EVALUATION AND REVISION OF THE PRACTICE ENVIRONMENT SCALE OF THE NURSING WORK INDEX FOR ACUTE CARE HOSPITAL STAFF NURSES

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NURSING

ABSTRACT

The Practice Environment Scale of the Nursing Work Index (PES-NWI) is the most frequently used instrument for measuring the nursing work environment. The original PES-NWI obtained its items directly from the parent instrument, the Nursing Work Index, which was developed in the 1980s. However, potential value change among younger generations and vast historical, social, and technological transformations in the way healthcare is provided may have led to different factors that compose a favorable work environment for nurses working today.

The purpose of this dissertation was to evaluate and revise the PES-NWI for use in today’s nursing workforce. To accomplish this goal, a three-article dissertation has been prepared. Article 1 is a literature review chronicling the lineage of instruments derived from the Nursing Work Index. Articles 2 and 3 describe the findings of a descriptive, cross-sectional survey administered in May-July of 2021 to a national sample of direct care hospital nurses. As part of this survey, a modified version of the PES-NWI was administered. The modified instrument contained additional selection options that allowed nurses to indicate an item’s importance to their job satisfaction and ability to provide quality patient care, as well as 19 new items that may be relevant to contemporary nursing practice. Additionally, open-ended questions were asked, to allow nurses to suggest additional relevant items. To evaluate each individual item on the instrument, individual item-level content validity indices were used. Items maintaining a
value of greater than 0.80 were retained for further analysis. The responses to the open-ended questions were analyzed via content analysis. The modified instrument then underwent a thorough psychometric analysis, including exploratory and confirmatory factor analyses.

Findings from this dissertation verify that descendent instruments of the Nursing Work Index, particularly the PES-NWI, have been administered to hundreds of thousands of nurses globally in the last 40 years. Further, the addition of several new items and removal of previous items on the PES-NWI is supported to measure current nursing practice. Lastly, the modified PES-NWI, and the subsequently derived instrument, the PES-v2021, are suitable for further testing and refinement in other samples.

Keywords: nursing work environment, instrumentation, measurement
DEDICATION

To

Shailaja, Mom, Dad

and to Tye, who inspired me with the idea in the first place.
ACKNOWLEDGEMENTS

Abba, thank you for another good gift.

To Shailaja, for giving me a reason to want things to be better.

To Tye, for being the first to think I could do this.

To Mom and Dad, for years of sacrifice and guidance that allowed me to get here.

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To the members of my committee, for you hours of dedication, attentiveness, and willingness to guide me through this process.

To the past, present, and future nurses who selflessly serve patients.
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INTRODUCTION

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MEASURING THE WORK ENVIRONMENT IN 2022: THE VOICE OF THE STAFF NURSE

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LIST OF ABBREVIATIONS

CFA   confirmatory factor analysis
CMS   Centers for Medicare and Medicaid Services
CNO   chief nursing officer
EFA   exploratory factor analysis
EHR   electronic health record
EOM   Essentials of Magnetism
EOM II Essentials of Magnetism II
ICC   intraclass correlation
I-CVI item content validity index
IRR   interrater reliability
IT    information technology
LPN   licensed practical nurse
NDNQI National Database of Nursing Quality Indicators
NWE   Nursing Work Environment
NWI   Nursing Work Index
NWI-R Revised Nursing Work Index
PES-NWI Practice Environment Scale of the Nursing Work Index
RN    registered nurse
CHAPTER 1

Introduction

The nursing work environment, defined as “factors that enhance or attenuate a nurse’s ability to practice nursing skillfully and deliver high quality care,” (Swiger et al., 2017a, p. 77), has been a topic of interest in nursing science for almost 40 years (McClure et al., 1983). Favorable nursing work environments have been known to increase nurse job satisfaction and are associated with providing better quality patient care (Aiken et al., 2011; McHugh et al., 2016; Olds et al., 2017). Attributes of favorable work environments for nurses were originally derived from the Magnet Hospital studies in the 1980s (Kramer & Hafner, 1989; McClure et al., 1983; Warshawsky, 2019). However, potential changes in values and perspectives among younger generations (Inglehart, 2008) and vast historical, social, and technological transformations in the way healthcare is provided may have led to different factors that compose a favorable work environment for nurses working today. The purpose of this chapter is to introduce a three-paper dissertation entitled *Evaluation and Revision of the Practice Environment Scale of the Nursing Work Index for Acute Care Hospital Staff Nurses*. Topics that will be addressed in this chapter include: 1) the background and significance of the problem, 2) aims and research questions of the study, 3) the conceptual framework guiding the study, 4) a brief description of the study design and methods, and 5) definitions for key concepts that will be used throughout the other chapters of this dissertation.
Problem Statement

The most frequently used instrument to measure the nursing work environment globally is the Practice Environment Scale of the Nursing Work Index (PES-NWI) (Lake, 2002; Swiger et al., 2017; Zangaro & Jones, 2019). However, the items on this instrument were derived directly from the original Magnet Hospital Study completed in 1982 and job satisfaction literature from the 1960s through the 1980s (Kramer & Hafner, 1989; McClure, et al., 1983). Therefore, the relevancy of the items to nurse job satisfaction and nurses’ ability to provide quality patient care in a 21st century work environment is uncertain.

Background and Significance of the Problem

In order to explain the background surrounding the measurement of the nursing work environment, several areas need to be addressed. These areas include historical changes, technological advances, sociologic science, nursing education alteration, and continued development of knowledge in nursing science. Each of these areas will be addressed, and their events presented in chronological order. To anchor the timeline of important events, this background begins with the study, “Magnet Hospitals: Attraction and Retention of Professional Nurses,” which represents the first attempt to formally study organizational factors important to the attraction and retention of nurses (McClure et al., 1983). The factors identified in this study were used to create an instrument to measure the nursing work environment characteristics important to nurse job satisfaction and a nurse’s ability to provide quality patient care (Kramer & Hafner, 1989). A timeline of significant events and the publication of instruments used to measure the work
environment is depicted in Figure 1. Each of these events is discussed in greater detail within this section.

**The Original Study of “Magnetic” Hospitals (Early 1980s)**

In 1981, the American Academy of Nursing created a taskforce to identify what factors present within hospital organizations were important to the recruitment and retention of nurses (McClure et al., 1983). They initiated a study of “magnet” hospitals, meaning those hospitals which had a reputation for retaining nursing staff and attracting new nurses to their facility. The results of this study yielded a wealth of information about what constitutes hospital work environments conducive to nurse job satisfaction and the provision of quality nursing care.

**History, Technology, Sociology, Education, and Studies Examining the Nursing Work Environment**

**History**

Since the 1960s, Medicare has been the primary insurer of the American population (Blumenthal et al., 2015; Center for Medicare and Medicaid Services, 2020; Jaffe, 2015). As the largest health care payer, any change in the way Medicare issues payments means large changes for hospital budgeting, which in turn affects nursing practice. In 1983 (after the completion of the study of “magnetic” hospitals), the Center for Medicare and Medicaid Services (CMS) transitioned to a prospective payment arrangement based on diagnostic-related groups (DRGs) (Blumenthal et al., 2015). Previous to this time, health care payments were based on whatever physicians and hospitals charged for the services they provided to patients (Blumenthal et al., 2015).
This new payment format drastically changed the way that hospitals were reimbursed for the care that they provided.

In the 1990s, hospital restructuring occurred as a result of decreased budgets related to reduced reimbursement rates paid by DRGs and changes to CMS payment structures (Norrish & Rundall, 2001). This restructuring attempted to increase the efficiency of hospital care provided while decreasing costs (Aiken et al., 2000), but also added to budgetary uncertainty for many facilities. For nursing specifically, this restructuring often resulted in reduced registered nurse (RN) staffing, as well as increased nurse turnover and job dissatisfaction (Aiken et al., 2000; Davidson et al., 1997; Norrish & Rundall, 2001).

