also increased. Unlike other studies showing nurses had higher satisfaction when empowerment structures are in place (Friese & Himes-Ferris, 2013; Kutney-Lee et. al., 2016; Nowrouzi et. al., 2015; Wilson, et al, 2015), Atiyeh and AbuAlRub (2017) found that nurses who worked in government-affiliated hospitals had higher levels of trust with their NMs compared to those who worked in university-affiliated hospitals specifically because NMs in governmental-affiliated hospitals had limited authority to control work conditions. Because of the limited control of NMs, nurses felt more secure and perceived their NMs to be more benevolent, which enabled mutual trust to develop. Results from this study may not be generalizable to U.S. nurses due to the different culture in Jordan. This study also invited nurses from teaching hospitals only, thus further limiting generalizability of findings to similar settings.

Other NM practices that contribute to nurses' ITS include meaningful recognition and the ability to connect with staff. A descriptive phenomenological study explored the lived experiences of nurses in a 528-bed Magnet-designated teaching hospital. The analysis revealed four main factors that brought meaning to the nurses' experiences and impacted their ITS: experiences of feeling good, relationships, job strain, and having choices. Receiving personal recognition was experienced as feeling valued. Meaningful recognition, alignment of their own values with the organization's, and having a manager who is approachable, understanding, and a good listener were other factors that impacted nurses' commitment to their employment setting (Anselmo-Witzel, Orshan, & Bachand, 2017).

In summary, Atiyeh and AbuAlRub's (2017) findings about NM empowerment contrasted with other studies but still added to the review of literature. Also, although the majority of the studies reviewed here were conducted in other countries (Canada, Jordan, and Taiwan), all provided evidence of the important role NMs play in nurses ITS and the association between NM practice and ITS. However, further exploration is warranted, especially in U.S. hospitals. No study was found exploring the direct association of ITS with the overall NM competency. NM-related predictors of nurses' ITS seem to be related to competencies that fall under specific aspects of NM competency, mostly limited to the Art of Leadership or leading the people domain (human resource, leadership skills, and relationship management). This proposed study examining the direct effect of NM competency on frontline nurses' ITS and the indirect effect through the nurse practice environment will provide better understanding about how to retain more frontline nurses by improving NMs' competency skills and nurse practice environments.

Conclusion

With the nursing shortage in the U.S. projected to continue increasing in the future, expanding the number of strategic efforts, programs, and policies to retain current staff is critical. Identifying gaps in NM competency and understanding how NM competency relates to nurses' perception of the practice environment and nurses' ITS can lead to the development of policies and resources to improve NM competencies and potentially decrease frontline nurse turnover.

Clearly NMs need to be competent. However, research exploring the association among NMs' competencies and frontline nurses' ITS and the mediation of the nursing practice environment is scarce at best. This study will provide important knowledge about NMs' self-

assessed competency and which specific leadership competencies are related to the practice environment and frontline nurses' ITS.

CHAPTER 3

METHODOLOGY

Introduction

This chapter addresses the methodological process for the study. This study was conducted to develop new knowledge to better understand: (1) NM's self-assessed essential competencies; and (2) the relationship between NM competencies, frontline nurse perception of the practice environment, and frontline nurses' ITS.

This chapter will describe the research design, study sample, setting, data sources, measures, and data analysis. Discussion will include considerations made to ensure data integrity and protection of human subjects. Finally, the methodological limitations will be addressed.

Methods

Research Design

To examine the direct effect of NM competency on frontline nurses' ITS and the indirect effect of NM competency on frontline nurses' ITS through the frontline nurses' perception of the practice environment, this study conducted secondary analysis of the NM Competency data and 2017 NDNQI® RN Survey data. A cross-sectional correlational design was used to evaluate the relationships among the study variables, controlling for hospital characteristics (location, teaching status and size), unit characteristics (unit types), NM characteristics (education and certification), and frontline nurse characteristics (tenure and education). Correlational design was used to confirm relationships among variables; thus, this design type was appropriate for the study. Since data used were collected at a given point in time, cross-sectional study was also appropriate to examine the relationship between variables of interest.

Data Sources

This study used existing NM competency data from Warshawsky's (2017) study and the 2017 NDNQI RN Survey data, provided by Press Ganey Associates, Inc. (see the disclosure statement in Appendix I). NDNQI was founded in 1998 by the American Nurses Association (ANA) and is now a repository of nursing quality data collected in U.S. hospitals as well as international hospitals. NDNQI was developed to enable researchers to explore relationships among organizational structures, nursing processes, and outcome indicators at the unit level. NDNQI data have been useful in improving care quality and patient safety, and organization's nursing culture to minimize nurse turnover (Montalvo, 2007; Press Ganey, n.d.). Unit-level comparison reports produced by NDNQI also have been used for member hospitals to identify targeted improvements to enhance retention and recruitment of nurses. NDNQI, purchased by Press Ganey Associates in 2014, has continued to collect nursing quality data used to guide changes in nursing practice and enable nursing units to benchmark themselves against similar units from almost 2,000 participating hospitals (Press Ganey, n.d.).

NDNQI member hospitals voluntarily participate in the annual RN Survey while selecting one of the two survey options: RN Survey with Practice Environment Scale of the Nursing Work Index (PES-NWI) or RN Survey with Job Satisfaction Scale (JSS). Data from hospitals choosing the PES-NWI survey option were used because the nurse practice environment was measured by the PES-NWI in this study. The RN surveys also include: (1) RN characteristic items such as gender, race, age, tenure, education, and certification; (2) work context items such as RN job plans, quality of care, ratings of the last shift worked, breaks, and overtime; (3) nursing workforce-related items including staffing levels and job plans; and (4) information on characteristics of hospitals and units where RNs are employed and work.

To participate, hospitals register and identify a primary point of contact for the organization who assumes the role of NDNQI Site Coordinator (SC). The SC has access to an individualized webpage to manage the different phases of the survey process. SCs receive technical support, data collection training, and standardized definitions of the survey elements to ensure data integrity of the RN survey. Hospitals choose from one of the six data collection periods to administer the web-based RN survey every year (Press Ganey, n.d.). The survey is made available for a three-week period and eligible nurses are provided the survey link with a unit specific code.

Study Sample and Setting

Close to 2,000 U.S. hospitals participate in NDNQI, capturing more than 300,000 nurses' input from across the nation about their job satisfaction and practice environment (Press Ganey, n.d.). In 2017, 650 hospitals participated in the RN survey and 385 of those hospitals collected data using PES-NWI option. RNs at all levels, regardless of job title, who spend at least 50% of their time in direct patient care and have been employed a minimum of three months on the unit, were invited to participate in the RN survey. Full-time, part-time, unit-based PRN, or per-diem RNs employed by the hospital were eligible for the survey participation; however, agency or contract RNs were not eligible.

U.S. hospitals that were scheduled in 2017 to take the NDNQI RN survey with the PES-NWI option were invited to participate in Warshawsky's 2017 NM competency study. Of the 300 invited, 150 hospitals that expressed interest, 80 were invited to participate and 54 hospitals submitted NM survey data and 48 also submitted NDNQI nurse survey data. The inclusion of hospitals from diverse characteristics such as size, teaching status, location, and rurality was considered in the phase of the sample recruitment. Thus, the NM study could collect data from

small to large hospitals, including teaching and non-teaching hospitals located in metropolitan and non-metropolitan areas. Furthermore, the NM study included data from various types of units, such as critical care, medical, surgical, and specialty units for adult and pediatric patients.

This study merged datasets from Warshaswsky's NM study and the NDNQI RN Survey. The study sample included units in NDNQI participating U.S hospitals, providing data on both NM competency from the NM study and the RN Survey with the PES-NWI option.

Measures

This study measured NM competency, the nurse practice environment, and ITS. Hospital, unit, NM, and frontline nurse characteristics were measured and used as covariates. Conceptual and operational definitions of the study variables are summarized in *Appendix C*.

NM competency. NM competencies are defined as the knowledge, skills, and abilities that guide the practice of NMs (AONE, 2015). NM competencies were measured using Warshawsky's NM Competency Instrument© modified from the AONE NM Competencies Assessment tool. Warshawsky reduced the items (from 55 to 26) to reduce participant burden and increase the likelihood of participants completing the survey. The modified 26-item instrument intends to measure 10 NM competencies from two domains of the NM Learning Domain Framework (NMLDF): (1) *Science of Leadership,* which includes financial management (2 items), human resource management (2 items), performance improvement (4 items), foundational thinking (3 items), technology (1 item), strategic management (5 items), and clinical practice knowledge (1 item); and (2) *Art of Leadership,* which includes human resource leadership (4 items); relationship management (2 items), and diversity (3 items) (*Appendix B*; *Appendix C*). The competencies from the *Leader Within* domain were added in the demographic

section as information about their education, leadership workshops attended, and professional certifications were obtained.

Conceptual definitions of the 10 NM competencies. The NM Competencies are defined as follows. *Financial Management Skills* refers to the effective management of funds in such a manner as to accomplish the objectives of the organization. Financial competence includes knowledge of and ability to successfully manage financial, marketing, and budgeting issues (Sinkkonen, & Taskinen, 2003). *Human Resource Management Skills* focus on management of people, and knowledge of policies and systems, including employee-benefits design, recruitment, and training and development (Paauwe & Boon, 2009). *Human Resource Leadership Skills* involve the development and management of personnel (Pihlainen, Kivinen, & Lammintakanen, 2016). *Performance Improvement Skills* include competence in quality improvement and management of service processes, especially those focused on patients (O'Neil, Morjikian, Cherner, Hirschkorn, & West, 2008). *Foundational Thinking Skills* include the ability to think critically, prioritize, multi-task, and use information in decision-making and problem-solving (Pihlainen, Kivinen, & Lammintakanen, 2016). *Technology Skills* are related to the use of patient care technologies to support care, and the use of decision support systems to guide practice, understand standardized terminologies, and to ethically manage data, information, and knowledge to support safe and quality patient care (American Association of Colleges of Nursing, 2008). *Relationship Management and Influencing Behaviors* are interpersonal skills essential for relationship building and development of collaborative relationships within the organization (Pihlainen, Kivinen, & Lammintakanen, 2016). *Diversity Management Skills* encompass acceptance and respect, understanding that each individual is unique, and recognizing individual differences (Patrick & Kumar, 2012). *Strategic Management Skills* include analytical

thinking; achievement orientation, ability to communicate strategy, vision, and mission; and motivating staff to accomplishing the mission (Sherman, Bishop, M., Eggenberger, & Karden, 2007). Finally, *Clinical Practice Knowledge* encompasses knowledge and skills of clinical operations (Connelly, Yoder, & Miner-Williams, 2003).

Operational definitions. The item response categories include novice (1), advanced beginner (2), competent (3), proficient (4), and expert (5). NM competency were measured as mean scores for each competency as well as a composite mean score.

Psychometric evaluation. AONE (2015) stated that periodic job analyses and role delineation studies have been conducted to establish the reliability and validity of the AONE NM competency tool. Previous studies on role delineation have identified critical skills for competent job performance (AONE, 2015). Their findings might be valuable to support validity of the AONE NM competency tool. However, no psychometric testing to establish reliability was found in the literature.

Warshawsky's NM Competency Instrument is a modified version of the AONE NM Competency tool. The items were used to assess competencies of NMs in two hospitals, University of Kentucky Healthcare (UKHC, [an academic medical center]) and the Veteran's Administration Medical Center (VAMC) in Lexington, KY. The NMs at UKHC were assessed using the full NM Competency tool and the NMs at the VAMC were assessed using only the categories of the AONE NM Competency tool. Findings for the two groups were similar. NMs reported mean scores ranging from novice to expert that increased with years of experience as expected (Baxter & Warhawsky, 2014). For this study, Warshawsky modified the AONE NM Competency tool by developing two to three items per dimension that summarized the essence of each dimension. An experienced PhD prepared nurse leader reviewed the items to confirm the

content validity of the modified NM Competency instrument. This study performed further psychometric evaluation of Warshawsky's NM Competency instrument while assessing: (1) item analysis, (2) dimensionality (3) reliability, and (4) validity.

Practice environment. Lake (2002) defined nurse practice environment as the organizational characteristics of a work setting that facilitate or constrain professional nursing practice. This study used the PES-NWI to measure practice environments for frontline nurses. The PES-NWI has five subscales: Nurse Participation in Hospital Affairs; Nursing Foundations for Quality of Care; Nurse Manager Ability, Leadership, and Support of Nurses; Staffing and Resource Adequacy; and Collegial Nurse-Physician Relations.

Nurse participation in hospital affairs. Nurse participation in hospital affairs, also often referred to as shared leadership or shared governance, is defined as the participatory role and valued status of nurses in the hospital context (Lake, 2002). This includes nurses' involvement in governance, policy decisions, and committee work on both the hospital and the unit level. This subscale contains nine items to assess opportunities for nurses to serve on hospital or unit committees, provide input on daily problems and procedures, and participate in policy decisions.

***Nursing foundations for quality care*.** Nursing foundations for quality care is defined as the pervasive use of nursing philosophy, a nursing (rather than a medical) model of care, and nurses' clinical competence as the foundation for providing a high standard of patient care (Lake, 2002). This subscale contains 10 items to assess the structures in place to ensure quality such as strengthening the clinical competence by offering preceptor and continuing education programs for nurses.

NM's ability, leadership, and support. NM's ability, leadership, and support are defined as the ways NMs recognizes nurses for a job well done and how they support nurses when there

are conflicts with physicians and when nurses make mistakes (Lake, 2002). This subscale contains five items to assess the extent to which NMs support their staff such as providing recognition, using mistakes as learning opportunities, and backing up the nursing staff on conflicts with physicians when appropriate.

Staffing and resource adequacy. Staffing, and resource adequacy is defined as having adequate staff and support resources to provide quality patient care and having time to spend with patients and discuss patient care problems with other nurses (Lake, 2002). This subscale contains four items to assess the adequacy of nurses and support services to get the work done.

Collegial nurse-physician relations. Collegial nurse-physician relations is characterized by the positive working relationships between nurses and physicians (Lake, 2002). This subscale contains three items to assess collaboration between the two disciplines.

When responding to the PES-NWI, nurses are asked to indicate the extent to which they agree that items under each subscale are present in their current job. Response options are on a 4-point Likert-type scale and range from strongly disagree (1) to strongly agree (4). For unit-level data analysis, this study used unit mean scores of each of the five PES-NWI subscales and a unit mean score of the entire PES-NWI scale. Unit-level mean scores of the PES-NWI represent unit-level practice environments with higher scores indicating better perception of the practice environment.

The PES-NWI has been extensively used worldwide and has established reliability and validity (De Pedro-Gómez et. al., 2012; Ferreira & Martins, 2014; Parker et al., 2010). Several studies using the PES-NWI reported Cronbach's α's ranging from 0.91– 0.96 (Lake, 2002; Warshawsky & Havens, 2011), and item-total correlation coefficients ranging from 0.37 to 0.90 (Warshawsky & Havens, 2011). Warshawsky and Havens (2011) reviewed 37 research studies

published from 2002 through 2010 and also found consistent associations between PES-NWI scores and nurse satisfaction and employment intentions, thus further establishing good predictive validity of the PES- NWI.

Frontline nurses' ITS. ITS has been defined as the intent of nurses to stay in their area of practice, the organization, or the nursing profession (McGilton et al., 2013). The focus of this study was limited to nurses' ITS in their current position in the same unit given that NMs' impact is mainly on the units for which they are accountable (Gregory et al., 2007). Nurses' ITS was measured from the NDNQI RN Survey. The survey asks nurses about their job plans for the following year with the following response options: *stay in my current position*, *stay in direct patient care but in another unit in this hospital*, *stay in direct patient care but outside this hospital*, *leave direct patient care but stay in the nursing profession*, and *leave the nursing profession for another career*, or *retire*. Job plans were re-categorized into a dummy variable as: 0 = not staying in the current position in the same unit, and 1 = stay in my current position in the same unit. Nurses' ITS was calculated as the proportion of unit RNs who planned to stay in the current position. Responses of leaving nursing profession for another career or retirement were excluded from data analysis in this study because those job plans are not typically influenced by the NMs.

Hospital characteristics. As described in Chapter 1, hospital size, location, and teaching status may be associated with the hospital's available resources; thus, were used as control variables for this study. Urban, academic centers and larger hospitals typically have access to more advanced technology and other resources while smaller and rural hospitals typically have less financial and human resources (Brown et al., 2014; Lutfiyya et al., 2007). Hospital size is the bed size category based on the facility's number of licensed beds (NDNQI, 2013). NDNQI

collects data on bed size with the following categories: 1 = < 100; 2 = 100-199; 3 = 200-299; 4 = 300-399; 5 = 400-499; and 6 = ≥500. This study recoded hospital size into three categories: small (<100); medium (100-299); and large (≥300). Hospital location is defined by metropolitan status (NDNQI, 2013). NDNQI classifies hospital location as: 1 = neither metro nor micro area; 2 = metropolitan area; and 3 = non-metropolitan area. Hospital location was measured in this study as: non-metropolitan area vs. metropolitan area. A teaching hospital is defined as having an AMA-approved residency program and is a member of the Council of Teaching Hospitals (HCUP, n.d.). Teaching status was measured by NDNQI as: 1 = Academic Medical Center; 2 = Teaching; and 3 = Non-teaching. Teaching status was recoded as non-teaching and teaching.