The 2000s saw another change in the way CMS reimbursed hospitals. In 2008, CMS stopped providing additional payments for patients who experienced “never events,” or events that could have been prevented by hospitals (Mattie & Webster, 2008). Examples of these events include falls, pressure injuries, blood incompatibility, and leaving an object in a patient after surgery (Mattie & Webster, 2008; McKeon & Cardell, 2011). Media coverage of “never events” and related hospital negligence further illuminated the need for additional attention to patient safety (Attenello et al., 2015; Mattie & Webster, 2008). Because of nursing’s proximity to patients and their ability to potentially prevent some “never” events, nurses have been essential to improving patient safety in hospitals (National Quality Forum, 2021).
In the early 2010s, two more significant changes occurred related to hospital payments and therefore budgets. First, the Affordable Care Act was passed in 2010, representing a major change in hospital reimbursement procedures (HealthCare.gov, n.d.). Because nurses are the largest occupation working in American hospitals, they represent one of the highest expenses for hospitals (Bureau of Labor Statistics, 2019). Any major change in hospital reimbursements can have significant implications for practicing nurses due to budgetary restraints. Secondly, at the intersection of technology and cost, in 2011, CMS provided an incentive for health care providers to use electronic health records, rather than paper documentation (American Hospital Association, 2021). The implications of this incentive will be further discussed in the next section.

Ultimately, financial constraints over the last 40 years have forced reductions to nursing resources, which has caused an expectation for nurses to care for sicker patients with fewer resources.
Technology

In addition to the historical context of insurance payments and hospital restructuring, technological advances have drastically altered the way that health care is provided since the original Magnet Hospital Study was performed (McClure et al., 1983). Most of these advances have had a large influence on the way that nurses practice and provide patient care. Several major advances affecting nursing practice are outlined in chronological order here.

The Pyxis Corporation was founded in 1987 (University of California at San Diego, 2017). This corporation developed a medication dispensing machine which enhanced the safety of medication delivery to patients. This allowed for a change in medication administration strategies during the early 2000s. In 2000, the first study of barcoded medication administration occurred (Wideman et al., 2005). Now, bar-coded medication administration is commonly used to ensure that medications are delivered safely and correctly to patients in hospitals and today, medication dispensing machines are found in 70% of U.S. hospitals (Schneider et al., 2018; University of California at San Diego, 2017). Overall, findings from a systematic review of medication dispensing machines supports that patient safety is improved with their use (Ahtiainen et al., 2020). However, they sometimes negatively affect the practice of nursing, with a recent study finding that medication dispensing machines may cause delays in accessing patient medications, interrupting workflow and delaying patient medication administration (Craswell et al., 2020). However, most nurses still report overall satisfaction with the transition to the machines (Craswell et al., 2020).
Another technological advance involved the availability of the internet in the general public. The internet became public domain in 1993 and has aided in the rapid exchange of information globally ever since its introduction (Giampietro, 2013; Leiner, et al., 2009). For nurses, the internet became a resource for communication and education (Ward, 1997). In recent times, the internet in conjunction with additional technological advances, such as mobile device applications, are showing promise to improve the safety and speed of medication administration (Siebert et al., 2017).

As mentioned in the previous section, another nursing task, documentation, was altered significantly when documentation shifted from a paper format to an electronic format. By 2015, at least 80.5% of hospitals were utilizing basic electronic health records for recording patient information and provider documentation (Adler-Milstein et al., 2017). The proliferation and use of electronic health records has occurred in part to CMS providing incentives for meeting meaningful use requirements beginning in 2011 (Adler-Milstein et al., 2017; American Hospital Association, n.d.). The focus of the incentive was primarily on physician documentation; however, previous studies support that nurses spend anywhere between 19-35% of their time at work in documentation tasks (O’Brien et al., 2015). Furthermore, nurses represent the largest proportion of health care providers in the world, and as such, are some of the most frequent users of the electronic health record (World Health Organization, 2020). Altering the way nurses document, often without considering their workflow, has implications for nurse job satisfaction and influences the amount of time nurses are able to spend in direct patient care (O’Brien et al., 2015). Yet no items on the PES-NWI inquire about the electronic health record or
documentation tasks as it relates to the nursing work environment or hospital nursing practice.

**Sociology: Generations**

Apart from historical and technological changes, generational differences within the nursing workforce have been an area of interest (Stevanin et al., 2018). Significant exploration of generational differences by sociologists dates back to at least 1923 (Pilcher, 1994). From longitudinal global studies, sociologists posit there is evidence that generational value change may be occurring over time in Western countries (Inglehart, 2008). These value changes are thought, in part, to be a result from individuals no longer having values related only to survival, but values that are post-materialist in nature due to economic and industrial flourishing (Inglehart, 2008). In nursing literature, findings about differences among generations as they relate to nursing practice have been mixed. Some studies report little to no differences in nursing-related topics among the generations employed in the workforce (Bugajski et al., 2017; Jobe, 2014; Wonder, 2013). Other nursing studies report differences in areas such as perceptions of unit climate, predictors of work engagement, and work satisfaction (Apostolidis et al., 2006; Farag et al., 2009; Havens et al., 2013; Wilson et al., 2008). In a mixed-methods systematic review of nursing literature, differences were found among generations in the areas of job attitudes, workplace emotion factors, and leadership (Stevanin et al., 2018). Additionally, a concept analysis of preferences for the nursing work environment revealed that Millennials, born 1981-1996 (Pew Research Center, 2018), had additional expectations for the work environment that were not present in the older generations (Campbell & Patrician, 2020).
Millennials desired aspects of work that would primarily benefit themselves, such as flexibility in balancing work and home life, work benefits (time off, pay, etc.), and personal attention from their nursing leaders (Campbell & Patrician, 2020). Because of the inconsistencies reported in the literature, it is reasonable to examine whether job factors and values that were important to nurses in the 1980s are still important to nurses today.

**Education**

Another area that has significantly changed is the area of nursing education. In the 1970s, registered nurse degrees were primarily received through diploma programs, but in subsequent years, this shifted to associate or bachelor’s degrees in nursing (McBride, 1999). Today, 48.1% of nurses hold a bachelor’s degree in nursing (Smiley et al., 2021). Furthermore, the acceptance and use of advanced practice nurses has proliferated in the past 30 years, with approximately 17% of nurses in 2020 reporting their highest level of education being at the master’s degree level or higher (Smiley et al., 2021). Part of this may stem from the shift toward thinking of nursing as a professional career, rather than an individual who simply performs patient care skills (McBride, 1999). As nurses have increasingly been thought of as more professional, capable, and autonomous than in prior decades, this could have affected their expectations for their working environment (McBride, 1999).
**Studies of Nursing and Quality of Patient Care**

While hospital payment systems changed and technological advances proliferated, a considerable amount of nursing research in the 1980s and 1990s examined nursing care and work environments. Many studies found better work environments led to better patient or nurse outcomes. For instance, Hinshaw and colleagues (1981) found that patient satisfaction improved on a hospital unit staffed by all RNs after phasing out a staffing mix that included both RNs and licensed practical nurses. Flood and Diers (1988) observed that more hospital acquired infections and an increased length of stay occurred on units with lower nurse staffing levels. Other research supported that magnet hospitals and AIDS specific units (where nurses had more control over patient care) had better nurse and patient outcomes (Aiken et al., 1994; Aiken & Sloane, 1997a; Aiken & Sloane, 1997b). A commissioned review paper for the Institute of Medicine reached the conclusion that the nursing work environment had a significant association with patient mortality (Institute of Medicine, 1996). When taken together, the research of this time period supported an integral connection between the nursing work environment and the quality of patient care provided by nurses.

**Institute of Medicine Reports (early 2000s)**

Following the established link between nursing care in hospitals and quality patient care, in 2000, the Institute of Medicine published *To Err is Human*, which presented the problem of medical errors responsible for up to 98,000 patient deaths each year (Institute of Medicine, 2000). As a result of this publication, a new emphasis on patient safety occurred in research and policy (Bates & Singh, 2018). In 2001, the
Institute of Medicine further expounded on ways to bridge the gap between provider errors and patient outcomes, citing nurses as an integral part of the process to prevent adverse events. In part based on previous research asserting that better patient outcomes were associated with nursing care and the work environment, another report from the Institute of Medicine (2004) specifically recognized the impact of the nursing work environment on the quality of patient care. This report cited such areas as nurse staffing, nursing leadership, and organizational attributes that must be addressed to create favorable work environments that provide high quality patient care (Institute of Medicine, 2004). These documents helped to shape an emphasis on research, focusing on nursing performance and the work environment as essential components in safe patient care.

**Measuring the Nursing Work Environment (1980s-2002)**

Since the 1980s, nurse researchers have been interested in measuring the nursing work environment (Kramer & Hafner, 1989). From the results of the original Magnet Hospital Study (McClure et al., 1983) and literature on job satisfaction and job values, Kramer and Hafner (1989) developed the Nursing Work Index (NWI). The NWI is a 65-item survey instrument which measures the presence of Magnet Hospital attributes, their importance to job satisfaction, and the attributes’ importance for nurse ability to provide quality patient care (Kramer & Hafner, 1989). In 2001, Aiken and Patrician (2000) modified the NWI to create the Nursing Work Index-Revised (NWI-R). They reduced the number of items to 57 and excluded the two additional columns inquiring whether the items were important to nurses’ job satisfaction and important to nurses’ ability to provide quality patient care. These value columns were eliminated so nurses would
describe the degree of agreement that specific attributes were present in their unit or hospital. Therefore, the instrument only measures the presence of a particular item. Additionally, three subscales were created to represent attributes concluded in the literature to form a favorable work environment: “autonomy, control over the work environment, and relationships with physicians,” (Aiken & Patrician, 2000; Instrument Modification, para. 3). In 2002, Lake further modified the NWI after testing the instrument’s psychometric properties, shortening it to 31 items and continuing to only measure whether or not a particular item is present in a nurse’s current work environment. Lake’s (2002) instrument is referred to as the Practice Environment Scale of the Nursing Work Index (PES-NWI). The PES-NWI contains five empirically derived subscales: 1) Nurse participation in hospital affairs; 2) Nursing foundations for quality of care; 3) Nurse manager leadership, ability, and support; 4) Staffing and resource adequacy, and 5) Collegial nurse-physician relationships. The original PES-NWI is in Appendix A. This instrument has been used globally for measuring the professional nursing work environment, with a recent review of the use of the PES-NWI reporting its use in at least 28 countries (Swiger et al., 2017).

Selected Modifications Made to the PES-NWI Since 2002

Several significant modifications have been made to the original PES-NWI since its publication in 2002. Three of these modifications and a brief introduction to other alterations of the PES-NWI are discussed in the following sections.

Technology Subscale. In 2010, a technology subscale, entitled the “Nursing Information Technology Subscale,” was developed and added to the PES-NWI with the
intention of measuring nurse perception of whether the technology present in their work environment aided in the provision of patient care (Moorer et al., 2010). This subscale contains five items, with the items focusing on functionality and access to technology systems, whether there is an electronic health record that “supports nursing practice” (p.54), and overall, if the technology available allows nurses to provide higher quality patient care. The subscale was administered to nurses working in eight different Veteran’s Administration hospitals. The researchers demonstrated that it could be a reliable and valid addition to the PES-NWI (Moorer et al., 2010).

_PES-NWI-R._ The PES-NWI was selected to measure the nursing work environment in an international study of nurses called the RN4CAST study (Sermeus et al., 2011). For the study, the PES-NWI was revised to contain 32 items, still scored on a four-point Likert-scale. The PES-NWI-R subscale titles remained the same as those on the original PES-NWI, however, the number of items in four of the subscales changed slightly. The PES-NWI-R removed one item from three of the subscales, added four items to the collegial nurse-physician relationship subscale, and retained the same number of items on the staffing and resource adequacy subscale (Lake, 2002; Sermeus et al., 2011).

_Assistive Staff._ In adapting the PES-NWI for use among nurses employed in the ambulatory oncology population, Friese (2012) added a two-item subscale related to the presence of medical assistant support. These two items were added after focus groups identified the importance of medical assistants in reducing nurses’ workload burden and improving patient care (Friese, 2012; Kamimura et al., 2012).

_Other Modifications._ Researchers who have used the PES-NWI also report other slight modifications or adoptions. The four-point Likert-scale has been changed to a six-
point Likert-scale (Boev, et al., 2012) and a five-point scale (Friese, 2012; Liou & Cheng, 2009). The PES-NWI has also been used extensively in an international context and has been translated into at least 15 languages other than English (Alzate et al., 2014; De Pedro-Gómez et al., 2012; Ferreira et al., 2014; Fuentelsaz-Gallego et al., 2013; Liu et al., 2012; Mainz et al., 2015; Sermeus et al., 2011).

Recent Literature Exploring Outcomes Associated with the Nursing Work Environment

Since the development of the NWI, NWI-R, and the PES-NWI, studies have examined both nurse and patient outcomes related to the nursing work environment.

Patient Outcomes

Studies examining the work environment frequently explore its association with patient outcomes. Better nursing work environments have been associated with reduced inpatient and 30-day patient mortality (Aiken et al., 2011; Lake et al., 2019; Olds et al., 2017; Silber et al., 2016) and failure to rescue (Aiken et al., 2011). Negative financial impacts, such as hospital readmission rates and in-hospital care costs are also reduced with more favorable work environments (Ma, et al., 2015; Silber et al., 2016). Lastly, better work environments are associated with greater patient satisfaction, and reduced amounts of negative patient outcomes, such as hospital acquired infections, falls, and pressure injuries (Aiken et al., 2012; Lake et al., 2016; Lee & Scott, 2018).
**Nurse Outcomes**

The association of the nursing work environment and outcomes among nursing staff has also been investigated. Favorable work environments are associated with higher levels of job satisfaction (Kelly et al., 2011; Wei et al., 2018) and less turnover intention (Park et al., 2016; Wei et al., 2018). Other negative nurse outcomes, such as burnout (Aiken et al., 2008; Kelly et al., 2011) and compassion fatigue (Wei et al., 2018) are lower with better work environments. With so many outcomes associated with the quality of the work environment, the importance of the nursing work environment cannot be overstated.

**Impact of the Study**

The present study sought to determine if there are aspects of the 21st century nursing work environment that have not been measured using the original PES-NWI, or if aspects that are currently measured are no longer important to nurses. Without conducting this study, nursing scientists, hospitals, and administration may be missing out on key elements, that if identified and addressed, could improve both nurse and patient outcomes.

**Study Purpose**

The purpose of this study was to evaluate and revise the PES-NWI for use in today’s nursing workforce.
Specific Aims and Research Questions

This study sought to address the following aims and questions:

**Aim 1:** To determine if each of the 31 items currently on the PES-NWI and 19 additional items are relevant to current nurses' job satisfaction and ability to provide quality patient care.

  **Question 1:** Is each item on the PES-NWI still relevant to nurses in terms of their job satisfaction and ability to provide quality patient care?

  **Question 2:** Should questions identified by previous researchers and experts in the field related to teamwork, technology, assistive staff, civility, and respect be included on the PES-NWI?

**Aim 2:** To determine if additional items are needed on the PES-NWI in order to more comprehensively address nurse job satisfaction and ability to provide quality patient care.

  **Question:** Are there any additional items reported by nurses that should be added to the PES-NWI that would reflect factors important to nurse job satisfaction and quality patient care?