Unit characteristics. Unit type was used as a control variable. Unit type is defined by the patient population care on the units (NDNQI, 2013). Different types of units also have varying staffing levels, patient acuity, and practice environment structures. NDNQI provides 53 different unit type options. This study included units that were from major unit types and were regrouped into seven different unit types: adult critical care; adult step down; adult medical and surgical; pediatric general; pediatric critical care; obstetrics, and emergency department.

NM characteristics. NM characteristics (education level and certification) were used as control variables. NM education represents progression from rudimentary to more advanced learning experience (Organisation for Economic Co-operation and Development, 2003). NM Competency Instrument response options include the following: *diploma*, *associate*, *baccalaureate*, *masters*, and *doctorate degrees*. For this study, NM education was dichotomously recoded into the following: diploma, associate, or baccalaureate degrees; and masters or higher degrees. Certification is the process by which a nongovernmental agency validates competency based upon predetermined standards and provides evidence of

qualifications for practice in a defined clinical area of nursing (American Association of Critical-Care Nurses, n.d.). The NM Competency Instrument asks which of the following Nursing Leadership certifications the NM has earned. Response options include: Certified Nurse Manager and Leader (AONE); Certified Executive Nursing Practice (AONE); Executive (ANCC); Nurse Executive-Advanced (ANCC); Other (Specify); and None. Certification was recoded to a binary variable (certified in nursing leadership; not certified).

Frontline nurse characteristics. Frontline nurse characteristics (education and unit tenure) were controlled. Frontline nurse education represents the highest level of nursing education (NDNQI, 2013). The frontline education levels were recoded into the following: less than a baccalaureate degree (diploma, associate degree); and baccalaureate degree or higher (master's degree, doctorate). In this study, education was measured as the proportion of unit RNs who have a baccalaureate degree or higher. Nurses with a baccalaureate degree or higher in Nursing reported more positive perception of the practice environment (Sexton et al., 2008). Frontline nurses' unit tenure is defined as the amount of time that nurse has held a job on the unit (Tenure, n.d.). The NDNQI RN survey asks participants about the length of time they have been employed as an RN on their current unit and provides the following response options: less than 3 months, 3-6 months, 7-11 months, 1 year, 2 years…54 years, greater than or equal to 55 years. This study measured tenure as the number of years the nurse has been on the unit and reported at the unit level as the mean years nurses have been working on the unit.

Data Analysis

This study examined NM competencies and determined the direct effect of NM competency on the frontline nurses' ITS, and the indirect effect of NM competency on ITS mediated by the nursing practice environment. Hospital (size, location, and teaching status), unit

(unit type), NM (education level and certification), and frontline nurse (education and unit tenure) characteristics were used as covariates.

Power. It is essential to determine the necessary sample size in order to provide adequate power for identification of the research question. Power analysis involves four interrelated measures: (1) effect size, or the quantitative measure of the magnitude of a phenomenon (Kelley & Preacher, 2012), with medium effect size selected for most social behavior studies (Sedlmeier & Gigerenzer, 1989); (2) significance level, represented by alpha (α), is the risk of committing a type I error or rejecting the null hypothesis when it is true, and is typically set at 0.05; (3) statistical power limits the chance of type II error or the likelihood of accepting a false null hypothesis (Shadish, Cook, & Campbell, 2002); and (4) sample size (n), the number of observations to include to have sufficient statistical power (Cohen, 1992).

In the 2017 NM competency study, Warshawsky planned to recruit a minimum of 50 hospitals in consideration of the average cluster size for the number of NMs per hospital and attempted to have a nationally representative sample of at least 250 NMs from different units. This goal was established based on an a priori power analysis performed by Warshawsky (2017) using Monte Carlo simulation to determine the number of NMs needed to achieve 90% power. Out of the 160 that were interested in participating, 83 hospitals were invited to account for organizations dropping out. Consequently, 647 NMs in 53 hospitals completed data collection.

Assessing the data. SPSS Statistics version 24 (IBM Corp, Armonk, New York) was used for data management. The study sample was limited to units meeting the inclusion criteria. Missing data and pattern of missing data were assessed for all study variables. There are different assumptions about missing data. Data can be classified as: (1) missing completely at random (MCAR), missing observation is completely unrelated to the values of the data for the

other variables; (2) missing at random (MAR), data meet the requirement that *missingness* does not depend on the value of x_j after controlling for all the other variables; or (3) not missing at random (NMAR), values of the missing data can be predicted from some of the other variables in the study (Soley-Bori, 2013). Missing values can result in data loss and bias for respondents and non-respondents (Munro, 2005). Depending on the extent of missing data and the degree to which they occur randomly, full information maximum likelihood (FIML) estimation may be conducted using Mplus version 8 (Muthén & Muthén, Los Angeles, CA, USA). In FIML, missing values are not replaced or imputed. Instead, the missing data is accounted for by estimating the population parameters that would most likely produce the estimates from the sample data that is analyzed (Enders & Bandalos, 2001). FIML has been shown to produce unbiased parameter estimates and standard errors (SE) or variability in the sampling distribution for missing values classified as MAR or MCAR (Soley-Bori, 2013).

Ensuring assumptions are met. Normality, linearity, homoscedasticity, independence of variables, and issues with collinearity were determined to ensure that assumptions for using regression are met and that inferences about the population of interest can be made (Munro, 2005). The normal probability plot and histogram were assessed for normality of the data. Linearity was assessed through examination of correlations between each independent variable (IV) and dependent variable (DV), partial plots for the IV, and scatterplots. To assess for homoscedasticity, the distribution of DV scores having approximately equal variability, scatter plots were generated to compare the amount of random variation indicated by points spread throughout. Patterns such as clustering, and curvilinear or funnel shape are indicative of homoscedasticity issues (Shelly, 1996). Durbin-Watson statistic (*d*) was used to check for

independence. Value of $d = 2$ indicates no autocorrelation and suggests that the data points are independent (Durbin & Watson, 1950).

Variables studied in behavioral research often measure similar information. Since highly correlated independent variables (IVs) can pose problems in interpreting the results, correlation coefficients among IVs were assessed for multicollinearity. Correlation values greater than 0.85 indicate high levels of inter-correlation and may signify multicollinearity. Tolerance and variance inflation factors (VIF) were considered before decisions were made to remove any variable (Valmi, 2016). Small values (less than 0.1) of tolerance indicate that the variable is almost a perfect linear combination of an IV already in the equation (Munro, 2005). The VIF measures the impact of collinearity among the variables in a regression model (1/tolerance) and is always greater than 1. Values of VIF that are greater than 10 suggest multicollinearity, but in weaker models, thresholds for concern may be lower (Munro, 2005).

Descriptive and bivariate data analyses were conducted with SPSS Statistics version 24, and multivariate analyses and path analysis were conducted with Mplus version 8. Data analyses were performed to answer the four research aims and to test the hypotheses.

Aim 1: To describe the 10 essential competencies self-assessed by NMs. The 10 competencies described in this study included financial management, human resource management, human resource leadership, performance improvement, foundational thinking, technology, relationship, diversity, strategic management, and clinical practice knowledge.

RQ_1: What are the competency scores self-assessed by NMs?

Descriptive statistics were conducted to descriptively summarize the 10 essential competencies self-assessed by NMs. Measures of central tendency (mean) and dispersion (range and standard deviation) were assessed.

RQ_2: Do NM competencies differ depending on hospital characteristics?

RQ_3: Do NM competencies differ depending on unit characteristics?

RQ_4: Do NM competencies differ depending on NM characteristics?

Descriptive statistics such as means, ranges, and standard deviations were used to descriptively summarize NM competency scores depending on hospital, unit, and NM demographic characteristics. T-test and analysis of variance (ANOVA) were used to determine whether there are any statistically significant differences in NM competency average composite scores between NMs: (1) from different hospital locations, sizes, and teaching status; (2) from different unit types; and (3) with different NM education levels and certifications. The significance level (α) is typically set at .05. However, multiple testing may increase in Type I error that occurs when statistical tests are used repeatedly; thus, correction for alpha was required. For multiple comparisons testing (RQ_2, RQ_3, and RQ_4), this study used Bonferroni correction to adjust for the level of statistical significance, α, rather than using the conventional significance level at .05. The Bonferroni-corrected significance level was set at α /m, where α was the desired overall alpha level (0.05) and *m* was the number of hypotheses. For example, for RQ_2, this study conducted 50 hypothesis tests because each NM competency skill had one testing for teaching status, one for location, and three for hospital size, and this study examined 10 NM competencies. With the Bonferroni correction for 50 tests (.05/50), the statistical significance level was set at $p \leq .001$(Benjamini & Hochberg, 1995).

Aim 2: To evaluate the psychometric properties of Warshawsky's NM Competency Instrument. Item analysis, dimensionality, validity and reliability of the NM Competency Instrument will be evaluated.

Item analysis. Item Analysis refers to statistical methods used for evaluating each item's contribution to a tool (Varma, 2006). Item-total correlations were assessed to determine how strongly each item in the scale is associated with the overall scale. Each item's contribution to the overall alpha was determined by looking at changes in alpha when items are deleted. Pearson correlation were assessed between each item's scores and the average of the scores for all items. In a reliable measure, all items should correlate well with the average (Field, 2005). A low item-correlation provides empirical evidence that the item is not measuring the same construct measured by the other items included. A correlation value less than 0.2 or 0.3 indicates that the corresponding item does not correlate very well with the scale overall and, thus, should be further evaluated (Field, 2005). Descriptive statistics including frequencies and measures of central tendency and variability were also assessed. Finally, missing responses were examined for frequency and pattern.

Dimensionality. Confirmatory Factor Analysis (CFA) was conducted with Mplus version 8 (Muthén & Muthén, Los Angeles, CA, USA) to confirm the underlying structure of the items in the instrument. CFA, most commonly used in social research, is used to test whether measures of a construct are consistent with a researcher's understanding of the nature of that construct (Bartholomew, Knott, & Moustaki, 2011). CFA was conducted to test whether the items fit the hypothesized measurement. In CFA, the number of factors and the pattern of indicator-factor loadings are specified in advance (Brown, 2015). Based on NMLDF, it was hypothesized that the 26 items will load into 10 factors (representing the 10 essential leadership competencies). Unique variance, i.e., variance in the indicator that is not accounted for by the latent variables, is presumed to be measurement error. CFA can help identify the nature of

relationships among unique variances of the items in the instrument and if covariation is due to reasons other than the shared influence of the latent variable (common factor).

CFA can determine how to best score the instrument. Based on the pattern of factor loadings, recommendation can be made whether the instrument supports being scored using the subscales only, or also the total scores (composite of all items). Average composite score can be used if the relationships among the subscales or latent dimensions can be accounted for by higher-order factors (*Art of Leadership* and *Science of Leadership* domains), and if the test items are meaningfully related to the higher-order factors (Brown, 2015).

The CFA solution were evaluated based on the following fit indices recommended by Hoyle (1995): chi square; comparative fit index (CFI); root mean square error of approximation (RMSEA); and standardized root mean square residual (SRMSR). Chi square is typically conducted to determine whether there is any difference between the observed and the expected value. The chi-square statistic should be non-significant for the model to be considered a good fit. The CFI evaluates the fit of a user-specified solution in relation to a more restricted, nested baseline model (Brown, 2015). CFI was used to analyze the model fit by examining the discrepancy between the data and the hypothesized model, while adjusting for the issues of sample size inherent in the chi-squared test of model fit. CFI values range from 0 to 1, with larger values indicating better fit. CFI value of greater than 0.9 is indicative of a well-fitting model. RMSEA provides a mechanism for adjusting for large sample sizes where chi-square statistics are used. RMSEA refers to covariance residuals and represents the differences between the observed and model-implied covariances (Hayes, 2009). RMSEA values <.06 in the lower bound of the 90% confidence interval (CI) are indicative of a good approximation of fit (Brown, 2015; Hu & Bentler, 1999). SRMR, the standardized difference between the observed

correlation and the predicted correlation was assessed. SRMR values of less than 0.08 typically indicate a good fit. Finally, the residual correlation or the correlation among items that is not explained by common factors were evaluated to confirm the results of CFA.

Reliability testing. Reliability analysis refers to the precision or consistency of measurement and determines how well a set of items go together into a single scale (Brown, 2015). Reliability can be evaluated with repeated use of the tool, by assessing the internal consistency of items, and performing CFA. This study was the second study to use the NM Competency Instrument and thus was the first to assess the tool's reliability.

Internal consistency refers to the extent to which the items are measuring the construct the tool was designed to measure (Cronbach, 1951). Internal consistency was evaluated by assessing the Cronbach's α. Cronbach's α is the proportion of true variability to the total observed variability, and values range from 0 to 1.0. The higher the value of Cronbach's α, the higher the correlation is between the items in the subscale. A value of zero indicates that all items are entirely independent from one another (not correlated or share no covariance). A high α coefficient indicates that more items have shared covariance and items are measuring the same construct (Salkind, 2006). Cronbach's α coefficients less than 0.5 are considered unacceptable, and should be 0.7 at a minimum (Cronbach, 1951). Cronbach's α greater than 0.7 is considered acceptable and greater than 0.9 as excellent (Kline, 2000).

CFA is also an important analytic tool for reliability testing. CFA has important advantages over traditional estimates of internal consistency since Cronbach's α can either underestimate or overestimate scale reliability due to correlated measurement errors. The factor loadings, error variances, and error covariances estimated from the CFA solution were used to obtain point estimates and 90% CIs to assess the overall proportion of true-score variance to total

observed variance of the measure (Brown, 2015). In addition, each item was evaluated by looking at the factor loadings from the CFA, which indicates the relationship of each variable to the underlying factor. The magnitude, direction, and significance of the factor loadings were examined.

Validity testing. Validity of an instrument is the degree to which it measures what it is supposed to measure. Content validity refers to the extent to which a measure represents all facets of a given construct (Haynes et al., 1995). AONE's periodic job analysis and role delineation studies helped establish content validity of the items in the original tool. The published use of the revised AONE NM Competency tool and expert nurse leader review of Warshawsky's revised NM Competency instrument provided additional support of the content validity of the modified tool. Construct validity testing was conducted using confirmatory factor analysis (CFA) in this proposed study.

Aim 3: To examine the correlation between NM competencies, nurse practice environment, and frontline nurses' ITS. The 10 essential NM competencies listed above were examined. Practice environment was examined in five dimensions: Nurse Participation in Hospital Affairs; Nursing Foundations for Quality of Care; Nurse Manager Ability, Leadership, and Support of Nurses; Staffing and Resource Adequacy; and Collegial Nurse-Physician Relations.

RQ_5: Are the 10 NM competencies correlated with practice environment subscales?

RQ_6: Are the 10 NM competencies correlated with frontline nurses' ITS?

Pearson correlation coefficient or Pearson's *r*, the measure of strength and direction of the linear correlation between two variables, were obtained. Pearson's *r* were assessed for correlations between each of the 10 NM competencies and five PES-NWI subscales (RQ_5), and correlations between the 10 NM competencies and frontline nurses' ITS (RQ_6). Pearson's *r* is

reported in values that range from +1 to -1, with 0 indicating that there is no association between the two variables. Values greater than zero indicate a positive association, and less than zero, a negative association between the two variables. In RQ_5, it would mean, as NM competency increases, the nursing practice environment rating increases and vice versa for negative association. In RQ_6, positive association indicates that as NM competency increases, nurses' ITS increases, and vice versa for negative association. To test the statistical significance of correlation comparisons, Bonferroni correction was used. For example, in RQ_5, 50 correlations were conducted between 10 NM competency skills and five PES-NWI subscales. For this, the corrected significance level was $p \leq .001$.

Aim 4: To examine the direct effect of NM competency on frontline nurses' ITS and to examine the indirect effect of NM competency on frontline nurses' ITS, mediated by the nurse practice environment

H_1: Higher NM competency scores will be associated with better practice environments (path *a*), controlling for hospital location, size, teaching status; unit type; NM education and certification; and frontline nurse unit tenure and education.

H_2: Better practice environments will be associated with higher rates of frontline nurses' ITS (path *b*), controlling for hospital location, size, teaching status; unit type; NM education and certification; and frontline nurse unit tenure and education.

H_3: Higher NM competency scores will be associated with higher rates of frontline nurses' ITS (path *c*, direct effect), controlling for hospital location, size, teaching status; unit type; NM education and certification; and frontline nurse unit tenure and education.

H_4: Higher NM competency scores will indirectly affect higher ITS through nurses' perception of their practice environment (path *a***b*, indirect effect), controlling for

hospital location, size, teaching status; unit type; NM education and certification; and frontline nurse unit tenure and education.

The basic causal chain involved in mediation assumes that the three variables (predictor [X], mediator [M], and outcome [Y]) show evidence of significant association with each other. (see *Figure 3*).