**Aim 3:** To conduct a thorough psychometric analysis of a newly developed instrument.

  **Question:** Is the newly developed instrument a reliable and valid tool for measuring the nursing work environment?

Introduction of the Theoretical/Conceptual Framework

Donabedian’s framework for medical care quality serves as the basis for this study (Donabedian, 1966). Donabedian’s framework posits that structure, or the organizational characteristics of hospitals, influences the process (the mechanism for the
delivery of care), which in turn impacts outcomes of interest (Donabedian, 1966). The nursing work environment is a complex concept, especially as it pertains to Donabedian’s framework. It has been conceptualized as both a structure or a process depending upon the variables being examined in the study. For example, the nursing work environment serves as a structural variable when examining the relationship between the nursing work environment and unfinished nursing care on patient outcomes (Hessels et al., 2015; Jones et al., 2015). Alternatively, when the variable of interest is staffing or Magnet® hospital status, the nursing work environment serves as a process variable, mediating the relationship between outcomes and the structural components investigated (Breckenridge-Sproat et al., 2012; Swiger et al., 2018; Taylor-Clark et al., 2022).

For purposes of this study, the nursing work environment serves as the “process.” Wong and colleagues (2013), describes the process portion of Donabedian’s model as, “concerned with mechanisms for coordinating and facilitating patient care,” (p. 710). Conceptualizing the nursing work environment as a process is consistent with Wong’s (2013) definition, as well as previous research (Breckenridge-Sproat et al., 2012; Dubois et al., 2013; Schmalenberg & Kramer, 2008; Swiger et al., 2018). Outcomes for this study are job satisfaction and the ability to provide quality patient care as previous research supports that the nursing work environment is associated with both of these outcomes (Aiken et al, 2002; Aiken et al., 2011; McHugh et al., 2016; Olds et al., 2017). Additionally, previous research has expanded on Donabedian’s framework to include employee outcomes under the traditional “outcomes” portion of the model (Blake et al., 2013; Liu et al., 2018; Schmalenberg & Kramer, 2008; Stone et al., 2006; Stone et al., 2005). Figure 2 provides a visualization of the framework for this study.
**Figure 2**

*Conceptual Framework*

Note. This figure depicts the components that were examined in the proposed study based on the elements of Donabedian’s (1966) medical care quality framework.

**Introduction of the Design and Methods**

The study was descriptive and cross-sectional in nature, relying on nurses’ self-report. A questionnaire containing a modified PES-NWI was administered as a web-based survey to a national sample of hospital RNs currently working in direct patient care roles. The dissemination of the survey questionnaire to nurses was facilitated by the University of Kansas Medical Center in partnership with Press Ganey®.

**Introduction to Press Ganey®**

Press Ganey® is an organization that partners with hospitals and other health care facilities to improve health care delivery (Press Ganey, 2020). One of their primary functions is to provide data about patients’ experiences with care to respective health care organizations (Press Ganey 2020). Additionally, Press Ganey contracts with hospitals to
regularly administer a survey to hospital nurses. The survey collects information such as nurse-reported demographic data, job satisfaction, turnover intention, the work environment, and perceived quality of care on their unit (E. Cramer, personal communication, April 6, 2020).

**Instrument**

In order to ascertain whether the items contained in the original PES-NWI (Appendix A) remain relevant to current nurse job satisfaction and ability to provide quality patient care, the instrument was modified. Appendix B shows the format of the modified PES-NWI and Appendix C contains the actual modified PES-NWI. The modified instrument enabled nurses to indicate their agreement with the presence of an item in the work environment, the item’s importance to their job satisfaction, and the item’s importance to their ability to provide quality patient care. This resembles the format of the parent instrument of the PES-NWI, the NWI (Kramer & Hafner, 1989). Following the suggestion of E. Lake (personal communication, July 5, 2019) and literature supporting the relationship between teamwork or nurse-to-nurse relationships and the outcomes of nurse job satisfaction and quality patient care, three items were added which address nursing staff relationships (Crawford et al., 2019; Kalisch et al., 2010; Purdy et al., 2010). Another seven items were added to capture the use, efficiency, and functionality of information technology in the practice environment. The decision to add these items was based on previous literature, known increased use of technology within nursing since the development of the PES-NWI, and anticipated continued development and reliance on nursing technologies in the future (Archibald et al., 2018;
Krick et al., 2019; Maalouf et al., 2018; Moorer et al., 2010). Two more items were added that examine the effectiveness of medical assistants due to their importance in the provision of patient care (Friese, 2012; Kamimura et al., 2012; Kalisch et al., 2009; Wagner, 2018). Following the suggestion of other experts on the PES-NWI as well as relevant literature, additional items related to civility, respect, organization, and communication among interprofessional team members have been added (Crawford et al., 2019; Kalisch et al., 2009; Regan et al., 2016; Wang et al., 2020). Lastly, three open-ended questions were added to allow nurses to write in what else may be important to their job satisfaction and ability to provide patient care, with the last question allowing nurses to indicate the three most important factors for creating a favorable work environment. Overall, this new instrument contained 50 Likert-scale items and three open-ended questions in order to establish what nurses regard as important in their work environment.

**Setting and Sample**

Participants in this study came from acute care hospitals across the United States. Press Ganey©, in partnership with the University of Kansas, invited hospitals who currently participate (or previously participated) in the National Database of Nursing Quality Indicators to administer the modified PES-NWI to their hospital nurses working in direct patient care roles. The University of Kansas provided the data for the proposed study. Data sharing was supported via a data use agreement between the University of Kansas and the University of Alabama at Birmingham. Press Ganey© reports they have nurses in 2,000 hospitals across the country who respond to their annual surveys (Press
Ganey, 2019). However, because the survey was optional for hospitals, it was known that the sample would be relatively small (E. Cramer, personal communication, February 18, 2021). For this study, the original goal was to have two separate data sets, with a preferred sample size of 1,000 usable nurse responses for both a first data set and a second data set. Therefore, a total of 2,000 usable nurse responses was desired. However, it was not achieved. The sample contained a variety of Magnet®, non-Magnet, rural, and urban hospitals. The University of Kansas Medical Center provided a data set containing demographic information, outcome information (job satisfaction, nurse perceived quality of care), and nurse responses to the modified PES-NWI, among other data. For a complete list of variables that were requested from Press Ganey® and the University of Kansas Medical Center, please see Appendix D. The data set was provided in a de-identified electronic format that could be imported into data analysis software.

Data Analysis

Aim 1: To determine if each of the 31 items currently on the PES-NWI and 19 additional items are relevant to current nurses' job satisfaction and ability to provide quality patient care.

To ensure relevancy of each item on the modified PES-NWI, content validity was established by using the Likert-scale responses as an item content validity index (I-CVI) with nurses themselves serving as experts. Creating content validity indices is a common approach to establishing the content validity of an instrument (Polit et al., 2007; Polit & Yang, 2016). More about content analysis will be shared in the next section. The four-point Likert-scale responses used to measure the agreement of an item’s importance to job satisfaction and ability to provide quality patient care were dichotomized to simply
“agree” or “disagree.” Each item was assessed individually for the percentage that nurses agreed that it was important to their job satisfaction and ability to provide quality patient care. Items rated as important to nurses’ job satisfaction and ability to provide quality patient care by greater than 80% of nurses (I-CVI of at least 0.80) were included on a revised instrument. The cut-off of 80% was determined by previous literature using this value (Flynn et al., 2005; Polit & Beck, 2007; Polit & Yang, 2016).

**Aim 2: To determine if additional items are needed on the PES-NWI in order to more comprehensively address nurse job satisfaction and ability to provide quality patient care.**

This aim used the results from the three open-ended questions to determine if the instrument had left off any items that are particularly salient to nurses’ conceptualization of job satisfaction and ability to provide quality patient care. To this end, the responses were descriptively examined using content analysis for repetitive or similar ideas that could inform additional items to include on a new instrument (Elo & Kyngäs, 2008; Polit & Beck, 2017). Content analysis is a descriptive process that has often been used to analyze documents or other written text for overall conceptualizations of ideas (Elo & Kyngäs, 2008). Additionally, it is used in the analysis of quantitative as well as qualitative data, making it an appropriate fit for this study (Elo & Kyngäs, 2008). An inductive approach was utilized by which participant ideas were coded and incorporated into larger categories, which could form potential items to be included on a new instrument (Elo & Kyngäs, 2008; Polit & Beck, 2017).
**Aim 3: To conduct a thorough psychometric analysis of a newly developed instrument.**

After calculating the I-CVIs as described under Aim 1, additional testing was performed using only those items that met the 0.80 I-CVI value criteria. For the psychometric analyses, only the “present in current job” responses were used. Using these results, a shortened instrument was developed that is suitable for further testing and refinement with a new sample.

**Validity**

According to Polit and Yang (2016), there are three domains of validity related to measurement. These are: 1) content and face validity, 2) criterion validity, and 3) construct validity (Polit & Yang, 2016). These three forms of validity were assessed in the proposed study.

Face validity is concerned with whether the instrument appears to measure the construct of interest (Polit & Yang, 2016). In the study, the concept to be measured is the nursing work environment. To ensure face validity, the instrument underwent revision by experts (the committee) and two rounds of pilot testing (one by a small sample of registered nurses in December 2019-January 2020 and again in November of 2020 by a larger sample of nurses). The results of these two pilot testing measures and review by experts supported that the instrument has face validity. Content validity was ensured as the included items were those with satisfactory I-CVI values as described under Aim 1.

Criterion validity seeks to determine if the scores of a newly developed instrument are consistent with another measure demonstrating that the scores of the new instrument are “predictive of real-life outcomes,” (Piedmont, 2014, para. 2). In order to
do this, a concurrent validity approach was performed. The composite scores of the newly developed instrument were correlated to single item measures of job satisfaction and nurse reported quality of care (Anzai et al., 2014; Lu et al., 2019; Wei et al., 2018).

Construct validity is concerned with whether the construct or concept of interest is being measured appropriately (Polit & Yang, 2016). Two methods were planned to establish construct validity: a confirmatory factor analysis (CFA) and an assessment via discriminative validity. First, an exploratory factor analysis (EFA) was performed. An EFA, rather than a CFA, was performed first due to the number of items being added and the uncertain nature of how these new items may load onto factors. The results of the EFA provided an idea of the underlying structure of the instrument. Based on the results of the EFA, a CFA was performed. Procedures and decisions followed during the EFA and CFA were guided by Tabachnick and Fidell (2013). The study used varimax rotation to reduce the items into components and enhance the factor loading values for each item (Tabachnik & Fidell, 2013).

As a second method of establishing construct validity, a discriminative validation technique via a known-groups approach between Magnet and non-Magnet hospitals was planned, following the assumption based on prior literature that Magnet hospitals have more favorable work environments than non-Magnet hospitals (Kelly et al., 2011; Lake, 2002; Márquez-Hernández et al., 2020). Scores indicating a significant difference between Magnet® and non-Magnet hospitals, specifically that Magnet® hospitals score higher, would indicate validity via a known groups approach.
Reliability

To establish reliability, Cronbach’s alpha, omega, and interrater reliability assessed by an intraclass correlation at the unit level were used (McNeish, 2018; Polit & Yang, 2016). Cronbach’s alpha is a common test of internal consistency reliability to ensure that the instrument is measuring an overall construct, which in this study, is the nursing work environment (Polit & Yang, 2016). Following the lead of Lake (2002), a Cronbach’s alpha value of 0.80 was considered acceptable. However, as Polit & Yang (2016) point out, alpha values greater than 0.90 can indicate redundancy among the items. Therefore, a priori, it was decided that should a value greater than 0.90 be obtained, the instrument would be critically reassessed for items that may be unnecessary.

Due to concerns about Cronbach’s alpha, a more contemporary assessment of reliability using omega was also performed (McNeish, 2018). Omega is intended to measure composite reliability and, when violations to assumptions to Cronbach’s alpha occur, may provide a more precise estimate of the reliability of the instrument (McNeish et al., 2018).

Lastly, because nurses working on the same unit should respond similarly in regard to the presence of specific characteristics of the nursing work environment, aggregating nurse responses to the unit level was used to establish interrater reliability. Intraclass correlation values of 0.60 or higher have previously been used to define acceptable levels of agreement among nurses on the PES-NWI, and therefore served as the criteria for this study (Park et al., 2018; Swiger et al., 2018).
Overview of the Three Articles

**Article One: Evolution of an Instrument: Measuring the Nursing Work Environment - A Scoping Review**

The purpose of Article One is to trace the lineage of instruments developed from the NWI. Creating a meaningful lineage of instruments ensures that researchers know what options are currently available for measuring the nursing work environment depending on the nursing population they are interested in assessing. Additionally, this article displays the wide scope of literature that exists for measuring the nursing work environment. Specifically, the context, populations, translations, and adaptations of the instruments are provided, presenting the magnitude of this line of research and showing the vast numbers of nurses who receive requests to measure their work environment. For purposes of the dissertation, this paper helped inform the additional items that were added to the modified PES-NWI and identified potential methods for data analysis.

**Article Two: Measuring the Work Environment in 2022: The Voice of the Staff Nurse**

Article Two presents the I-CVI findings from the two value scales (i.e. importance to job satisfaction and ability to provide quality patient care). Additionally, it shares the content analysis results of the open-ended questions that were administered to nurses on the modified PES-NWI. Article Two provides the foundation for what could form a new, updated instrument that is assured, based on nurse responses, that it is measuring factors that nurses have deemed important for their job satisfaction and ability to provide quality patient care. Aims 1 and 2 were addressed in this article.
**Aim 1:** To determine if each of the 31 items currently on the PES-NWI and 19 additional items are relevant to current nurses' job satisfaction and ability to provide quality patient care.

**Question 1:** Is each item on the PES-NWI still relevant to nurses in terms of their job satisfaction and ability to provide quality patient care?

**Question 2:** Should questions identified by previous researchers and experts in the field related to teamwork, technology, assistive staff, civility, and respect be included on the PES-NWI?

**Aim 2:** To determine if additional items are needed on the PES-NWI in order to more comprehensively address nurse job satisfaction and ability to provide quality patient care.

**Question:** Are there any additional items reported by nurses that should be added to the PES-NWI that would reflect factors important to nurse job satisfaction and quality patient care?

**Article Three: A Revised Instrument for Measuring the Contemporary Nursing Work Environment**

Article Three presents the final product of the dissertation: an instrument designed and validated for nurses and by nurses, for measuring the contemporary nursing work environment. This article also provides the results of the analysis of the psychometric properties of the modified instrument. Only items which achieved at least a 0.80 I-CVI were retained on the new instrument. Using the results from the “current in your present work environment” scale, Article Three presents the psychometric properties of the instrument, including findings from an EFA and CFA. Additional measures of validity and reliability, as described in the data analysis portion of this chapter, are also included.
in the article. Ultimately, this article provides the public a free, valid, and reliable instrument that can be used to measure the 21st century work environment among acute care hospital staff nurses in the United States. Additionally, it provides a recommendation for a shortened instrument, the PES-v2021, that needs continued testing and refinement in a new sample but could serve as a modernized PES-NWI.

Definitions of Key Terms

Nursing Work Environment

In this study, the nursing work environment is defined as the “factors that enhance or attenuate a nurse’s ability to practice nursing skillfully and deliver high quality care,” (Swiger et al., 2017, p. 77). Other titles for this concept, including professional practice environments (Ditomassi, 2012; Siu et al., 2008; Stimpfel et al., 2015) and the nursing practice environment (Lake, 2002; Swiger et al., 2017) seem to be used interchangeably in the literature. However, these concepts have all been measured by the PES-NWI (Ditomassi, 2012; Lake, 2002; Lake et al., 2016; McHugh et al., 2016; Siu et al., 2008; Stimpfel et al., 2015).

Nursing Work Index

The Nursing Work Index (NWI) is a 65-item instrument used for measuring the nursing work environment as well as factors important to nurse job satisfaction and nurse’s ability to provide quality patient care. The NWI was developed by Kramer and Hafner (1989) and was based on findings from the Magnet Hospital studies and job satisfaction literature from the 1960s through 1980s.
Revised Nursing Work Index

In 2000, Aiken and Patrician published the Revised Nursing Work Index (NWI-R). This is a 57-item instrument intended to measure only the current presence of certain factors within the nursing work environment. Fifty-five of the items came directly from the NWI. In addition to these items, Aiken and Patrician (2000) added one item and altered another.