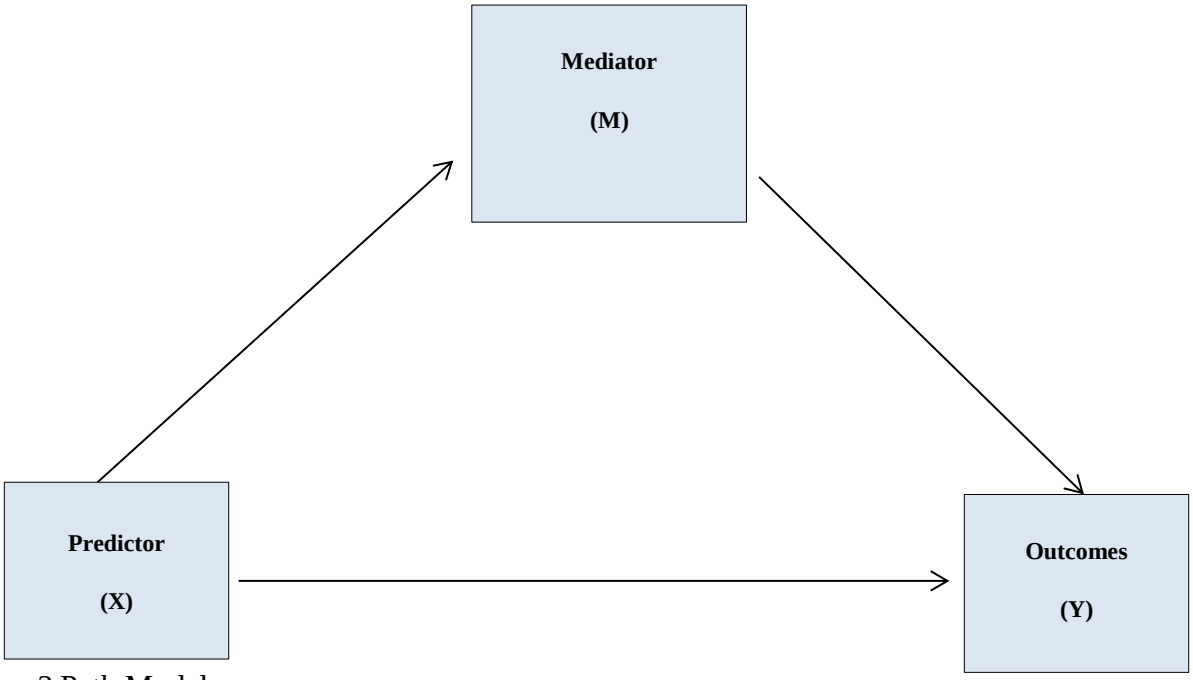


Figure 3 Path Model

This study tested the four hypotheses, using Path Analysis (PA). A valuable benefit of PA is the ability to assess indirect relationships among variables and the total direct and indirect effects; thus, it is often used when one or more variables are thought to mediate the relationship between other variables (Wright, 1934). PA was used to assess the degree to which: NM competency directly affects the frontline nurses' perception of their practice environment (PE) (path *a*), PE directly affects ITS (path *b*), NM competency directly affects ITS (path *c*), and NM competency indirectly affects ITS through its influence on the PE (mediation) (*Figure 4*). *Figure 4* also shows the hospital characteristics (location, size, and teaching status), unit characteristic (unit type), NM characteristics (education, certification), and frontline nurse characteristics (education and tenure) that were used as control variables.

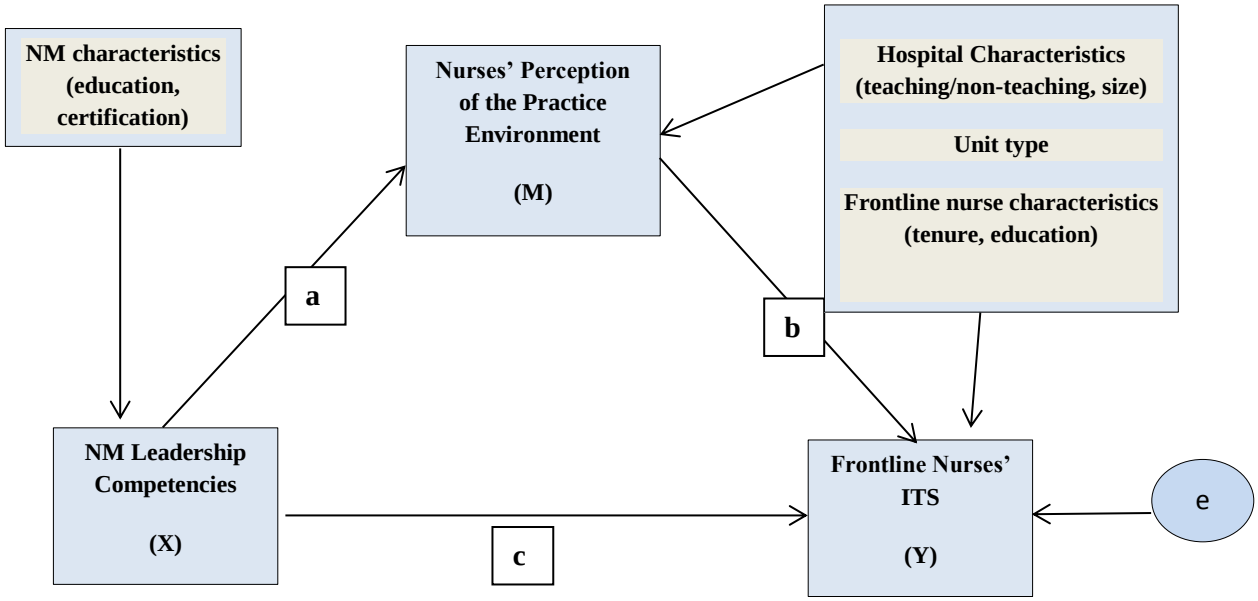


Figure 4 Model of Nurse Manager Competencies, Nursing Practice Environment, and Frontline Nurses' Intent to Stay

Path analysis was used to examine path *a*, *b*, and *c* and determine: (1) whether the relationship between the variables is statistically significant; (2) how much of the variation in the DV is explained by the IV; and (3) the direction and magnitude of the relationship; and (4) predict values of the DV based on different values of the IV. Assumptions for regression were checked and the model was fit was assessed. To determine whether the data fit the hypothetical model, values of the Chi-Square Test of Model Fit, with degrees of freedom (df) and *p*-value were checked. These statistics assess the model by comparing the $\chi 2$ value of the model to the $\chi 2$ of the null model to determine the magnitude of discrepancy between the sample and fitted covariance matrices (Charalambous et al., 2016; Kline, 2005). Finally, the minimum and maximum standardized residuals were assessed to determine for presence of outliers. Values outside of the acceptable range of -3.5 and 3.5 suggest outliers that may be influential; thus, were considered when interpreting the output. It is important to note that statistical significance indicates whether the effect is due to chance based on the predetermined significance level and

does not explain the clinical significance (Owen, 2005). After assessing the overall model fit, the path coefficients were interpreted to determine whether there is association between the two variables being tested. The researcher looked at the magnitude of the effect to discuss the overall relevance of the findings. If the effect for each path seen is too small, it may not have practical value to suggest a change in practice.

H_4 was evaluated by conducting the estimated indirect effect of NM competency on ITS (through PES). The causal steps approach by Barron and Kenny (1986) has been the method most widely used for testing intervening variable effects. However, given that causal steps require testing of several hypotheses and that the possibility of decision errors exist with each hypothesis test, a shift toward estimating the two pathways of influence from X to Y, one direct and one indirect, is now recommended (Preacher & Hayes, 2008) (*Figure 4*). Indirect effect was evaluated by calculating the results of $a*b$. Bootstrapping technique, which uses resampling with replacement, was then conducted to test hypotheses. Bootstrapping created new samples of size *n* from the original sample, allowing any case that has been drawn to be included back in the main pool of data to be redrawn. Bootstrapping technique estimates the variance of sampling distributions and creates confidence intervals (CI) for the indirect effect (Taylor, 2018). Randomly selected samples with a specified *n* were drawn from the data to re-estimate the mediation model and calculate $a*b$ within each bootstrap sample. These steps were repeated multiple times to produce a distribution of indirect effects that can then be used to estimate the standard error (SE) for the indirect effect. Coefficients for *a* and *b* pathways were estimated for each resampled data set and the product of the path coefficients were recorded. This process was repeated for a total of 5,000 times as recommended by Hayes (2009). The 5,000 estimates of the indirect effect represented the empirical approximation of the indirect effect in the population

sampled and was used to generate an empirical CI. Values of *a***b* were sorted from smallest to largest to generate a percentile-based bootstrap C. The lower bound of empirical CI is defined as the value of *a***b* in the 5000th (.5 – *empirical CI* /200) ordinal position of the ordered list and the upper bound is the value in the 1 + 5000th (.5 + *empirical CI* /200) ordinal position (Hayes, 2009). The indirect effect is not zero with *empirical CI* if zero is not between the lower and upper bound. In this case, the null hypothesis that the true indirect effect is zero at the 100-empirical CI level of significance can be rejected. SE terms, or the variability in the bootstrapped distribution, for the ITS was measured and assessed to help estimate the paths in the models and to test if *a***b* = 0.

Limitation of the Method

An inherent limitation of cross-sectional studies is the inability to detect changes over time (Polit & Beck, 2012). However, using cross-sectional design will be beneficial because it is cost-effective, more convenient, and knowledge is gained in a shorter period. It is preferred when information is needed to urgently address a phenomenon of concern. Future studies can examine changes in NM competency scores over time using a longitudinal study design to determine effectiveness of different leadership training programs.

As with any secondary analysis of existing data, there are limitations and potential threats to validity. The researcher had no control of how data was collected. The researcher had no knowledge of potential inconsistencies with instructions, environment conditions, and resources. However, NDNQI maintains data quality and accuracy through SC training, technical support, standardized definitions, data collection guidelines, and data entry forms. All NM and RN survey data were self-reported and participant responses may have been influenced by the perceived researcher's expectations and pose threats to construct validity. Potential threats to

external validity and generalizability of results may be plausible because the NDNQI database overrepresents teaching hospitals and hospitals that have achieved or are pursuing the ANCC's Magnet or Pathway to Excellence designations. One would expect these designated hospitals to have greater emphasis on continued professional development, succession planning, and leadership development, leading to higher mean scores for the predictor variable. The NDNQI also contains a greater proportion of hospitals with > 400 beds (Montalvo, 2007), which further limits the generalizability of results to similar size hospitals. Finally, this study included all units that participated. Since different types of units have varying staffing levels, patient acuity, and practice environment structures, unit type was controlled in the study.

Human Subjects

Studies of existing data sets may not meet the definition of *human subjects* research requiring IRB review and may be exempt from the Health and Human Services regulations (Social and Behavioral Sciences Institutional Review Board, n.d.). Whether analysis of secondary data requires IRB review is based on whether the data is identifiable. Data in this research was de-identified and there were no anticipated risks to the participants.

Approval from the Human Subjects Committee, the designated IRB for the University of Kansas Medical Center, for nonhuman subject research was obtained for this SDA. The researcher was also added to the existing IRB application that was submitted by Warshawsky to the University of Kentucky. Following the approval steps, data for the study was requested. All data was transmitted via a secure file to a password protected website and stored in a KUMC School of Nursing secure folder.

CHAPTER 4

RESULTS

This chapter reports the results of statistical analyses used to examine NM competencies, the direct relationship between NM competency and frontline nurses' ITS, and the indirect effect of NM competency on ITS mediated by the nursing practice environment. The chapter begins with an overview of participant characteristics for hospitals, units, NMs, and frontline nurses, after which it provides a descriptive summary of NM competencies. Subsequently, the results of reliability testing of Warshawsky's NM Competency Instrument and path analysis are provided.

The analysis conducted to achieve Aim 2, testing Warshawsky's NM Competency Instrument, used the complete sample obtained from Warshawsky's NM study (N = 594). The original NDNQI dataset with PES-NWI had 964 nursing units. To address Aims 1, 3, and 4, the two datasets, i.e., Warshawsky's NM dataset and the NDNQI dataset, were merged. Observations that did not include both the NM competency and PES-NWI data were deleted, resulting in 837 observations. Subsequently, units that had more than one NM (212 cases) and all the units under NMs that were accountable for more than one unit (268 cases) were deleted, resulting in 357 observations. Given that the NDNQI classifies nursing units according to patient population types and similar patient acuity levels, observations gathered from the units that were very different (perioperative, psychiatric, rehabilitation, mixed beds, ambulatory, and interventional units) were also deleted. The final unit types considered for this study were as follows: (1) adult critical care; (2) adult step down; (3) adult medical and surgical (including adult medical, adult surgical, and adult medical–surgical units); (4) pediatric general; (5) pediatric critical care (including neonatal and pediatric critical care units); (6) obstetrics; and (7)

the emergency department. Consequently, 248 observations remained in the final dataset used for the data analyses of Aims 1, 3, and 4.

The final sample with 248 observations was collected from 43 hospitals in 20 different states. It includes responses from 248 NMs and that of frontline nurses aggregated at the unit level from 248 units.

Sample Characteristics

In the final sample (N = 248), some NMs (maximum of three) did not specify their self-assessed competency for certain competency skills. To elaborate, the following NM competencies had missing data: human resource management skills (n= 3, 1.2% missing data), human resource leadership skills (n = 1, 0.4%), performance improvement skills (n = 1, 0.4%), foundational thinking skills (n = 1, 0.4%), technology skills (n = 1, 0.4%), relationship management and influencing behaviors (n = 2, 0.8%), strategic management skills (n = 1, 0.4%), and clinical practice knowledge (n =1, 0.4%). However, there were no missing data for the mediating and dependent variables. Hair, Black, Babin, and Anderson (2010) suggested that cases with approximately 10% missing data can generally be ignored unless the data are missing in a systematic fashion. Since missing data in this analysis were miniscule, either including or excluding the observations with missing data was not expected to bias the results (Fox-Wasylyshyn & El-Masri, 2005; Rosenthal & Rosnow, 2008). For this study, listwise deletion (deleting observations with missing information the NM skills), was used when the individual and composite NM competency variables were calculated.

Hospital and units. Descriptive statistics for hospital and unit characteristics are listed in *Table 2*. Because each NM worked in a different unit, but several of the NMs worked in the same hospitals, descriptive statistics were calculated for both the unit level and the hospital level.

When displayed this way, each NM represents a single unit, while hospital level data represent the sample of hospitals used as sites during data collection. More than half of the NM participants worked in hospitals with over 300 beds (55%), and majority of hospitals were in metropolitan areas (98%). Furthermore, most of them were from teaching hospitals (82%). Seventy-six percent of the NMs were from hospitals that are ANCC recognized or pursuing one of the organizational recognitions: Magnet-designated (*n* = 125, 50%), Pathway-designated (*n* = 9, 4%), or are on the journey to becoming Magnet designated (*n* = 54, 22%). The most common unit type in which NMs worked was adult medical–surgical (*n* = 100, 40%).

Examination of the hospitals from which NMs were collected revealed that all study data came from NMs within 43 hospitals. Hospital types appeared to be proportionally well-represented by the data at the NM level, as 9.3% of the hospitals sampled from were small, with 53.5% considered medium and 37.2% considered large. This was reasonably aligned with the proportion of NMs from each size of hospital in the dataset. Hospitals that acted as the sampling site were mostly in metropolitan areas (95.3%) with only 4.7% considered micropolitan. The hospitals were largely magnet hospitals (44.2%), and most were teaching hospitals (69.8%).

Table 2
Descriptive Statistics for Hospital and Unit Characteristics (N = 248)

	Unit level (*n* = 248)		Hospital level (*n* = 43)	
Control Variable	Frequency	Percent	Frequency	Percent
Hospital size				
Small (<100)	9	3.6	4	9.3
Medium (100-299)	103	41.5	23	53.5
Large (≥300)	136	54.8	16	37.2
Hospital location				
Metropolitan area	242	97.6	41	95.3
Micropolitan area	6	2.4	2	4.7
ANCC credential status				
Magnet	125	50.4	19	44.2
Magnet on the journey	54	21.8	9	20.9
Non-Magnet	69	27.8	15	34.9
Teaching Status				
Teaching	202	81.5	30	69.8
Non-teaching	46	18.5	13	30.2
Unit type				
Adult CC	34	13.7	-	-
Adult Step Down	33	13.3	-	-
Adult M/S	100	40.3	-	-
Peds Gen	20	8.1	-	-
Peds CC	16	6.5	-	-
OB	22	8.9	-	-
ED	23	9.3	-	-

Note. ANCC credential status = hospital status of designation/credential from the American Nurses Credentialing Center; Pathway = Pathway to Excellence; Adult CC = adult critical care; Adult M/S = adult medical-surgical; Peds Gen = pediatric general; Peds CC = pediatric critical care; OB = obstetrics; ED = emergency department.

Nurse managers. Descriptive statistics for NM characteristics are listed in *Table 3*. The distribution of NM age was approximately symmetric with skewness of 0.423. The mean NM age was 42.83 years (*SD* = 9.27), ranging between 26 to 66 years old. Most NM respondents were female (88%) and White (88%). The mean years of management experience for NMs was

5.47 (*SD* = 6.15). Distribution was slightly skewed to the right (1.913, considered trivial), and the median was 3.0, ranging from less than one to 35 years of experience. A third of the NMs had masters and above in nursing (33%), and the remainder of the sample was prepared at the baccalaureate-degree level (*n*=158, 64%), diploma (*n*=1, 0.4%), or associate (*n*=7, 3%). A third of the NMs did not provide information about certification and about 46% responded that they did not have any leadership certification.

Table 3
Descriptive Statistics for NM Characteristics (N = 248)

	Frequency	Percent
NM highest nursing education		
Diploma, associate, or baccalaureate degrees	166	66.9
Masters or higher degrees	82	33.1
NM leadership-specific certification		
Not certified	114	46.0
Certified	49	19.8
Missing/No response	85	34.3
Race		
Asian/Pacific Islander	4	1.6
African American	9	3.6
Hispanic	6	2.4
White	217	87.5
Other/Mixed	4	1.6
Missing/No response	8	3.2
	Mean	SD
Age	42.83	9.27
Years of experience in management	5.47	6.15

Note. SD = standard deviation.

Frontline nurses. Descriptive statistics for the aggregated unit-level data regarding frontline nurses are listed in *Table 4*. The distribution of unit RN age was approximately symmetric, with skewness of 0.463. The mean unit RN age was 35.67 years (*SD* = 3.92), with

the participants' age ranging between 27 to 51 years. The mean proportion of the unit RNs who were White was 81% (*SD* = 17.54). Moreover, the mean unit proportion of RNs who possessed a baccalaureate degree or higher was approximately 72% (*SD* = 18.00), and the average unit tenure of RNs on their respective units was 5.44 years (*SD* = 2.72).

Table 4
Descriptive Statistics for Unit-level Frontline Nurse Characteristics (N = 248)

Variable	Mean	*SD*
Education (% of RNs with a baccalaureate degree or higher on the unit)	71.68	18.00
Unit tenure years	5.44	2.72
Age	35.67	3.92
Race		
Asian	6.24	8.70
African American	4.61	6.39
Hispanic	3.60	5.71
White	80.96	17.54
Other	4.60	4.75

Note. SD = standard deviation.

Subsequently, descriptive statistics for the perception of practice environment and ITS of frontline nurses are listed in *Table 5*. The average composite score of the PES-NWI was 2.99 (*SD* = 0.22). On an average, about 76.12 % (*SD* = 13.75) of the RNs reported their ITS in their respective units.

Table 5
Descriptive Statistics for PES-NWI Subscales and Intent to Stay (N = 248)

Variable	Mean	*SD*
PES-NWI subscale		
Nurse participation in hospital affairs	2.93	0.24
Nursing foundations for quality of care	3.13	0.19
Nurse manager ability, leadership, and support of nurses	3.11	0.30
Staffing and resource adequacy	2.68	0.38
Collegial nurse-physician relations	3.10	0.24
PES-NWI composite	2.99	0.22
Intent to stay	76.12	13.75

Notes. SD = standard deviation.

Ten essential NM competencies. In this study, ten essential NM competencies were descriptively summarized (Aim 1). To address RQ1, "What are the competency scores self-assessed by NMs?", central tendency (mean) and dispersion (range, standard deviation, skewness, and kurtosis) were reported for the subscales of Warshawsky's NM Competency Instrument. These descriptive statistics have been presented in *Table 6*. Moreover, their human resource management skills (–0.69) and technology skills (–0.56) were moderately skewed. The remainder of the NM competencies were approximately symmetric. The mean composite score of NM competency was 3.39 (SD = 0.71). Relating to its subscales, the NMs reported greatest competence in their diversity management skills (M = 3.80, SD = 0.70), technology skills (M = 3.79, SD = .080), and clinical practice knowledge (M = 3.64, SD = 0.79). Conversely, the NMs reported least competence in their financial management (M = 2.92, SD = 0.99), strategic management (M = 3.13, SD = 0.82), and performance improvement skills (M = 3.27, SD = 0.81).

Table 6
Descriptive Statistics for NM's Self-Assessed Competency (N = 248)

Competency	Mean	*SD*	Skewness	Kurtosis
NM competency subscale				
Financial management	2.92	0.99	-0.20	-0.64
Human resource management skills*	3.59	0.90	-0.69	0.56
Human resource leadership skills †	3.44	0.84	-0.40	-0.22
Performance improvement skills †	3.27	0.81	-0.08	-0.37
Foundational thinking skills ‡	3.39	0.83	-0.24	-0.34
Technology skills†	3.79	0.80	-0.56	0.55
Relationship management and influencing behaviors ‡	3.57	0.85	-0.30	0.04
Diversity management skills	3.80	0.70	-0.46	0.60
Strategic management skills†	3.13	0.82	-0.11	-0.60
Clinical practice knowledge†	3.64	0.79	-0.23	-0.08
Overall (composite mean score of the NM Competency Scale) §	3.39	0.71	-0.32	-0.14

Note. SD = standard deviation. *n=245, † n=247, ‡ n=246, § n= 237

NM competencies by hospital characteristics. In order to address RQ2, "Do NM competencies differ depending on hospital characteristics?", independent samples *t*-tests were conducted to compare different categories of hospital characteristics (i.e., hospital size, teaching status, and location) for each of the competencies. Prior to interpreting the analyses, the assumptions pertaining to normality and homogeneity of variances were examined. The skewness of each dependent variable was within –1.0 to 1.0 (see *Table 6*), indicating that it was within normal limits. Furthermore, Levene's tests were conducted to examine the homogeneity of variances. For hospital size, the foundational thinking and strategic management skills showed that Levene's test was significant at the .05 level. Similarly, for teaching status, the human resource management skills showed that Levene's test was significant at the .05 level. Thus, the "equal variances not assumed" result derived from the SPSS output was interpreted for the *t*-tests.

A series of *t*-tests were conducted to compare the competencies across hospital sizes (see *Appendix D*). To account for the small group size of small hospitals (n = 9), the small- and medium-sized hospital groups were combined, and *t*-tests were performed by comparing this combined group to the large hospital group. None of these *t*-tests were observed to be significant at the Bonferroni-corrected p-value of .001, indicating that there were no differences in the NM competencies between small/medium and large hospitals.

A series of *t*-tests were conducted to compare the competencies across hospital locations and teaching status (see *Appendices E and F*). These *t*-test findings were not significant at the Bonferroni-corrected *p*-value of .001, indicating that there were no differences in the competencies between teaching and non-teaching hospitals as well. To account for the small group size of NMs from hospitals in non-metropolitan areas (n = 6), non-parametric Mann-Whitney U tests were conducted. None of the non-parametric tests were significant, demonstrating that no differences in NM competencies existed between metropolitan and non-metropolitan hospitals.

NM competencies by unit characteristics. In order to address RQ3, "Do NM competencies differ depending on unit characteristics?", one-way ANOVAs were conducted to compare the competencies across unit types (see *Appendix G*). The skewness ratio of each dependent variable was within –1.0 and 1.0 (see *Table 5*), indicating that skewness was within normal distribution limits. Moreover, Levene's tests were performed to examine the homogeneity of variances, none of which were significant at the .05 level, indicating that the assumptions for ANOVA were met. These findings were not significant at the Bonferroni-corrected *p*-value of .001, indicating that no differences existed regarding the competencies across unit types.

NM competencies by NM characteristics. In order to address RQ4, "Do NM competencies differ depending on NM characteristics?", *t*-tests were conducted to compare the competencies across NM education levels (see *Table 7*). The assumptions for these *t*-tests were met since the competencies were normally distributed (see *Table 6*). However, the Levene's tests were not significant at the .05 level, indicating equal variances. According to the said *t*-tests, the overall competency and the competencies concerning financial management, human resource leadership, foundational thinking, and strategic management skills were significantly different when considering NM education.

To be specific, the overall competency was significantly different by NM education, $t(235) = -3.38$, $p < .001$. This shows that NMs with masters or higher degrees ($M = 3.61$, $SD = 0.69$) had significantly higher overall competency than those with lower level degrees ($M = 3.29$, $SD = 0.70$). Moreover, the financial management competency was significantly different, $t(246) = -3.73$, $p < .001$. NMs with masters or higher degrees ($M = 3.24$, $SD = 0.94$) had significantly higher competency in financial management than those with lower educational degrees ($M = 2.76$, $SD = 0.98$). Further, the human resource leadership skills were significantly different, i.e., $t(245) = -3.96$, $p < .001$. NMs with masters or higher degrees ($M = 3.73$, $SD = 0.79$) had significantly higher competency in human resource leadership skills compared to the participants with lower level degrees ($M = 3.29$, $SD = 0.83$). The foundational thinking skills were significantly different as well, $t(244) = -3.45$, $p = .001$. NMs with masters or higher degrees ($M = 3.64$, $SD = 0.83$) had significantly higher competency in foundational thinking skills than those with lower level degrees ($M = 3.26$, $SD = 0.81$). Lastly, their strategic management skills were also significantly different, $t(245) = -4.06$, $p < .001$. NMs with masters or higher degrees ($M =$

3.43, *SD* = 0.75) possessed significantly higher competency in terms of these skills in comparison to those with lower level degrees (*M* = 2.99, *SD* = 0.82).

Table 7
Differences in Mean NM Competencies by NM Education (N = 248)

Competency	Mean (*SD*) Below Masters (n= 166)	Mean (*SD*) Masters or Above (n= 82)	*t* statistic	*p* value
Financial management	2.76 (0.98)	3.24 (0.94)	-3.73	< .001
Human resource management skills*	3.47 (0.92)	3.82 (0.79)	-2.93	.004
Human resource leadership skills †	3.29 (0.83)	3.73 (0.79)	-3.96	< .001
Performance improvement skills †	3.17 (0.80)	3.49 (0.80)	-2.97	.003
Foundational thinking skills ‡	3.26 (0.81)	3.64 (0.83)	-3.45	.001
Technology skills†	3.76 (0.83)	3.85 (0.74)	-0.83	.408
Relationship management and influencing behaviors ‡	3.49 (0.84)	3.72 (0.85)	-2.00	.047
Diversity management skills	3.79 (0.72)	3.84 (0.67)	-0.53	.597
Strategic management skills†	2.99 (0.82)	3.43 (0.75)	-4.06	< .001
Clinical practice knowledge†	3.57 (0.80)	3.78 (0.76)	-1.98	.049
Total§	3.29 (0.70)	3.61 (0.69)	-3.38	.001

Notes. SD = standard deviation. *n=245, † n=247, ‡ n=246, § n= 237

A series of *t*-tests were conducted to compare the competencies across NM certifications (see *Table 8*). Sample noted in the table reflects NMs with missing certification data. The following NM competencies were significantly different by NM certification: overall competency, financial management, human resource management skills, performance improvement skills, and foundational thinking skills. First, the results for composite competency were significant, $t(150) = –3.40$, $p = .001$. NMs with a certification (*M* = 3.75, *SD* = 0.74) possessed significantly higher overall competency than those without one (*M* = 3.34, *SD* = 0.65). Second, the results for financial management were also significant, $t(161) = –4.08$, $p < .001$. NMs with a certification (*M* = 3.51, *SD* = 0.88) had significantly higher competency in this regard than those without a certification (*M* = 2.86, *SD* = 0.95). Third, the results for human resource management skills were significant, $t(158) = –3.25$, $p = .001$. NMs with a certification

(M = 4.01, SD = 0.83) demonstrated significantly higher competency in these skills than the participants without a certification (M = 3.53, SD = 0.86). Fourth, the performance improvement skills were also significantly different, $t(160) = -3.95$, $p < .001$, indicating that participants with a certification (M = 3.71, SD = 0.85) had significantly higher competency in the said skills than those without a certification (M = 3.18, SD = 0.74). Fifth, the foundational thinking skills were significantly different as well, $t(159) = -3.67$, $p < .001$. It was noted that NMs with a certification (M = 3.81, SD = 0.89) showed significantly higher competency in this regard than those without a certification (M = 3.31, SD = 0.74). Lastly, the strategic management skills were observed to be significantly different, $t(160) = -4.08$, $p < .001$. NMs with a certification (M = 3.58, SD = 0.83) demonstrated significantly higher competency in these skills than the participants without a certification (M = 3.03, SD = 0.77).

Table 8
Differences in Mean NM Competencies by NM Certification (n = 163)

Competency	Mean (*SD*) Not Certified (n= 114)	Mean (*SD*) Certified (n= 49)	*t* statistic	*p* value
Financial management (n = 163)	2.86 (0.95)	3.51 (0.88)	-4.08	< .001
Human resource management skills (n = 160)	3.53 (0.86)	4.01 (0.83)	-3.25	.001
Human resource leadership skills (n = 162)	3.38 (0.82)	3.83 (0.86)	-3.16	.002
Performance improvement skills (n = 162)	3.18 (0.74)	3.71 (0.85)	-3.95	< .001
Foundational thinking skills (n = 161)	3.31 (0.74)	3.81 (0.89)	-3.67	< .001
Technology skills (n = 162)	3.80 (0.76)	3.76 (0.88)	0.30	.762
Relationship management and influencing behaviors (n = 162)	3.51 (0.76)	3.91 (0.87)	-2.93	.004
Diversity management skills (n = 162)	3.80 (0.63)	3.95 (0.72)	-1.37	.173
Strategic management skills (n = 162)	3.03 (0.77)	3.58 (0.83)	-4.08	< .001
Clinical practice knowledge (n = 162)	3.68 (0.77)	3.73 (0.81)	-0.40	.691
Composite (n = 152)	3.34 (0.65)	3.75 (0.74)	-3.39	.001

Note. SD = standard deviation. The reduced sample size (n = 163) was due to missing data in the NM certification variable

Psychometric Properties of the NM Competency Instrument

Aim 2 of this study was to evaluate the psychometric properties of Warshawsky's NM Competency Instrument. With the NM dataset comprising 594 observations, confirmatory factor analysis (CFA) and Cronbach's alpha were performed to test the psychometric properties of the Warshawsky's NM Competency Instrument. The CFA model included the following latent factors: financial management (two items), human resource management skills (two items), human resource leadership skills (four items), performance improvement skills (four items),

foundational thinking skills (three items), relationship management and influencing behaviors (two items), diversity management skills (three items), and strategic management skills (five items). Moreover, two factors (technology skills and clinical practice knowledge) were included in the model as observed variables because only one item from the instrument was associated with each of these factors.

Dimensionality. The chi-square statistic of the model fit was significant, $\chi^2(281, N = 593) = 1038.33$, $p < .001$, which indicates an imperfect fit. Given that chi-square is sensitive to sample size, other analyses were considered to evaluate model fit. CFI, the discrepancy between the data and the hypothesized model while adjusting for the issues of sample size, was .94. CFI value of greater than 0.9 is indicative of a well-fitting model. The SRMR, i.e. the standardized difference between the observed correlation and the predicted one, was .04 (less than 0.08), also indicating a good fit. The RMSEA, which represents the differences between the observed and model-implied covariances, was .07 (90% CI = [.06, .07]), slightly higher than .06; RMSEA value less than .06 in the lower bound of the 90% confidence interval (CI) indicates a good fit.

Reliability. Standardized item loadings of the latent factors have been presented in *Table 9*. All 26 items significantly loaded onto their eight respective factors, based on the NM Learning Domain Framework (all *p*-values < .001), with standardized item loadings ranging from 0.68 to 0.91. Furthermore, all these items correlated well with the average, with item-total correlations ranging from 0.63 to 0.84, which indicated good reliability of measure (Field, 2005). The standardized estimates of covariance between the factors are presented in *Table 10*. The results demonstrate that all possible bivariate relationships between the competencies were significantly correlated at $p < .001$. No modifications were made to the factor structure of the instrument based on the model fit, item loadings, and covariances.

Table 9
Standardized Items Loadings and Item Total Correlations for Latent Factors (N = 594)

Item	Standardized Item Loading	S.E.	*p*	Item Total Correlation
Financial management (FM; n = 591)				
FM1	0.83	0.02	< .001	.72
FM2	0.87	0.02	< .001	.72
Human resource management skills (HRMS; n = 588)				
HRM1	0.89	0.01	< .001	.82
HRM2	0.91	0.01	< .001	.82
Human resource leadership skills (HRLS; n = 591)				
HRLS1	0.86	0.01	< .001	.80
HRLS2	0.90	0.01	< .001	.84
HRLS3	0.88	0.01	< .001	.84
HRLS4	0.80	0.02	< .001	.76
Performance improvement skills (PIS; n = 589)				
PIS1	0.78	0.02	< .001	.71
PIS2	0.74	0.03	< .001	.70
PIS3	0.73	0.03	< .001	.63
PIS4	0.79	0.02	< .001	.69
Foundational thinking skills (FTS; n = 589)				
FTS1	0.82	0.02	< .001	.75
FTS2	0.87	0.02	< .001	.81
FTS3	0.86	0.01	< .001	.76
Relationship management and influencing behaviors (RMIB; n = 590)				
RMIB1	0.87	0.02	< .001	.76
RMIB2	0.87	0.01	< .001	.76
Diversity management skills (DMS; n = 589)				
DMS1	0.87	0.02	< .001	.79
DMS2	0.87	0.02	< .001	.81
DMS3	0.84	0.02	< .001	.77

Strategic management skills (SMS; n = 586)				
SMS1	0.87	0.01	< .001	.80
SMS2	0.84	0.02	< .001	.79
SMS3	0.68	0.03	< .001	.64
SMS4	0.85	0.01	< .001	.81
SMS5	0.72	0.02	< .001	.66

Note. S.E. = standard error.