Practice Environment Scale of the Nursing Work Index

The Practice Environment Scale of the Nursing Work Index (PES-NWI) is a 31-item instrument intended to measure the presence of certain factors in the nursing work environment (Lake, 2002). This instrument was also derived from the NWI, keeping only those items that focused on concepts related specifically to nursing practice (Lake, 2002). The PES-NWI contains five subscales. A score of 1-4 is derived for each subscale and the subscales are then averaged to provide a composite score that gives a quantitative measure of the nursing work environment.

Subscales of the PES-NWI

Nurse Participation in Hospital Affairs. This subscale includes nine items related to the degree to which nurses have a say in what happens at the hospital level. Sample items include “Staff nurses are involved in the internal governance of the hospital,” and “My administration listens to and responds to employee concerns,” (Lake, 2002, p. 181).
**Nursing Foundations for Quality of Care.** The ten items contained within this subscale inquire about the degree to which items are in place that support the ability of nurses to provide quality patient care. Items from this subscale include “Use of nursing diagnoses” and “Active in-service/continuing education programs for nurses,” (Lake, 2002, p. 181). Lake (2002) believed this subscale to be more reflective of hospital level measures.

**Nurse Manager Ability, Leadership, and Support of Nurses.** Five items pertaining to nurse management and leadership are contained within this subscale. Items include “A head nurse who is a good manager and leader,” and “Supervisors use mistakes as learning opportunities, not criticism,” (Lake, 2002, p. 181). This subscale may be more specific at the individual hospital unit, rather than overall hospital level (Lake, 2002).

**Staffing and Resource Adequacy.** The four staffing and resource adequacy items inquire about the amount of personnel and supplies available to complete nursing work. Sample items are “Enough staff to get the work done,” and “Enough registered nurses to provide quality patient care,” (Lake, 2002, p. 181). Similar to the “Nurse Manager Ability, Leadership, and Support of Nurses” subscale, this may most accurately reflect unit-level factors (Lake, 2002).

**Collegial Nurse-Physician Relationships.** The interest of this subscale is the working interconnection between nurses and physicians. This three-item subscale asks if nurses perceive that there is “A lot of teamwork between nurses and doctors,” and if “Physicians and nurses have good relationships,” (Lake, 2002, p. 181). This subscale may be most precise at the unit level (Lake, 2002).
**Job Satisfaction**

Job satisfaction can be defined as whether or not nurses like their job (Price & Mueller, 1986).

**Quality Patient Care**

Quality patient care is defined as the extent to which care is more likely to produce better patient outcomes (Agency for Healthcare Research and Quality, 2020).

**Direct Patient Care Roles**

Direct patient care roles are those staff positions in which an RN is assigned to patients and is responsible for caring for those patients in the full scope of RN practice.

**Magnet Hospitals**

Magnet® hospitals are known to exhibit a commitment to professional nurses and for having favorable nursing work environments (American Nurses Credentialing Center, 2019; Lake & Friese, 2006; McClure et al., 1983)

**Generations**

A generation refers to a cohort of individuals born within typical timeframe; typically, 15-20 years (Strauss & Howe, 1991). According to the Pew Research Center (2018), there are currently five primary defined generations alive today. The generations are as follows: 1) the Post-Millennial generation (sometimes called Generation Z) born 1997 or later, 2) the Millennial generation born 1981-1996, 3) Generation X born 1965-
1980, 4) Baby Boomers born 1946-1964, and 5) the Silent or Greatest generations, born before 1945.

**Relevancy**

Relevancy in this study refers to the degree to which nurses find each item on the modified PES-NWI as important to either their job satisfaction or ability to provide quality patient care.

**Summary**

This chapter describes a study that would evaluate and revise the PES-NWI. The nursing work environment’s association with both nurse and patient outcomes has been well documented and has led to concern and desire for its continued study. Presently, the most commonly used instrument to measure the nursing work environment is the PES-NWI. By evaluating and revising the PES-NWI, the instrument may become more relevant for assessing the 21st century nursing work environment. This study offers a significant contribution to nursing because of how extensively the PES-NWI is used to measure the nursing work environment.
EVOLUTION OF AN INSTRUMENT: MEASURING THE NURSING WORK ENVIRONMENT- A SCOPING REVIEW

by

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EVOLUTION OF AN INSTRUMENT: MEASURING THE NURSING WORK ENVIRONMENT- A SCOPING REVIEW

ABSTRACT

Background and Purpose: The Nursing Work Index (NWI) was developed in the 1980s to measure the nursing work environment (NWE). Instruments descended from the NWI continue to measure the NWE today. The purpose of this review was to identify instruments derived from the NWI, examine how they have been used and revised, and evaluate their ability to capture elements of the current work environment.

Methods: A scoping literature review.

Results: Forty articles were included. Instruments developed from the NWI have been translated into numerous languages and administered to hundreds of thousands of nurses globally.

Conclusions: Study of the NWE remains extensive throughout the world. Future research should examine the factorial structure of instrument adaptions and ensure that items are relevant to contemporary nursing practice.

Keywords: nursing work environment, instrumentation, measurement
Introduction

The nursing work environment (NWE) has been a topic of study since the early 1980s (McClure et al., 1983). Defined as “factors that enhance or attenuate a nurse’s ability to practice nursing skillfully and deliver high quality care,” (Swiger et al., 2017a, p. 77), the NWE has now received global recognition for its association with patient outcomes (World Health Organization, 2020). Better work environments are associated with reduced levels of 30-day inpatient mortality, adverse events, and hospital length of stay (Lake, 2019; World Health Organization, 2020). Additionally, favorable NWEs are associated with better nurse job outcomes, such as decreased burnout and intention to leave (Lake et al., 2019). The NWE was first measured via an instrument called the Nursing Work Index (NWI) published in 1989 by Kramer and Hafner. From the NWI, other significant instruments have been created and are frequently administered to measure the NWE.

Background

In 1981, the American Academy of Nursing created a task force to examine hospital nursing practice due to a significant shortage of nurses in hospitals (McClure et al., 1983). This task force conducted interviews with staff nurses and chief nursing officers of Magnet hospitals that did not have trouble attracting and retaining nurses, despite the shortage in the rest of the United States (U.S.). The purpose of these interviews was to determine attributes present in these hospitals that attracted nurses to work and remain employed there. The results of this landmark study provided the
foundation for understanding what nurses desired in their work environment (McClure et al. 1983).

The 1990s saw a proliferation of literature regarding nursing and the NWE. In 1994, reputational magnet hospitals (those hospitals identified as magnet in the original Magnet Hospital Study) were determined to have significantly lower Medicare mortality rates than other hospitals (Aiken et al., 1994). Further, in 1996 a commissioned review for the Institute of Medicine supported that professional nursing practice environments could reduce Medicare mortality (Institute of Medicine, 1996).

Reports published by the Institute of Medicine in the U.S. during the early 2000s brought patient safety into the forefront of patient care quality discussions and further emphasized the importance of the NWE as it directly relates to patient safety (Institute of Medicine, 2000; 2004). The COVID-19 pandemic has exacerbated concern over a worldwide nurse shortage and the retention of nurses, but even prior to the pandemic, concerns with nurse staffing emphasized the importance of the NWE globally (International Council of Nurses, 2021; World Health Organization, 2020). Therefore, interest in the NWE has spanned from the U.S. in the 1980s to world-wide today (Swiger et al., 2017a).

**Aims**

The purpose of this literature review was to trace the lineage of instruments developed from the NWI to measure the NWE (Kramer & Hafner, 1989). This provides novice researchers of the NWE with an accurate understanding of the history of the primary family of instruments used for measuring the NWE. Additionally, a closer
inspection and examination of the instruments used to measure the NWE provides historical context for the instruments, assesses the present state of the measurement of the NWE, and provides future direction for research on the NWE. Because multiple literature reviews conclude the instruments derived from the NWI are the most frequently used to measure the NWE, only instruments derived from the NWI were included for review in this study (Norman & Sjente, 2017; Swiger et al., 2017; Wei et al., 2018).