Table 10

Correlations Between Factors (n = 594)

Factor	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Financial management (n = 591)	-									
2. Human resource management skills (n = 588)	.84	-								
3. Human resource leadership skills (n = 591)	.84	.92	-							
4. Performance improvement skills (n = 589)	.81	.81	.90	-						
5. Foundational thinking skills (n = 589)	.78	.80	.89	.93	-					
6.Technology skills (n = 591)	.35	.42	.45	.53	.51	-				
7. Relationship management and influencing behaviors (n = 590)	.67	.73	.84	.80	.86	.47	-			
8. Diversity management skills (n = 589)	.58	.70	.76	.78	.78	.55	.88	-		
9. Strategic management skills (n = 586)	.85	.80	.86	.89	.88	.51	.80	.72	-	
10. Clinical practice knowledge (n = 591)	.55	.53	.61	.68	.67	.45	.64	.72	.66	-

Notes. All correlations significant at $p < .001$.

Cronbach's alpha coefficients were computed for each of the subscales derived from the factor analysis to determine internal consistency. The results of the internal consistency analysis appear in *Table 11*. Cronbach's alphas, the proportion of true variability to the total observed variability, ranged from .84 to .91, indicating high correlations with the items in each subscale and affirming that these items measured the same construct. Cronbach's α greater than 0.7 is considered to be acceptable, while greater than 0.9 is deemed as excellent (Kline, 2000). As all the factors showed high internal consistency, no items were considered for removal.

Table 10
Cronbach's Alpha Coefficients for the Subscales (n = 594)

Factor	Number of Items	Cronbach's Alpha
Financial management (n = 591)	2	.84
Human resource management skills (n = 588)	2	.90
Human resource leadership skills (n = 591)	4	.91
Performance improvement skills (n = 589)	4	.84
Foundational thinking skills (n = 589)	3	.88
Relationship management and influencing behaviors (n = 590)	2	.86
Diversity management skills (n = 589)	2	.89
Strategic management skills (n = 586)	5	.89

Validity. Although the AONE has conducted periodic job analyses and role delineation studies to support the AONE's NM Competency tool's content validity, in addition to the fact that expert nurse leaders also reviewed Warshawsky's NM Competency instrument, CFA was conducted for further validity testing. CFA demonstrated item-total correlations among the ten competencies to be greater than 0.3 (see *Table 9*), which indicate that the corresponding items correlate well with the scale overall (Field, 2005). Furthermore, the item-total correlations indicate that the tool measured the NM competencies that it intends to measure (construct validity). As shown in *Table 10*, correlations between factors, especially between human resource leadership skills and human resource management skills (r = 0.92), performance improvement skills and human resource leadership skills (r = 0.90), foundational thinking skills and performance improvement skills (r = 0.93), were high, which may indicate poor discriminant validity or the inability of the items to distinguish among those factors.

Subsequently, a second-order CFA was conducted to distinguish between the domains of science and art. The second-order science domain included financial management, human resource management skills, performance improvement skills, foundational thinking skills, technology skills, strategic management skills, and clinical practice knowledge. The second-order art domain included human resource leadership skills, relationship management and

influencing behaviors, and diversity management skills. This model demonstrated worse fit than the previous one that did not contain second-order factors, $\chi^2(316, N = 593) = 1479.47$, $p < .001$, CFI = .90, SRMR = .07, RMSEA = .08 (90% CI = [.075, .083]).

To understand whether the models were statistically different, the chi square fit statistics were compared by chi square difference test. This comparison is accomplished by subtracting the more complex model's chi square degrees of freedom from the chi square degrees of freedom for the less complex model to determine a difference (Kline, 2005; Schermelleh-Engel, Moosbrugger, & Müller, 2003). This difference in degrees of freedom is used to calculate a critical chi square value, which is compared to the difference in chi square values between both models. If the difference in chi square values surpasses the critical chi square value for the difference in degrees of freedom, the models have a significantly different fit (Kline, 2005; Schermelleh-Engel et al., 2003). The difference in degrees of freedom was 35, and the difference in chi square fit statistics was 441.14. The critical chi square value for an alpha of .05 and 35 degrees of freedom is 49.80; because the difference surpassed this value, the second-order model was considered to have a significantly different fit from the first-order model. Compared to the fit statistics from the first model, this second-order model had a significantly poorer fit.

The standardized loadings of the competencies on the science domain ranged from .64 to .96 (all *p*-values < .001), while those for the art domain ranged from .84 to .95 (all *p*-values < .001), indicating that each competency was strongly associated with its respective domain. Moreover, the correlation between both domains was .98 ($p < .001$), demonstrating poor discrimination between the two. Finally, a third CFA was conducted with all the competencies as indicators of one overall second-order factor. This model demonstrated nearly identical fit to the previous second-order model, $\chi^2(317, N = 593) = 1485.48$, $p < .001$, CFI = .90, SRMR = .07,

RMSEA = .08 (90% CI = [.075, .083]). Based on the chi square difference test, this model also exhibited significantly poorer fit than the original first-order model, $\chi^2_{diff}(36) = 447.15$ as compared to a critical chi square of 49.80 for 36 degrees of freedom. Additionally, the standardized loadings of the competencies on one overall factor ranged from .64 to .96 (all *p*-values < .001), indicating that the competencies were strongly associated with one overall factor.

Correlation between NM Competencies, Frontline Nurse Practice Environment, and Frontline Nurses' ITS.

Aim 3 was to examine the correlation between NM competencies, nurses' practice environment, and frontline nurses' ITS.

NM competencies and frontline nurses' practice environments. Pearson correlations were performed to answer RQ5, "Are the 10 NM competencies correlated with practice environment subscales?". *Table 12* presents the correlation coefficients between NM competencies and frontline nurses' PES-NWI. *Appendix H* presents a complete table of correlations including *p* values. Human resource leadership skills were significantly and positively correlated with frontline nurse participation in hospital affairs ($r = .23$, $p < .001$), nursing foundations for the quality of care ($r = .21$, $p = .001$), staffing and resource adequacy ($r = .21$, $p = .001$), and the overall PES-NWI ($r = .20$, $p = .001$). Relationship management and influencing behaviors was significantly and positively correlated with nurse participation in hospital affairs ($r = .23$, $p < .001$), nursing foundations for quality of care ($r = .24$, $p < .001$), and the overall PES-NWI ($r = .22$, $p = .001$). Diversity management skills was significantly positively correlated with staffing and resource adequacy ($r = .21$, $p = .001$). The overall competency was significantly positively correlated with nursing foundations for quality of care ($r = .21$, $p = .001$). Although there were significant positive correlations between NM

competencies and frontline nurses' practice environments, the correlations were less than 0.3, which indicated weak correlations (Cohen, 1998).

Table 11
Correlations Between NM Competencies and Frontline Nurses' Practice Environments (N = 248)

Competency	PES-NWI Subscale					
	HA	QC	NM	SR	NP	Overall PES-NWI
Financial management	.12	.14	.03	.13	–.03	.10
Human resource management skills*	.15	.15	.12	.17	–.01	.15
Human resource leadership skills †	.23**	.21**	.17	.20**	–.02	.20**
Performance improvement skills †	.18	.20	.12	.18	.00	.17
Foundational thinking skills ‡	.14	.14	.07	.12	.04	.13
Technology skills†	.15	.17	.16	.14	–.06	.14
Relationship management and influencing behaviors ‡	.23**	.24**	.19	.18	.02	.22**
Diversity management skills	.18	.16	.14	.21**	.01	.18
Strategic management skills†	.18	.19	.10	.20	–.03	.17
Clinical practice knowledge†	.14	.16	.07	.17	.01	.14
Total§	.20	.21**	.14	.19	–.00	.19

Notes. HA = Nurse Participation in Hospital Affairs. QC = Nursing Foundations for Quality of Care. NM = Nurse Manager Ability, Leadership, and Support of Nurses. SR = Staffing and Resource Adequacy. NP = Collegial Nurse-Physician Relations. *n=245, † n=247, ‡ n=246, § n= 237 **$p \leq .001$.

NM competencies and frontline nurses' ITS. Pearson correlations were conducted to determine if NM competencies were correlated with frontline nurses' ITS (RQ6). *Table* 13 presents the correlation coefficients. No correlations were significant at the .001, indicating that the NM competencies were not significantly correlated with frontline nurses' ITS.

Table 12
Correlations Between NM Competencies and Frontline Nurses' Intent to Stay (N = 248)

NM Competency	*r*	*p-value*
Financial management	.00	.968
Human resource management skills*	.06	.368
Human resource leadership skills †	.04	.568
Performance improvement skills †	.01	.827
Foundational thinking skills ‡	–.07	.293
Technology skills†	.04	.509
Relationship management and influencing behaviors ‡	.06	.357

Diversity management skills	.09	.145
Strategic management skills†	.04	.571
Clinical practice knowledge†	.06	.377
Total§	.02	.755

Notes. *n=245, † n=247, ‡ n=246, § n= 237

Path Analysis Results

Aim 4 was to examine the direct effect of NM competency on frontline nurses' ITS and to examine the indirect effect of NM competency on frontline nurses' ITS, mediated by the nurse practice environment. To test the hypotheses in Aim 4, a path model was constructed using Mplus. In this model, a path was drawn from the composite NM competency score to the frontline nurses' ITS (direct effect). Paths were also drawn from the composite NM competency to the frontline nurses' ITS through the composite PES-NWI score (indirect effect). NM education was entered as a control for the composite NM competency score. NM certification was not included as a control variable because of a high percentage of missing responses. Hospital characteristics (location, size, and teaching status), unit characteristics (unit type), and frontline nurse characteristics (tenure and education) were also entered as control variables. The estimates and confidence intervals of the model effects in Mplus were estimated using 1,000 bootstrapped samples. According to this path model, the chi-square test of model fit was significant, $\chi^2(13, N = 248) = 8.76$, $p = .791$, indicating a good model fit. Also, there was no significant difference between the observed data and the fitted model.

Assumptions and outliers were examined prior to conducting a path analysis. Normal probability plots and histograms of residuals revealed that the residuals were normally distributed. Partial scatterplots did not reveal any nonlinear trends in the data. The scatterplots of residuals, in relation to the predicted values, showed that the data appeared to be randomly distributed, meeting the assumption of homoscedasticity. Durbin-Watson statistics showed that

the data were independent (all Durbin-Watson values < 2.00; values ranging from 1.63 to 1.90). VIF values showed that there was no multicollinearity in the regressions (all VIF values < 10; range of values from1.02 to 1.54). Standardized residuals showed that there were no outliers in the data (all standardized residuals < 3.5 in absolute value; values ranging from –3.28 to 3.04). Intra-class correlations (ICCs) were calculated to determine the hierarchical effect of hospital membership on competency, practice environment, and ITS. The ICCs were < .01, .04, and .01, for competency, practice environment, and ITS respectively, indicating that the relationships between observations with regard to hospital membership would not significantly affect the model.

The following first hypothesis was tested:

H_1: *Higher NM competency scores will be associated with better practice environments (path a), controlling for hospital location, size, teaching status, unit type, NM education and certification, and frontline nurse unit tenure and education.*

Standardized path coefficients for the model are displayed in *Table 14*. The path for composite NM competency score to composite PES-NWI score showed weak but significant relationship (β = 0.20, p = .001), indicating that a higher NM competency score is associated with a higher composite PES-NWI score.

Table 13

Direct Effect of NM Competency on Frontline Nurses' Practice Environments and Intent to Stay

	Standardized Coefficient	S.E.	*p*	95% CI Lower	95% CI Upper
NM Competency on					
NM Education	0.22	0.06	< .001	0.11	0.32
PES-NWI on					
NM competency	0.20	0.06	.001	0.10	0.30
Hospital location	–0.07	0.06	.245	–0.18	0.03

Hospital size	0.02	0.08	.850	–0.13	0.15
Teaching status	0.15	0.08	.067	0.00	0.28
Unit type (ref: Adult M/S)					
Adult CC	–0.01	0.07	.848	–0.13	0.11
Adult Step Down	–0.12	0.06	.044	–0.22	–0.02
Peds Gen	0.11	0.07	.078	0.00	0.21
Peds CC	–0.03	0.07	.704	–0.13	0.09
OB	0.07	0.06	.236	–0.02	0.16
ED	–0.07	0.08	.374	–0.19	0.06
Frontline nurse tenure	–0.09	0.07	.215	–0.22	0.02
Frontline nurse education	0.11	0.07	.103	0.00	0.22
Intent to Stay on					
NM Competency	–0.08	0.05	.128	–0.16	0.01
PES–NWI	0.55	0.06	< .001	0.45	0.64
Hospital location	–0.09	0.05	.079	–0.17	0.00
Hospital size	–0.09	0.05	.106	–0.18	–0.01
Teaching status	–0.05	0.05	.346	–0.13	0.03
Unit type (ref: Adult M/S)					
Adult CC	0.18	0.05	.001	0.10	0.27
Adult Step Down	0.00	0.04	.972	–0.07	0.08
Peds Gen	0.10	0.05	.043	0.02	0.18
Peds CC	0.22	0.05	< .001	0.13	0.30
OB	0.26	0.05	< .001	0.18	0.34
ED	0.18	0.04	< .001	0.12	0.25
Frontline nurse tenure	0.22	0.05	< .001	0.13	0.31
Frontline nurse education	–0.14	0.07	.031	–0.25	–0.03

Notes. S.E. = standard error. CI = confidence interval.

H_2: *Better practice environments will be associated with higher rates of frontline nurses' ITS (path b), controlling for hospital location, size, teaching status, unit type, NM education and certification, and frontline nurse unit tenure and education.*

Standardized path coefficients for the model are displayed in *Table 14*. The standardized path coefficient from composite PES-NWI score to ITS was significant ($\beta = 0.55$, $p < .001$), indicating that a higher composite PES score is associated with higher ITS.

***H₃**: Higher NM competency scores will be associated with higher rates of frontline nurses' ITS (path c, direct effect), controlling for hospital location, size, teaching status, unit type, NM education and certification, and frontline nurse unit tenure and education.*

The path for composite NM competency score to ITS was not significant (β = –0.08, p = .128, 95% CI [-0.16, 0.01]), indicating that there was no direct association between composite NM competency score and ITS.

***H₄:** Higher NM competency scores will indirectly affect higher ITS through nurses' perception of their practice environment (path a*b, indirect effect), controlling for hospital location, size, teaching status, unit type, NM education and certification; and frontline nurse unit tenure and education.*

Standardized indirect effect of NM competency score on frontline nurses' ITS through composite PES score is displayed in *Table 15*. A significant mediation relationship was found. The indirect effect was significant (β = 0.11, p = .002, 95% CI [0.05, 0.17]), indicating that the effect of composite NM competency score on ITS is mediated by composite PES score. Higher NM competency was associated with better perception of the practice environment and in turn, frontline nurses intending to stay in their current job. A model diagram is presented in *Figure 5*.

Table 14
Indirect Effects of NM Competency on Intent to Stay (N = 248)

	Standardized Estimate	S.E.	*p*	95% CI Lower	95% CI Upper
Effect from NM competency to intent to stay					
Total effect					
Total indirect effect (through PES-NWI)	0.11	0.04	.002	0.05	0.17

Notes. S.E. = standard error. CI = confidence interval.

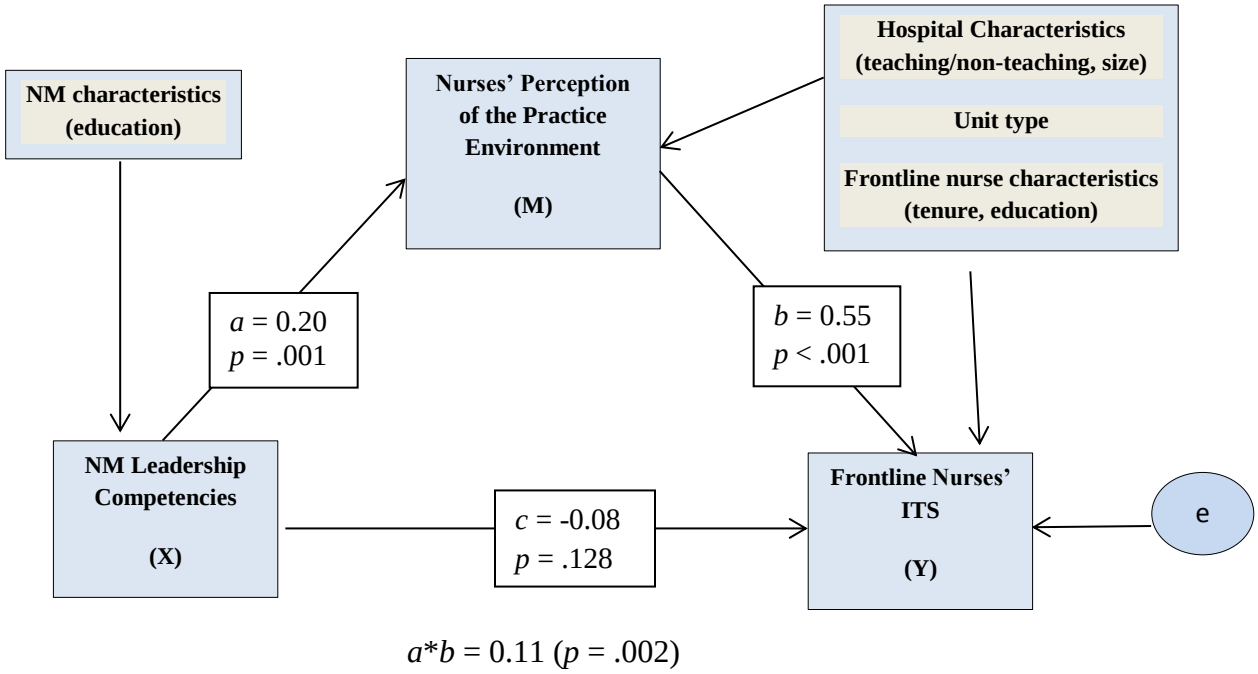


Figure 5 Path Analysis Diagram: Nurse Manager Competencies, Nursing Practice Environment, and Frontline Nurses ITS

Summary of Findings

The credibility of the data analysis relies on the reliability and validity of the instrument being used. The reliability of Warshawsky's instrument was supported by the results of CFA and Cronbach's alpha test. The results demonstrated that all indicators were significantly loaded onto their respective factors. All possible bivariate relationships between the competencies were significantly and strongly correlated. Results of the CFA further established the construct validity of this tool.

NMs reported about being the most competent in diversity management skills, technology skills, and clinical practice knowledge. Conversely, they also reported being least competent in financial management, strategic management skills, and performance improvement skills. NM education and certification impacted certain NM competencies. NMs with master's

or higher degrees had significantly higher competency in financial management, human resource leadership skills, foundational thinking skills, and strategic management skills than NMs with lower-level degrees. The composite competency of NMs with master's or higher degrees were also higher. The overall competency, financial management, human resource management skills, performance improvement skills, and foundational thinking skills were significantly higher in NMs who had a leadership certification.

Pearson correlations demonstrated weak but significant positive associations between NM competencies and frontline nurses' practice environments. Human resource leadership skills were positively correlated with frontline nurses' participation in hospital affairs, nursing foundations for quality of care staffing and resource adequacy, and the overall PES-NWI. Both relationship management and influencing behaviors were positively correlated with nurses' participation in hospital affairs, nursing foundations for quality of care, and the overall PES-NWI. Diversity management skills was positively correlated with staffing and resource adequacy. Finally, overall competency was positively correlated with frontline nurse nursing foundations for quality of care.

The path analysis showed that the composite NM competency score was significantly correlated with the composite PES-NWI score. As NM competency increased, the overall PES-NWI score increased. In turn, the PES-NWI score was also significantly positively correlated with frontline nurses' ITS. As nurses' perception of their practice environment increased, so did their ITS. Path model coefficients did not show a significant direct association between the overall NM competency score and ITS. However, the indirect effect of NM competency score on ITS through composite PES score was significant, thereby supporting mediation.

CHAPTER 5

DISCUSSION

This chapter provides a summary of the research findings and how the results provide a better understanding of the relationship between NM competencies, frontline nurses' practice environment, and frontline nurses' ITS. The implications of study results are presented. The chapter concludes with the strengths, limitations, and recommendations for future research.

Summary of Findings

The purpose of this study was to assess the essential NM competencies of the current NMs and examine the relationship among NM competencies, frontline nurses' perception of practice environments, and frontline nurses' intent to stay (ITS). The four specific aims were as follows: (1) to describe the 10 essential competencies as self-assessed by NMs; (2) to evaluate the psychometric properties of Warshawsky's NM Competency Instrument; (3) to examine the correlation between NM competencies, nurse practice environment, and frontline nurses' ITS; and (4) to examine the direct effect of NM competency on frontline nurses' ITS and evaluate the indirect effect of NM competency on frontline nurses' ITS, mediated by the nurse practice environment.

Ten NM competencies. In this study, the means for ten essential NM competencies ranged from 2.92 to 3.81. Given that the tool had a 5-point Likert-type scale (from novice to expert), on average, most NMs assessed their knowledge and skills at a beginner and competent level. A few NMs assessed themselves as being proficient or having expertise on any of the leadership skills, which supports previous accounts regarding most NMs lacking confidence and leadership competence (Pihlainen, Kivinen, & Lammintakanen, 2016). The findings of this

study support the need to prepare and educate NMs so that they can develop the essential leadership competencies to become effective in their roles.

The NMs in this study perceived themselves as having higher competency in terms of clinical practice knowledge. This finding might reflect the current circumstances under which most NMs are promoted based on their expert clinical skills (Schuettner, Van Sell, & Sheriff, 2015; Sherman & Pross, 2010). NM's support also plays a critical role in the successful adoption and use of current and new technology on their units (Strudwick, Booth, Bjarnadottir, Collins, & Srivastava, 2017; Whittaker, Aufdenkamp, & Tinley, 2009; Yang, Cui, Zhu, Zhao, Xiao, & Shen, 2014). In order to provide support, NMs must be knowledgeable of the new technology themselves which may explain why NMs perceived their technology skills to be higher than other competencies (Mean = 3.79). Finally, the NMs' diversity management skills were assessed to be higher. As both patient population and the nursing workforce become more diverse, there is an increased expectation for NMs to be more aware of cultural and generational differences (Roberts, Moussa, & Sherrod, 2011). In addition, as resource nurses on the unit, NMs often must identify the individual strengths of their team members and be open to diversity of thoughts. For all these reasons, the NMs may have assessed themselves to be more skilled in terms of diversity management.

In contrast, NMs reported being least competent in financial management, strategic management skills, and performance improvement skills. The lack of these skills is a concern, especially since financial and strategic management competencies could impact the NMs' ability to effectively advocate for the resources needed to successfully operate their units (Sherman & Pross, 2010). Not having adequate resources can negatively impact nurse satisfaction and patient safety (AACN, 2005; Van Bogaert et al., 2009). NMs' lack of business acumen and

understanding of new reimbursement models can also hinder their success in a pay-for-performance environment (Scoble & Russell, 2003). The Centers for Medicare and Medicaid Services' Premier Hospital Quality Incentive Demonstration program awards bonus payments to hospitals for providing high-quality care with the aim of improving the quality of inpatient care (Zhao et al., 2015). NMs' understanding of the financial impact of poor care on their respective units is essential. In addition, their lack of understanding can also impact what they communicate to nurses on their units. Frontline nurses must also recognize the important part they play in improving patient care and impacting the financial incentives and penalties their organization receive. Similarly, not being proficient in performance improvement skills requires attention. NMs play a critical role in ensuring provision of safe and high quality of care for patients on their units; thus, should be knowledgeable about continuous quality improvement (Ryan et al., 2015). Lack of performance improvement skill may hinder NMs' ability to identify and successfully remove obstacles or issues that lead to unsafe patient care and frontline nurses' frustration (Magsamen-Conrad, & Checton, 2014).

Findings show that competency skills for NMs should be improved up to the level of proficient or expert. It supports previous studies reporting that NMs are often promoted because of their clinical skills, not because of proven experience in managing teams (Schuettner, Van Sell, & Sheriff, 2015; Sherman & Pross, 2010. Whether NMs are moving into a different setting or staying on the same unit when promoted, transitioning from a clinician into a leadership role requires a different set of competencies. New knowledge about NMs' perception of their competencies will be helpful to hospital administrators in developing onboarding and ongoing development of their NMs' knowledge, skills, and abilities.

Leadership programs such as AONE's *Emerging Nurse Leader Institute* and *NM Fellowship*, and the American Nurses Association (ANA) Leadership Institute's *Nurse Leadership Bundle* are available in the U.S. to prepare NMs for their role (ANA, n.d.; AONE, n.d.). AONE's *Emerging Nurse Leader Institute* combines lecture, discussion, experiential learning, and self-assessment that is designed to prepare aspiring NMs. ANA's *Nurse Leadership Bundle* offers information on evidence-based practices and multidisciplinary approaches to build, develop, enhance, and grow NMs' leadership impact (ANA, n.d.). Several health systems and hospitals have also developed NM programs which are tailored to their own needs (Enterkin, 2013; Herrin & Spears, 2007; West, Smithgall, Rosler, & Winn, 2016; Williams et al., 2009). NMs, regardless of which program they might have attended, shared that training gave them more confidence and made them more effective leaders (Enterkin, 2013; Terzioglu, 2006; West, Smithgall, Rosler, & Winn, 2016). Training programs that include both skills training and theory classes were considered by NMs to be most helpful (Rani, Brennan, & Timmons, 2010). It is important to note that NMs also recognized the training as indicative of the organization's investment in their development as leaders, which made them feel valued. There is ample evidence demonstrating the benefits of structured education and preparation for NMs (Enterkin, 2013; Kelly et al., 2014; Kleinpell, 2009; Terzioglu, 2006; West, Smithgall, Rosler, & Winn, 2016). The findings regarding the NMs' perception of their competencies will be helpful to hospital administrators in enhancing the onboarding and ongoing development of their NMs' knowledge, skills, and abilities.

According to bivariate analyses, there were no differences between the size or location of hospitals and the NM competencies. No significant difference was found in the NMs' competency if they worked in small/medium or large hospitals and if they worked in a non-

metropolitan or metropolitan area. However, this study found significant positive associations between leadership certification and NM competency skills. The findings are consistent with existing evidence that certified nurses perceive themselves to have higher accountability, competence, and confidence resulting from their skills (Straka et al., 2014). Although previous studies about specialty certification have been focused on clinical nurses (Kendall-Gallagher, Aiken, Sloane, & Cimiotti, 2011; Straka et al., 2014), the results of this study show that the same benefits of certification apply to nurse leaders as well. This study also found similar positive associations between the level of formal education and NM competency. Findings support previous studies that report nurse leader's level of formal education having significant effects in improving their overall leadership practices and behaviors (Kelly et al., 2014; Straka et al., 2014). Although the benefits of higher education of NMs is well-documented, only a third of NMs from this sample have graduate or above education. Research findings can support the development of a recommendation to require graduate education for NMs, similar to current recommendations of BSN being required for direct care nurses.

Most importantly, identifying which specific competencies (overall, financial management, human resource leadership, foundational thinking, and strategic management skills) were higher for NMs with masters or higher degrees is extremely valuable. Identifying the specific competencies (overall, financial management, human resource management, human resource leadership, performance improvement, and foundational thinking skills) that were higher in NMs with leadership certification is equally important. Results of this study support the value proposition for encouraging nurses to pursue higher education and certification. Providing ongoing developmental opportunities for nurses to develop their leadership competencies is a worthwhile investment for hospital administrators.

Psychometric properties of the NM Competency tool. This study examined the internal consistency reliability and the construct and discriminant validity of the NM competency tool. Item-total correlation coefficients ranged from 0.63 to 0.84, indicating that the items correlated well with the scale overall (Field, 2005). Cronbach alphas ranged from 0.84 to 0.91, further indicating high intercorrelations among the items (Kline, 2000).

This study found high correlations between certain factors, especially between human resource leadership skills and human resource management skills, performance improvement skills and human resource leadership skills, and foundational thinking skills and performance improvement skills ($r > 0.90$). These findings indicate poor discriminant validity; thus, the items should be evaluated further. Similarly, the second-order CFA that was conducted to distinguish between the domains of *Science* and *Art of Leadership* also demonstrated poor discriminant validity. Items under the two domains may be closely related and should be analyzed more closely. For example, both Human Resource Management in the business domain and Human Resource Leadership Skills in the art domain are looking at very similar concepts. The potential for removing of one of the items should be considered. Assessing whether both human resource-related competencies would be a better fit under the art of leadership domain may be another option in improving the discriminant validity of the instrument.

Correlation between NM competencies, nurse practice environment, and frontline nurses' ITS. Human resource leadership skills were significantly and positively correlated with frontline nurse participation in hospital affairs, nursing foundations for quality of care, staffing and resource adequacy, and the overall PES-NWI. Similarly, relationship management and influencing behaviors were positively correlated with nurse participation in hospital affairs, nursing foundations for quality of care, and the overall PES-NWI. In addition, diversity

management skills positively correlated with staffing and resource adequacy. Finally, overall competency was positively correlated with nursing foundations for quality of care. All three specific NM competencies were from the *Art of Leadership* domain, which confirmed that NM's social relationships and communication skills are essential to the successful creation of a positive practice environment. Although the significant positive correlations between NM competencies and frontline nurses' practice environments were weak (less than 0.3), the results are consistent with previous studies that found proficiency in the "soft skills" or relational skills to contribute to NMs' success (Shirey, 2008; Rani, Brennan, & Timmons, 2010; Zwink et al., 2013).

Pearson correlations showed that NM competencies were not significantly correlated with frontline nurses' ITS, which is inconsistent with the previous findings. Other studies have found NM leadership style and practices to have positive associations with ITS (Cowden, Cummings, & Profetto-McGrath, 2011; Ribelin, 2003; Shirey 2017). Armstrong-Stassen et al. (2015) found nurses' satisfaction, trust, and ITS to be higher when they perceived that their NMs administered HR practices fairly. Similar findings were found in other studies, which associated NMs' effectiveness with frontline nurses' job satisfaction and commitment (Ballard, Boyle, & Bott, 2016; Cline, Reilly, & Moore, 2004; Cowden, Cummings, Patrician, Shang, & Lake, 2011; Hill, 2011). Although the result of the Pearson correlation is inconsistent with previous findings, none of the past studies on frontline nurses' ITS explored NM competency.

Direct effect of NM competency on frontline nurses' ITS and the indirect effect of NM competency on frontline nurses' ITS, as mediated by the nurse practice environment. The correlations among the ten competency skills ranged from .47 to .93. Given the concern about multicollinearity with some of the items (if ten separate subscales in the model were included), path analysis (Aim 4) was conducted using the composite NM competency scores.

Path analysis showed that the overall NM competency score was a significant positive predictor of composite PES-NWI score. Again, findings support previous studies linking NM support and leadership abilities as antecedents to practice environments (AACN, 2005; Van Bogaert et al., 2009). The more support frontline nurses get from their managers, the better their perception is of their practice environment and vice versa. This study extends existing knowledge and links NM competency with their effectiveness in creating positive and supportive practice environments. In turn, composite PES-NWI score was also a significant positive predictor of frontline nurses ITS. Higher composite PES-NWI score was associated with higher ITS. This again support findings that nurses who intended to stay in their current work settings perceived their practice environment more favorably than those who intended to leave (Friese & Himes-Ferris, 2013; Kutney-Lee et. al., 2016; Lin, Chiang, & Chen, 2011; Nowrouzi et. al., 2015; Wilson, et al, 2015).

No direct effect was found between composite NM competency score and ITS. Although this study found the overall NM competency, as a whole, was not a predictor of frontline nurses ITS, certain NM competency skills may have a positive impact. Prior studies have shown specific skills such as administering HR practices fairly being correlated with higher job satisfaction, trust with their NM and, ITS for frontline nurses (Ballard, Boyle, & Bott, 2016; Cowden, Cummings, Patrician, Shang, & Lake, 2011; Hill, 2011). Future studies could focus on the specific competencies or looking at the difference between the art and science leadership domains, and their impact on ITS.

Path analyses supported the proposed mediating role of the practice environment on the relationship between NM competency and frontline nurses' ITS, adjusting for the covariates. NM competency had a positive effect on the frontline nurses' perception of their practice

environment, which then also affected their ITS. This supports prior studies claiming NM's effectiveness in providing support, managing relationships, influencing others' behaviors, and creating an environment that promotes shared decision-making to increase nurses' organizational commitment and ITS (Ducharme, 2017; Kallas, 2014; Randazzo & Brown, 2016; Nelson-Brantley, Park, & Bergquist-Beringer, 2018; Schmalenberg, 2008). Trust in their NM's ability plays a vital and positive role in increasing organizational commitment (Armstrong-Stassen et al., 2015). Findings from this study is the first to demonstrate that NM competency impacts nurses' employment intentions through the practice environments fostered by NMs. Results underscore the importance of assessing and developing NM leadership skills and competency given their significant impact to nurse outcomes.