Methods
To conduct this scoping review of the literature, a three-pronged search strategy was utilized in October of 2020. First, a research librarian was consulted to determine appropriate search terms and strategies. After finalization of the terms, a search was conducted in three databases: PubMed, CINAHL, and PsycINFO. Because this review explored measurement of the NWE over time, no date limits were applied. Second, a descendancy search of articles citing the NWI and two of its primary descendent instruments, the Revised Nursing Work Index (NWI-R) and Practice Environment Scale of the Nursing Work Index (PES-NWI), was performed. Third, adaptations of instruments identified in two literature reviews on the use of the PES-NWI were also included for review (Swiger et al., 2017a, Warshawsky & Havens, 2011). Only these two literature reviews examining the PES-NWI were used because the PES-NWI is the most frequently and commonly used instrument to measure the NWE (Swiger et al., 2017a). From the search terms and descendancy search, a total of 745 articles were identified for review and input into Covidence software for duplicate elimination. After duplicate removal, 494 articles remained for review and were then exported into a Microsoft Excel file for the
Results

Table 1 provides key summary information for the major instruments. For each instrument, a brief description is provided, as well as information on the validity and reliability established for the original instrument. Additionally, this review will include mention of variations and modifications performed to the instruments, as well other relevant information about how the instrument has been used.
Nursing Work Index (NWI) (1980s)

The first documented use of the NWI occurred in a 1989 publication by Kramer and Hafner. While this was the first report publishing the use of the NWI, later works by Kramer explain that the NWI was developed shortly after the Magnet Hospital Study in 1984 (Kramer & Schmalenberg, 2004). According to Kramer and Hafner (1989), the NWI was developed based on the attributes identified in the Magnet Hospital Study and relevant literature on job satisfaction from 1962 through 1986.

The NWI asked nurses to make three value-based assessments about 65 items that are conceptually related to nursing work and organizational attributes (Kramer & Hafner, 1989). For each item, nurse respondents were asked to rate whether 1) the item is important to their job satisfaction 2) the item is important to their ability to provide quality patient care, and 3) the item is present in their current work environment. One open-ended item at the end of the survey also asked nurse informants to write-in other factors that they feel are important to their job satisfaction and ability to provide care. According to the authors of the original article, the only written responses received were the presence of childcare facilities and the ability to participate in research (Kramer & Hafner, 1989).

Content validity for the instrument was established by expert opinion, specifically by three of the four investigators who conducted the original Magnet Hospital studies (Kramer & Hafner, 1989). As a measure of internal consistency reliability, Cronbach’s alpha scores were reported to range from 0.894-0.928 for each of the three value-based assessment scales on the instrument (Kramer & Hafner, 1989). The original NWI did not contain subscales (Kramer & Hafner, 1989).
Nursing Work Index- Revised (NWI-R) (2000)

In 2000, Aiken and Patrician modified the NWI, creating the Nursing Work Index- Revised (NWI-R). The NWI-R was developed directly from the NWI but had several important differences. First, the intention of the NWI-R was to measure only the presence of certain items in the work environment, rather than also assess the item’s importance to nurse job satisfaction and ability to provide quality patient care. Second, the NWI-R excluded 10 items from the NWI, modified one item, and added an item regarding team nursing (for a total of 57 items). Items were excluded on the basis of whether or not the items were conceptually important to the professional NWE. Third, four subscales were derived conceptually from the NWI-R: autonomy, control over the work environment, relationships with physicians, and organizational support for caregivers (Aiken & Patrician, 2000).

When nurses respond using the NWI-R, they indicate whether they agree that each item is present in their NWE or not using a four-point Likert-scale (Aiken & Patrician, 2000). The Likert-scale ranges from “1” indicating strongly agree to “4” meaning strongly disagree. A lower score indicates a better agreement that the item is present in the nurse’s current NWE. Content validity of the NWI-R was established based on the fact that the parent instrument, the NWI, had established its content validity by including content from the Magnet Hospital Study and expert opinion from the researchers who performed the Magnet Hospital study. Criterion validity was ascertained by confirming that certain units, like those in reputational magnet hospitals or dedicated AIDS units, consistently scored better than non-Magnet hospital units in outcomes such
as nurse burnout, nurse needlestick injuries, patient satisfaction, and patient mortality rates (Aiken & Patrician, 2000). Cronbach’s alpha was determined to be 0.96 for the entire instrument (with subscale alphas of 0.84-0.91). The mean score for each subscale of the instrument is reported as the degree of agreement for the relevant conceptual domain (Aiken & Patrician, 2000). Importantly, responses from the NWI-R were used to describe the NWE at both the unit and hospital level, as some items were expected to be more specific to the unit than the overall hospital and vice versa.

Language and Country Adaptations of the NWI-R

According to Aiken and Patrician (2000), the NWI-R was first used to explore Medicare mortality rates between American reputational magnet hospitals and non-magnet hospitals in the early 1990s. Since its development, the NWI-R was translated into at least five languages other than English, with various modifications, additions, and cultural adaptions (Gunnarsdóttir et al., 2009; Gasparino et al., 2011; Lin et al., 2017; McCusker et al., 2004; Van Bogaert et al., 2009).

The NWI-R was modified or served as a foundation to create other instruments. The Practice Environment Index was created for the Canadian context (Estabrooks et al., 2002). The Perceived Nursing Work Environment Instrument, the Chinese Perceived Nursing Work Environment Instrument, and the Taiwan Nursing Work Environment Index, were also developed using items on the NWI-R (Choi et al., 2004; Lin et al., 2017; Zhao et al., 2013). For the Australian nursing population, Joyce-McCoach and Crookes (2007) adapted the NWI-R and entitled it the NWI-R:A. Palmer (2014) used a nine-item variation of the NWI-R to measure satisfaction among Ecuadorian nurses, although
satisfaction is technically not what the NWI-R was intended to measure. Additionally, the NWI-R was translated into Icelandic, Dutch, French Canadian, and Brazilian Portuguese (Gasparino et al., 2011; Gunnarsdóttir et al., 2009; McCusker et al., 2004; Van Bogaert et al., 2009).

The adaptions of the NWI-R primarily retained the same items and subscales, though wording and contextual modifications made the instrument better suited for the various populations (Gasparino et al., 2011; Gunnarsdóttir et al., 2009; Joyce-McCoach and Crookes, 2007; McCusker et al., 2004). Wording adaptions especially centered around the leadership terms. For example, the Australian nurses pointed out they do not have “directors of nursing,” prompting language amendment for these items (Joyce-McCoach & Crookes, 2009). Some differences from the original NWI-R subscales were also derived. The Dutch adaption for the NWI-R derived a subscale specific for unit level nurse management (Van Bogaert, 2009). The Canadian Practice Environment Index derived a single factor solution for the entire instrument (Estabrooks et al., 2002).

**Nursing Populations/Specialties**

The NWI-R was adapted and validated for at least two specific nursing populations. One study adapted the NWI-R for nurses working in dialysis clinics (Thomas-Hawkins, et al., 2003). The Brazilian version of the NWI-R has been validated for unlicensed assistive nursing personnel (Marcelino et al., 2014).
Practice Environment Scale of the Nursing Work Index (PES-NWI) (2002)

The PES-NWI was first published in 2002 by Lake, with the purpose “to develop a parsimonious, psychometrically sound scale with empirically derived subscales,” (Lake, 2002, p. 177). Using the original 65 items from the original NWI, 31 items were ultimately retained on the PES-NWI based on salient factor loadings (Lake, 2002). These 31 items form five separate subscales: 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 (Lake, 2002).