In summary, positive correlation was found between the nurse leader preparation (e.g. education and certification) and competency skills perceived by NMs. Investment in nurses' professional development by supporting their pursuit of higher education and certification prepares and sets up emerging leaders for better success. Given that one of the strongest predictors of frontline nurses' ITS was the practice environment, and that NMs' competency impacts the practice environment, it is essential for emerging nurse leaders and new NMs to have a good understanding of their role in creating a positive practice environment for frontline nurses in their respective units. Hospital administrators, organizations developing leadership programs, and even schools of nursing need to focus on the development of NMs' knowledge and skills. Training should combine business and relational skills to positively influence nurses' ITS. NM's effectiveness in their role and their ability to create positive practice environments are critical and can help retain frontline nurses and reduce nursing shortage in acute care hospital settings.

Strengths

This study was the first to merge the data collected from NMs regarding their self-assessed competency and frontline nurses' perception of the practice environment and their ITS. Most of the past studies that looked at associations between NMs and the practice environment or ITS were based on the frontline nurses' perception of their NMs (Anselmo-Witzel, Orshan, & Bachand, 2017; Armstrong-Stassen et al., 2015; Atiyeh & AbuAlRub's, 2017; Cline, Reilly, & Moore, 2004; Lin, Chiang, & Chen, 2011). In addition, these studies either had small samples which were from one site, or they were conducted in countries outside the United States. Analyzing data at the unit level within multiple facilities in 43 hospitals in 20 states enhanced the external validity and generalizability of the findings.

Instruments used in this study are reliable and valid. PES-NWI is endorsed by the National Quality Forum and has been widely used to measure the nursing work environments (Swiger et al., 2017; Warshawsky & Havens, 2011). The content validity of Warshawsky's NM Competency instrument has been established by the role delineation studies and content expert reviews that have been previously conducted. CFA and Cronbach's alpha test from this study supported the reliability of Warshawsky's NM Competency instrument. The results demonstrated a high internal consistency reliability, indicating high correlations with the items in each subscale. Furthermore, items in the subscale measured the same construct.

By examining NMs' perceptions of their specific leadership competencies, the researcher identified the skills that NMs felt they were lacking. The findings of this study have significant implications on guiding administrators in developing specific training programs for NMs. Finding positive associations between nurse leaders' level of formal education and certification and NM competency also strengthens the business case for hospital administrators to invest and

support the professional development of their nursing workforce. Supporting the professional growth of their emerging nurse leaders can prepare them for the NM role or other promotions. New knowledge about the mediation effect of the practice environment on NM competency and frontline nurses' ITS is extremely valuable. Findings from this study underscore the critical role NM's ability and support to frontline nurses play in positively impacting the growing nursing shortage. Findings suggest that improving NM competency can be vital to improving nurses ITS. Overall, new knowledge from this study is valuable in enhancing Warshawsky's NM Competency instrument, urging policy makers to formulate a plan to improve the effectiveness of NMs, and encouraging hospital administrators to invest in resources for increasing NM competency.

Limitations

This study has several limitations. Most NM participants are from medium to large hospitals from metropolitan areas, which limits the generalizability of the findings to hospitals of a similar size and type. NMs with more than one unit were not included in the study. NM accountable for multiple units may be less visible and accessible to the frontline nurses, thus, may have a different level of influence on the practice environment of their units. Results of this study are not generalizable to NMs who are responsible for more than one unit. It is also important to note that out of the 248 nursing units included in the sample, 50.4% were from Magnet® recognized facilities, 3.6% were from Pathway designated facilities, and 21.8% were from those embarking on the journey to Magnet. This could affect the generalizability of outcomes, as most Magnet recognized facilities typically fall in the large size hospitals and one would also expect ANCC-credentialed hospitals to have higher mean scores for most of the PES-NWI subscales, especially the mean scores for hospital affairs, quality of care, and nurse

manager. Recognizing the critical role of nursing leadership, both Magnet and Pathway programs promote succession planning, mentorship, and investment in their nurse leaders' development needs.

Many NMs did not provide information about their certification. Missing values can result in data loss and bias for respondents and non-respondents (Munro, 2005). Hence, NM certification could not be used as a control variable in the path analysis. In addition, it is important to note that the positive correlation seen between NM certification and NM competency might be biased due to the high number of non-respondents. For example, some NMs might have skipped the certification question because they did not have any leadership certification.

In addition, the reliance on NMs' self-reported measure of competency is a limitation. NMs might over- or under-report their assessment of their own knowledge, skills, and abilities due to the social desirability bias: respondents answer questions in a manner that will be viewed favorably by others (DeMaio, 1984). Participant responses might also be influenced by the perceived researcher's expectations. In addition, the presence of others while participants respond to questions and the participants' perceptions of the level of privacy or confidentiality of their responses might have influenced the way in which they rated themselves (Brener, Billy, & Grady, 2003).

Frontline nurses' assessment of the PES and ITS might vary based on other unmeasured confounding factors such as professional development opportunities, staffing, and pay, which are not related to their respective NMs. In Cline's (2004) study, NMs' practices emerged as a common predictor of nurse satisfaction and employment intention but only next to staffing. Other studies reported that professional development opportunities impacted their job

satisfaction and their intention to stay in the same unit (Carter & Tourangeau, 2012; Trinchero, Brunetto, & Borgonovi, 2013). Not knowing the factors or explanations for the frontline nurses' perception of their practice environment and ITS rating was a limitation.

The data used had a nested structure (multiple units/NMs within the hospital). Multi-level analysis was not conducted, which could be considered a study limitation. However, ICCs (1) were calculated to determine the hierarchical effect of hospital membership on competency, practice environment, and ITS. The ICCs (1) were all less than .04, indicating that the relationships between observations due to hospital membership did not significantly affect the model.

Finally, the composite NM competency scores were used in the path analysis since the correlations between the NM competency subscales were high. By using the overall competency, the associations between ITS and the specific NM skills could not be analyzed. Similarly, given that the construct validity was weak and there was poor discrimination between the *Art* and *Science of Leadership* domains, the associations between ITS and the two domains could not be explored.

Recommendations for Future Research

The correlations between factors in Warshawsky's NM competency instrument were high, especially between human resource leadership skills and human resource management skills; performance improvement skills and human resource leadership skills; foundational thinking skills and performance improvement skills. High correlations indicate multicollinearity and poor discrimination between items. To improve construct validity, further evaluation of the tool is recommended, along with potential revision to only include items which have the ability to distinguish known factors.

No differences were found in the NM competencies based on the size and location of hospitals; however, very few small and non-metropolitan hospitals were included in the sample. Future studies could focus especially on small or rural hospitals that may have less resources than other hospitals. This is particularly important since small or rural hospitals report having more difficulty filling NM positions (Squires, 2001). Additionally, no differences were found in the NM competencies across unit types. However, almost half of the participants were from adult medical-surgical units, and units that had remarkably different types of patients were excluded from this study. Future studies can explore NM competency in the units that were excluded from this analysis.

Examining the specific competencies' impact on ITS is also recommended, given that prior studies correlate specific human resource-related skills with higher nurse satisfaction, NM trust, and ITS (Ballard, Boyle, & Bott, 2016; Cowden, Cummings, Patrician, Shang, & Lake, 2011; Hill, 2011). Pearson correlations showed a positive correlation between the NM competencies from the *Art of Leadership* domain and the practice environment. Subsequently, the path analysis showed a positive association between NM competency and the practice environment and between the practice environment and ITS. Thus, it is possible that the relational skills impact nurses' employment intentions more than the competencies from the *Science of Leadership* domain.

In addition, neither the frontline nurses' actual turnover nor the reasons behind their job intention was explored in this study. Other factors such as their professional growth and changes in their professional lives may have contributed to their job intentions. Such factors impacting frontline nurses' intention to stay in their unit are completely unrelated to their perceptions of NMs' ability and their practice environment. Exploring the reasons behind nurses' employment

intentions and actual nurse turnover rates may have important implications and is recommended for future research.

Last, the use of an objective measure of NMs' competency such as scores on a national leadership certification rather than NMs' self-assessment is recommended for future studies. Objective measures will eliminate the concern for social desirability bias, which may result when one assesses the NMs' competency through their self-perception.

Conclusion

Nurse executives can use the findings of this study to support leadership development through a multifaceted approach. The results establish the business case for investment in leadership certification and the formal education of NMs. Leadership training can also be focused on the specific competencies that are assessed by NMs to be lower. With a structured approach to developing emerging nurse leaders, NMs can have a smoother transition from the bedside, be more effective in their roles, and be more successful in creating supportive work environments that can ultimately increase frontline nurses' ITS.

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Appendices

APPENDIX A: Nurse Practice Environment Scale

Appendix A. Practice Environment Scale Subscales

Practice Environment Scale Subscales

Nurse Participation in Hospital Affairs

1. Career development/clinical ladder opportunity.
2. Opportunity for staff nurses to participate in policy decisions.
3. A chief nursing officer which is highly visible and accessible to staff.
4. A chief nursing officer equal in power and authority to other top-level hospital executives.
5. Opportunities for advancement.
6. Administration that listens and responds to employee concerns.
7. Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees).
8. Staff nurses have the opportunity to serve on hospital and nursing committees.
9. Nursing administrators consult with staff on daily problems and procedures.

Nursing Foundations for Quality of Care

1. Active staff development or continuing education programs for nurses.
2. High standards of nursing care expected by the administration.
3. A clear philosophy of nursing that pervades the patient care environment.
4. Working with nurses who are clinically competent.
5. An active quality assurance program.
6. A preceptor program for newly-hired RNs.
7. Nursing care is based on a nursing model, rather than a medical model.
8. Written and up-to-date nursing care plans for all patients.
9. Patient care assignments that foster the continuity of care, i.e., the same nurse cares for the patient from one day to the next.
10. Use of nursing diagnoses.

Nurse Manager Ability, Leadership, and Support of Nurses

1. A supervisory staff that is supportive of the nurses.
2. Supervisors use mistakes as learning opportunities and are open to constructive criticism.
3. A nurse manager should be a good manager and leader.
4. Praise and recognition for a job well done.
5. A nurse manager who backs up the nursing staff in decision making, even if the conflict is with a physician.

Staffing and Resource Adequacy

1. Adequate support services allow me to spend time with my patients.
2. Enough time and opportunity to discuss patient care problems with other nurses.
3. Enough registered nurses to provide quality patient care.
4. Enough staff to get the job done.

Collegial Nurse-Physician Relations

1. Physicians and nurses have good working relationships.
2. A lot of teamwork between nurses and physicians.

APPENDIX B: Nurse Manager Competency Instrument©

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IMPORTANT: YOUR RESPONSES TO THIS SURVEY ARE CONFIDENTIAL. A report of your assessment of your work environment will be provided to your organization. Only aggregate findings will be provided. NO individual responses will be provided. Unless otherwise indicated, please select one choice for each item.

The purpose of this survey is to understand your level of skill development as a Nurse Manager.

Please assess your level of comfort with each of the following competencies. Benner (1982) described 5 stages of competency development. For each competency, use the following 1 to 5 scale:

Novice = Little to no experience with the competency.
Advanced Beginner = Able to demonstrate marginally acceptable performance. The Advanced Beginner has experienced real situations using the competency.
Competent = Able to self-evaluate performance and competence in handling various situations. Begins to make long-term goals and plans to improve competence.
Proficient = Perceives situations as whole events in context. Understands typical situations and variations of acceptable performance.
Expert = Able to grasp entirety of situations in context and respond to the immediate situation and larger context. No longer relies on algorithms or rules to make decisions and take actions.

	Novice	Advanced Beginner	Competent	Proficient	Expert
Financial Management Skills					
Knowledge of health care economics and application to the delivery of patient care.	1	2	3	4	5
Knowledge of the unit and departmental budgeting processes—both capital and operational.	1	2	3	4	5
Human Resource Management Skills					
Knowledge of the process to procure new employees. This includes recruitment, interviewing, labor laws, hiring policies and new hire orientation.	1	2	3	4	5
Implements effective recruitment and retention strategies.	1	2	3	4	5
Human Resource Leadership Skills					
Knowledge of the staff development process. This includes ongoing competency assessment and staff development.	1	2	3	4	5
Knowledge of how to manage performance of employees. This includes performance appraisals, goal setting, motivation, and the disciplinary process.	1	2	3	4	5
Demonstrates effective coaching and mentoring skills for employees.	1	2	3	4	5
Knowledge of how to develop a succession plan.	1	2	3	4	5
Performance Improvement Skills					

Knowledge of performance improvement tools. Tools include workflow analysis, cause and effect diagrams, root cause analysis, run charts and control charts.	1	2	3	4	5
Knowledge of quality improvement strategies such as continuous quality improvement, Total Quality Management, Six Sigma, and Balanced Scorecards.	1	2	3	4	5
Knowledge of and role models patient safety behaviors.	1	2	3	4	5
Knowledge of fundamental principles and regulations related to workplace safety.	1	2	3	4	5
Foundational Thinking Skills					
Knowledge of principles of systems thinking and complex adaptive systems.	1	2	3	4	5
Knowledge of organizational behavior such as planning, organizing, leading.	1	2	3	4	5
Demonstrates effective decision-making and problem-solving skills.	1	2	3	4	5
Technology Skills					
Knowledge of the effect of technology on patient care delivery and safety. Understands the organizations electronic medical record system.	1	2	3	4	5
Strategic Management Skills					
Demonstrates project management skills. This includes managing timelines, budgets, and resources.	1	2	3	4	5
Knowledge of basic business skills such as developing a business case and the project planning process.	1	2	3	4	5
Demonstrates effective written and oral presentation skills.	1	2	3	4	5
Develops strategic and operational plans.	1	2	3	4	5
Knowledge of and implements shared governance in department(s).	1	2	3	4	5
Relationship Management and Influencing Behaviors					
Demonstrates effective communication skills to include negation, persuasion, mediation, and conflict management.	1	2	3	4	5
Displays effective interpersonal leadership skills such as team building, emotional intelligence, self-awareness, and collaborative practice.	1	2	3	4	5
Diversity Management Skills					
Role models cultural competence.	1	2	3	4	5
Adheres to principles of social justice by creating an environment of fairness.	1	2	3	4	5
Able to lead multi-generational work teams.	1	2	3	4	5
Clinical Practice Knowledge					
Demonstrates knowledge of evidence-based nursing practice needed to lead the clinical services.	1	2	3	4	5

APPENDIX C: Conceptual and Operational Definitions

	Conceptual Definition	Operational Definition
Independent Variable		
Financial Management Skills	Effective management of funds to accomplish the objectives of the organization (Sinkkonen, & Taskinen, 2003	NM Competency Instrument (NMCI)-two items • Knowledge of health care economics and application in the delivery of patient care • Knowledge of the unit and departmental budgeting (capital and operational) processes Measured on a 5-point Likert-type scale: novice (1); advanced beginner (2); competent (3); proficient (4); expert (5). Reported as a mean score of the NMs' competency.
Human Resource Management Skills	Focusing on the management of people, and knowledge of policies and systems, including employee-benefits design, recruitment, and training and development (Paauwe & Boon, 2009)	NMCI–two items • Knowledge of the process to procure new employees • Effective recruitment and retention strategies Measured on a 5-point Likert-type scale: novice (1); advanced beginner (2); competent (3); proficient (4); and expert (5). Reported as a mean score of the NMs' competency.
Human Resource Leadership Skills	Involving the development and management of personnel (Pihlainen, Kivinen, & Lammintakanen, 2016)	NMCI, four items: • Knowledge of the staff development process • Knowledge of how to manage the performances of employees • Effective coaching and mentoring skills for employees • Knowledge of how to develop a succession plan Measured on a 5-point Likert-type scale: novice (1); advanced beginner (2); competent (3); proficient (4); expert (5). Reported as a mean score of the NMs' competency.
Performance Improvement Skills	Include competence in quality improvement and management of service processes,	NMCI, four items: • Knowledge of performance improvement tools

	especially those focused on patients (O'Neil, Morjikian, Cherner, Hirschkorn, & West, 2008)	• Knowledge of quality improvement • Knowledge of and role models patient safety behaviors • Knowledge of fundamental principles and regulations related to workplace safety Measured on a 5-point Likert-type scale: novice (1); advanced beginner (2); competent (3); proficient (4); expert (5). Reported as a mean score of the NMs' competency.
Foundational Thinking Skills	Include the ability to think critically, prioritize, multi-task, and use information in decision-making and problem-solving (Pihlainen, Kivinen, & Lammintakanen, 2016)	NMCI, three items: • Knowledge of principles of systems thinking and complex adaptive systems • Knowledge of organizational behavior • Effective decision-making and problem-solving skills Measured on a 5-point Likert-type scale: novice (1); advanced beginner (2); competent (3); proficient (4); expert (5). Reported as a mean score of the NMs' competency.
Technology Skills	Using patient care technologies to support care and guide practice, ethically managing data to support safe and quality patient care (American Association of Colleges of Nursing, 2008)	NMCI, one item: • Knowledge of the effect of technology on patient care delivery and safety. Measured on a 5-point Likert-type scale: novice (1); advanced beginner (2); competent (3); proficient (4); and expert (5). Reported as a mean score of the NMs' competency.
Relationship and Influencing Behavior Skills	Interpersonal skills being essential for relationship building and the development of collaborative relationships within the organization (Pihlainen, Kivinen, & Lammintakanen, 2016)	NMCI, two items: • Effective communication skills Effective interpersonal leadership skills Measured on a 5-point Likert-type scale: novice (1); advanced beginner (2); competent (3); proficient (4); expert (5). Reported as a mean score of NM the competency.
Diversity Management Skills	Encompassing acceptance and respect, understanding that each	NMCI, three items • A role model of cultural competence

	individual is unique, and recognizing individual differences (Patrick & Kumar, 2012)	• Adheres to principles of social justice by creating an environment of fairness • Able to lead multi-generational work teams Measured on a 5-point Likert-type scale: novice (1); advanced beginner (2); competent (3); proficient (4); and expert (5). Reported as a mean score of NM the competency.
Strategic Management Skills	Include analytical thinking; achievement orientation, ability to communicate strategies, vision, and mission; and motivating staff to accomplish the mission at hand (Sherman, Bishop, M., Eggenberger, & Karden, 2007)	NMCI, five items: • Project management skills • Knowledge of basic business skills such as developing a business case and the project planning process • Effective written and oral presentation skills • Developing strategic and operational plans • Knowledge of and implementation of shared governance in department(s) Measured on a 5-point Likert-type scale: novice (1); advanced beginner (2); competent (3); proficient (4); expert (5). Reported as a mean score of NM the competency.
Clinical Practice Knowledge	Encompassing knowledge and skills of clinical operations (Connelly, Yoder, & Miner-Williams, 2003)	NMCI, one item: • Demonstrates knowledge of evidence-based nursing practice needed to lead the clinical services. Measured on a 5-point Likert-type scale: novice (1); advanced beginner (2); competent (3); proficient (4); and expert (5). Reported as a mean score of the NMs' competency.
Mediating Variable		
Nurse Participation in Hospital Affairs	Often referred to as shared leadership or shared governance; defined as the participatory role and valued status of nurses	PES-NWI, nine items: • Career development/clinical ladder opportunity • Opportunity for staff nurses to participate in policy decisions

	in the hospital context (Lake, 2002)	• A chief nursing officer which is highly visible and accessible to staff • Chief nursing officer equal in power and authority to other top-level hospital executives • Opportunities for advancement • Administration that listens and responds to employee concerns • Staff nurses are involved in the internal governance of the hospital • Staff nurses have the opportunity to serve on hospital and nursing committees • Nursing administrators consult with staff on daily problems and procedures Measured on a 4-point Likert-type scale (strongly agree, agree, disagree, strongly disagree). Reported as mean score of the unit surveyed.
Nursing Foundations for Quality of Care	Nursing foundations for quality care is defined as the pervasive use of nursing philosophy, a nursing (rather than a medical) model of care, and nurses' clinical competence as the foundation for providing a high standard of patient care (Lake, 2002)	PES-NWI, ten items: • Active staff development or continuing education programs for nurses • High standards of nursing care are expected by the administration • A clear philosophy of nursing that pervades the patient care environment • Working with nurses who are clinically competent • An active quality assurance program • A preceptor program for newly-hired RNs • Nursing care is based on a nursing, rather than a medical, model • Written, up-to-date nursing care plans for all patients • Patient care assignments that foster the continuity of care

		• Use of nursing diagnoses Measured on a 4-point Likert-type scale (strongly agree, agree, disagree, strongly disagree). Reported as the mean score of the unit surveyed.
Nurse Manager Ability, Leadership, and Support of Nurses	NM's ability, leadership, and support are defined as the ways the NMs recognizes nurses for a job well done and how they support nurses when there are conflicts with physicians and when nurses make mistakes (Lake, 2002).	PES-NWI, five items: • A supervisory staff that is supportive of the nurses • Supervisors use mistakes as learning opportunities, not criticism • A NM who is a good manager and leader • Praise and recognition for a job well done • NM who backs up the nursing staff in decision making, even if the conflict is with a physician Measured on a 4-point Likert-type scale (strongly agree, agree, disagree, strongly disagree). Reported as mean score of the unit surveyed.
Staffing and Resource Adequacy	Staffing and resource adequacy is defined as having adequate staff and support resources to provide quality patient care and having time to be able to spend with patients and discuss patient care problems with other nurses (Lake, 2002).	PES-NWI –five items • Adequate support services allow me to spend time with my patients • Enough time and opportunity to discuss patient care problems with other nurses • Enough registered nurses to provide quality patient care • Enough staff to get the work done Measured on a 4-point Likert-type scale (strongly agree, agree, disagree, strongly disagree). Reported as mean score of the unit surveyed.
Collegial Nurse-Physician Relations	Collegial nurse-physician relation is characterized by the positive working relationships between nurses and physicians (Lake, 2002).	PES-NWI, three items: • Physicians and nurses have good working relationships • Teamwork between nurses and physicians • Collaboration between nurses and physicians Measured on a 4-point Likert-type scale (strongly agree, agree, disagree,

		strongly disagree). Reported as the mean score of the unit surveyed.
Dependent Variable		
Intent to Stay	Intent of nurses to stay in their area of practice (Gregory et al., 2007)	One item in the RN Survey • What are your job plans for the next year? Response options: Stay in my current position, stay in direct patient care but in another unit within this hospital, stay in direct patient care but outside this hospital, leave direct patient care but stay in the nursing profession, leave the nursing profession for another career, and retire. Measured as: 0 = not staying in the current position, and 1 = stay in my current position; reported as the proportion of RNs on the unit with a given response
Control Variables		
Hospital size	Bedsize category based on the facility's number of licensed beds (NDNQI, 2013).	Measured as the number of licensed beds: 1 = Small (<100); 2 = Medium (100-299); and 3 = Large (>300)
Hospital location	Hospital location is defined by metropolitan status (NDNQI, 2013).	Measured as: micropolitan/non-metropolitan area; and metropolitan area.
Hospital teaching status	Teaching status is measured by NDNQI (2013) as the status of hospitals either as an academic medical center, teaching, or non-teaching.	Teaching status will be measured as: 0 = non-teaching, and 1 = teaching.
Unit type	Defined by the patient population care for on the units (NDNQI, 2013).	Unit type will be coded as 1= Adult Critical Care (label: Adult CC); 2 = Adult Step Down (Adult Step Down); 3 = Adult Medical and Surgical (Adult M/S); 4 = Pediatric General (Peds Gen); 5 Pediatric Critical Care including Neonatal (Peds CC); 6 = obstetrics; 7 = Emergency Department (ED)

NM education level	Represents the highest level of nursing education (NDNQI, 2013)	NMCI demographic question: What is the highest level of NURSING education you have completed? Response options include: Diploma; ADN Degree; BSN Degree; MSN Degree; DNP; PhD. Measured as: diploma, associate, or baccalaureate degrees; and masters or higher degrees.
NM certification	Process by which a nongovernmental agency validates competency based on predetermined standards in a defined clinical area of nursing (American Association of Critical-Care Nurses, n.d.). The NM Competency Instrument defines NM certification as the Nursing Leadership certifications a NM has earned.	NMCI demographic question: asks which Nursing Leadership certifications the NM has earned. Response options include: Certified Nurse Manager and Leader; Certified Executive Nursing Practice; Executive; Nurse Executive-Advanced; Other (Specify); and None Measured as: certified; not certified; measured as proportion of RNs with certification on the unit
Frontline nurse education	Represents the highest level of nursing education (NDNQI, 2013)	PES-NWI demographic question - highest nursing license held. Response options are: LPN/LVN license; RN license; Advanced Practice license Measured as: 0= less than a baccalaureate degree (diploma, associate degree); and 1 = baccalaureate degree or higher (master's degree, doctorate); reported as the proportion of unit RNs who have less than or equal to and more than a baccalaureate degree.
Frontline unit tenure	Amount of time that nurse has held a job on the unit (Tenure, n.d.).	PES-NWI demographic question - the number of years worked on current unit. Response options: < 3 months, 3-6 months, 7-11 months, 1 year, 2 years…54 years, =>55 years. Measured at the unit level as the mean years nurses have been working on the unit.

APPENDIX D: Differences in Mean NM Competencies by Hospital Size

Competency	Mean (*SD*)		*t* statistic	*p*-value
	Small/ Medium	Large		
Financial management	2.80 (0.93)	3.02 (1.02)	–1.75	.082
Human resource management skills*	3.58 (0.83)	3.59 (0.96)	–0.09	.932
Human resource leadership skills †	3.41 (0.78)	3.46 (0.89)	–0.51	.612
Performance improvement skills †	3.29 (0.73)	3.26 (0.88)	0.24	.808
Foundational thinking skills ‡	3.29 (0.75)	3.47 (0.89)	–1.70**	.090
Technology skills†	3.86 (0.75)	3.74 (0.85)	1.14	.257
Relationship management and influencing behaviors ‡	3.57 (0.83)	3.56 (0.87)	0.08	.938
Diversity management skills	3.82 (0.66)	3.78 (0.74)	0.47	.642
Strategic management skills†	3.06 (0.74)	3.20 (0.88)	–1.31**	.193
Clinical practice knowledge†	3.61 (0.76)	3.66 (0.82)	–0.51	.609
Total§	3.36 (0.63)	3.42 (0.77)	–0.73	.466

Notes. SD = standard deviation. *n=245, † n=247, ‡ n=246, § n= 237 ** indicates that equal variances not assumed result reported due to significant Levene's test.

APPENDIX E: Differences in Mean NM Competencies by Hospital Location

Competency	Mean (*SD*)		*Mann–Whitney U statistic*	*p*-value
	Metropolitan (n= 242)	Non-metropolitan (n= 6)		
Financial management	2.92 (0.99)	3.08 (0.86)	646.00	.641
Human resource management skills*	3.59 (0.90)	3.50 (0.84)	666.00	.761
Human resource leadership skills †	3.44 (0.85)	3.25 (0.32)	554.50	.327
Performance improvement skills †	3.27 (0.82)	3.38 (0.26)	653.00	.684
Foundational thinking skills ‡	3.38 (0.84)	3.44 (0.17)	702.00	.916
Technology skills†	3.79 (0.80)	4.00 (0.89)	639.00	.595
Relationship management and influencing behaviors ‡	3.56 (0.85)	3.67 (0.82)	703.00	.906
Diversity management skills	3.80 (0.71)	3.89 (0.34)	711.00	.943
Strategic management skills†	3.14 (0.83)	3.07 (0.35)	695.00	.871
Clinical practice knowledge†	3.63 (0.80)	4.00 (0.63)	534.50	.239
Total§	3.39 (0.72)	3.42 (0.21)	675.50	.916

Notes. SD = standard deviation. *n=245, † n=247, ‡ n=246, § n= 237

APPENDIX F: Differences in Mean NM Competencies by Hospital Teaching Status

Competency	Mean (*SD*) Teaching (n= 202)	Non-Teaching (n= 46)	*t statistic*	*p*-value
Financial management	2.91 (1.01)	2.96 (0.89)	-0.28	.778
Human resource management skills*	3.59 (0.93)	3.58 (0.73)	0.09**	.925
Human resource leadership skills †	3.42 (0.87)	3.5 (0.73)	-0.57	.571
Performance improvement skills †	3.25 (0.83)	3.40 (0.73)	-1.18	.238
Foundational thinking skills ‡	3.37 (0.86)	3.44 (0.71)	-0.50	.615
Technology skills†	3.79 (0.83)	3.83 (0.68)	-0.30	.761
Relationship management and influencing behaviors ‡	3.55 (0.87)	3.62 (0.78)	-0.47	.643
Diversity management skills	3.78 (0.72)	3.88 (0.63)	-0.89	.377
Strategic management skills†	3.14 (0.84)	3.11 (0.74)	0.20	.846
Clinical practice knowledge†	3.64 (0.79)	3.63 (0.83)	0.05	.961
Total§	3.38 (0.74)	3.44 (0.59)	-0.52	.605

Notes. SD = standard deviation. *n=245, † n=247, ‡ n=246, § n= 237 ** indicates that equal variances not assumed result reported due to significant Levene's test.

APPENDIX G: Differences in Mean NM Competencies by Unit Type

Competency	Mean (*SD*)							*F* statistic	*p*-value
	ACC	ASD	AMS	PG	PCC	OB	ED		
Financial management	2.81 (0.98)	2.88 (0.97)	2.96 (1.01)	2.83 (0.98)	3.03 (1.04)	3.09 (0.92)	2.80 (1.02)	0.33	.921
Human resource management skills*	3.46 (0.90)	3.56 (0.64)	3.64 (0.88)	3.50 (1.21)	3.72 (0.82)	3.52 (0.97)	3.61 (1.00)	0.29	.941
Human resource leadership skills †	3.26 (0.89)	3.45 (0.67)	3.50 (0.83)	3.39 (1.15)	3.42 (0.79)	3.35 (0.87)	3.53 (0.80)	0.44	.848
Performance improvement skills †	3.15 (0.76)	3.32 (0.71)	3.33 (0.82)	3.13 (1.02)	3.23 (0.77)	3.25 (0.87)	3.34 (0.84)	0.35	.910
Foundational thinking skills ‡	3.28 (0.80)	3.43 (0.56)	3.45 (0.87)	3.15 (1.02)	3.35 (0.90)	3.26 (0.95)	3.51 (0.76)	0.62	.711
Technology skills†	3.56 (0.79)	3.85 (0.71)	3.91 (0.79)	3.85 (0.88)	3.53 (0.74)	3.68 (0.84)	3.78 (0.90)	1.22	.297
Relationship management and influencing behaviors ‡	3.51 (0.69)	3.59 (0.73)	3.61 (0.90)	3.50 (1.00)	3.66 (0.54)	3.3 (0.97)	3.67 (0.98)	0.55	.773
Diversity management skills	3.71 (0.57)	3.71 (0.59)	3.82 (0.77)	3.83 (0.76)	3.96 (0.49)	3.65 (0.69)	4.01 (0.76)	0.87	.521
Strategic management skills†	2.91 (0.77)	3.25 (0.67)	3.15 (0.88)	3.05 (0.89)	3.16 (0.67)	3.24 (0.92)	3.19 (0.81)	0.63	.704
Clinical practice knowledge†	3.62 (0.70)	3.45 (0.62)	3.70 (0.84)	3.40 (0.75)	3.75 (1.00)	3.68 (0.84)	3.73 (0.83)	0.80	.568
Total§	3.25 (0.67)	3.43 (0.55)	3.44 (0.73)	3.25 (0.94)	3.37 (0.58)	3.37 (0.81)	3.47 (0.74)	0.47	.832

Notes. SD = standard deviation. ACC = adult critical care. ASD = adult step down. AMS = adult medical and surgical. PG = pediatric general. PCC = pediatric critical care, including neonatal. OB = obstetrics. ED = emergency department. *n=245, † n=247, ‡ n=246, § n= 237.

APPENDIX H: Correlations with P-Values Between Competencies and PES-NWI Subscales

Competency	PES-NWI Subscale					
	HA	QC	NM	SR	NP	Overall PES
Financial management	.12 (.061)	.14 (.033)	.03 (.589)	.13 (.049)	–.03 (.683)	.10 (.123)
Human resource management skills	.15 (.019)	.15 (.020)	.12 (.057)	.17 (.008)	–.01 (.925)	.15 (.017)
Human resource leadership skills	.23* (< .001)	.22* (.001)	.17 (.006)	.21* (.001)	–.02 (.724)	.21* (.001)
Performance improvement skills	.18 (.004)	.20 (.002)	.12 (.052)	.18 (.005)	.00 (.997)	.17 (.006)
Foundational thinking skills	.15 (.022)	.14 (.028)	.08 (.227)	.12 (.054)	.04 (.541)	.13 (.041)
Technology skills	.15 (.018)	.17 (.009)	.16 (.012)	.14 (.028)	–.06 (.348)	.14 (.024)
Relationship management and influencing behaviors	.23* (< .001)	.24* (< .001)	.19 (.002)	.18 (.004)	.02 (.705)	.22* (.001)
Diversity management skills	.17 (.006)	.16 (.012)	.13 (.040)	.20* (.001)	.00 (.958)	.18 (.006)
Strategic management skills	.18 (.005)	.19 (.002)	.10 (.112)	.20 (.002)	–.03 (.671)	.17 (.009)
Clinical practice knowledge	.14 (.027)	.16 (.012)	.07 (.266)	.17 (.008)	.01 (.877)	.14 (.026)
Overall Competency	.21* (.001)	.21* (.001)	.14 (.028)	.21* (.001)	–.01 (.911)	.19 (.002)

Notes. HA = Nurse Participation in Hospital Affairs. QC = Nursing Foundations for Quality of Care. NM = Nurse Manager Ability, Leadership, and Support of Nurses. SR = Staffing and Resource Adequacy. NP = Collegial Nurse-Physician Relations. *$p \leq .001$.

APPENDIX I: Disclosure

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