Similar to the NWI-R, nurses indicate their agreement on a four-point Likert-scale for each of the 31 items (Lake, 2002). Potential scores range from one to four. However, in contrast to scoring on the NWI-R, higher scores on the PES-NWI indicate stronger agreement that the item is present in the nurse’s work environment. To score responses, a mean is derived for each subscale as a subscale score, and then the five subscale scores are averaged together to form a composite score (Lake, 2002). A later publication classified work environments into three categories based on the subscale scores: favorable, mixed, and unfavorable, to help hospital administration understand scores more easily (Lake & Friese, 2006). If hospitals score above 2.5 on four or five subscales, then the work environment is considered favorable. If the hospital has two or three subscales that score above 2.5, the hospital is considered to have a mixed work environment. If only one or no subscales achieve a score of 2.5, then the hospital is deemed to have an unfavorable work environment (Lake & Friese, 2006).
Validity and reliability of the PES-NWI was established in the original publication (Lake, 2002). Items were chosen from the NWI based on the opinions from a hospital staff nurse, Lake, and another nurse researcher as to which items satisfied the definition of a nursing practice environment. The PES-NWI was validated via a known-groups approach, with the assumption that formally recognized Magnet® hospitals (as opposed to the reputational magnet hospitals of the 1980s and early 1990s) would score higher on the PES-NWI than non-Magnet hospitals. Reliability of the overall instrument was reported with a Cronbach’s alpha of 0.82 at the individual nurse level, with subscale reliability ranging from 0.71 to 0.84. Responses to the PES-NWI can also be aggregated to the unit or hospital level to be more descriptive of those contexts.

The PES-NWI has become the most frequently used instrument to measure the NWE globally (Swiger et al., 2017a). In comparison with other instruments, the PES-NWI demonstrated superiority in measuring the NWE due to its validity, reliability, ease to use, comprehensive theoretical underpinnings, and the availability of reference scores to compare hospital performance (Lake et al., 2019). The instrument has been translated into at least 13 different languages, adapted for use in different cultures, and used in global initiatives to measure the NWE (Alzate et al., 2014; Chiang & Lin, 2009; Parker et al., 2010; Sermeaus et al., 2011).

**Revisions and Modifications to the PES-NWI**

Nineteen studies which revised or adapted the PES-NWI were identified through this review. Revisions primarily resulted from translations of the instruments or minor alterations to make it usable for specific nursing populations or different cultures. Some
revisions to the PES-NWI have changed the Likert scale to a six-point scale (Boev et al., 2012) or a five-point scale (Friese, 2012; Liou & Cheng, 2009). Some revisions have shortened the instrument (Friese, 2012; Liou & Cheng, 2009; Middleton, 2008; Parker et al., 2010) or increased the number of items (Sermeus et al., 2011). Other revisions have added new subscales, including subscales related to technology (Moorer et al., 2010) and medical assistant contributions to the work environment (Friese, 2012). Most revised versions from the PES-NWI were based on language adaptions. However, at least one significant modification used in a large multi-country study deserves mention. The revised PES-NWI (PES-NWI-R) contained 32 items and was created to be administered to nurses in 12 different countries to compare the perceived NWE among the different countries as part of the RN4CAST study (Sermeus et al., 2011). The PES-NWI-R differs from the PES-NWI in that one item was removed from each of the following subscales: Nursing Foundations for Quality of Care; Nurse Participation in Hospital Affairs; and Nurse Manager Ability, Leadership, and Support of Nurses. The PES-NWI-R then added four items to the Collegial Nurse-Physician Relations subscale to form a total seven items on that subscale (Sermeus et al., 2011).

Language/Country Culture Adaptions

The PES-NWI has been translated into at least 15 languages, including Chinese (Liu et al., 2012), Danish (Mainz et al., 2015), Spanish for Spain (De Pedro-Gómez et al., 2012; Fuentelsaz-Gallego et al., 2013), Spanish for Colombia (Alzate et al., 2014), and Portuguese for Portugal (Ferreira et al., 2014). A modified 26 item PES-NWI has also been validated for use specifically for Portuguese hospitals (Nascimento et al., 2021).
The PES-NWI-R from the RN4CAST Study contained at least 10 different translations (Sermeaus et al., 2011).

Various new instruments have also been derived from the PES-NWI. Middleton and colleagues (2008) created a PES-AUS, or the Australian version the PES-NWI. This Australian adaption excluded the item related to nursing diagnoses and modified leadership titles contained within the items (Middleton et al., 2008). The Chinese Nursing Practice Environment Scale also has its roots in the PES-NWI and contains leadership title rewording as well as practice examples in items enhance its relevance for Chinese nursing practice (Chiang & Lin, 2009). One study validated the PES-NWI for Asian nurses working in the U.S. (Liou & Cheng, 2009). In 2020, the Spanish version of the PES-NWI was validated in the undergraduate student nurse population in Spain (Rodríguez-García et al., 2020).

**Nursing Populations/Specialties**

Nursing population-based validations include PES-NWI versions specific to mental health nurses (Hanrahan, 2007), nurses working in ambulatory oncology (Friese, 2012), nurses working for the U.S. military (Swiger et al., 2017b), and nurses in rural regions of the U.S. (Havens et al., 2012). In Spain, a version of the PES-NWI was developed and validated for primary care (De Pedro-Gómez et al., 2012). The original PES-NWI has also been used to assess the work environment of nurses working in dialysis clinics (Gardner et al., 2007). Several studies have used the PES-NWI or a validated modification of it with care providers other than direct care registered nurses,
such as nursing assistants, licensed practical nurses, midwives, and medics (Friese et al., 2012; Swiger et al., 2017b).

**Essentials of Magnetism (2004)**

From the NWI, Kramer and Schmalenberg (2004) developed the Essentials of Magnetism (EOM) (Kramer et al., 2017; Kramer & Schmalenberg, 2004). According to Schmalenberg and Kramer (2008), the goal for the creation of the EOM was to measure a “productive work environment” (p. 3). The reason for focusing on identifying items capable of measuring a productive work environment came from previous work, in which they discovered that 80% of job satisfaction was explained by a nurse’s perception that they were able to give quality patient care (Kramer & Schmalenberg, 2004).

In developing the EOM, Kramer and Schmalenberg (2004) realized that there were many items on the NWI that were never or rarely selected by nurses as important to their job satisfaction or ability to provide quality patient care. They reduced the original 65 item NWI to 37 items and called this new tool “Dimensions of Magnetism.” By providing the Dimensions of Magnetism tool to hospital nurses, the instrument was further narrowed down into eight essential components that enabled nurses to provide high quality patient care (Kramer & Schmalenberg, 2004). Kramer and Schmalenberg (2004) then conducted interviews and observations of nurses in hospitals to define and determine what the best items would be to measure each of the eight “magnetic” properties derived from the NWI. Ultimately, a 54-item instrument was developed to measure the essential components of magnetism desired by nurses. This instrument is known as the EOM.
A total of eight subscales were derived on the EOM: 1) Adequacy of Staffing, 2) Support for Education 3) Nurse-Physician Relationships, 4) Working with Clinically Competent Nurses, 5) Autonomy 6) Control Over Nursing Practice, 7) Values, 8) and Nurse Manager Support (Kramer & Schmalenberg, 2004, p. 371). Seven of the eight subscales for the EOM are scored via four-point Likert-scale (Schmalenberg & Kramer, 2007). The subscale pertaining to physician and RN relationships is scored differently, as nurses are asked to indicate how frequently the items are true of physicians. Overall scoring procedures are as follows: “The sum of the weighted items equals the score for the subscale. Professional job satisfaction, equivalent to productive work environment, is the composite score for the 8 subscales,” (Schmalenberg & Kramer, 2007, p. 462). The items were weighted based on the ranked results of interviews with nurses (Kramer & Schmalenberg, 2004). Cronbach’s alphas were originally reported for each subscale and ranged from 0.80 to 0.90 (Kramer & Schmalenberg, 2004).

**Essentials of Magnetism II**

In 2006, Kramer and Schmalenberg made significant changes to the subscales of the EOM measuring nurse manager support and staffing adequacy, calling this new version of the instrument the Essentials of Magnetism II (EOM II) (Schmalenberg & Kramer, 2008). The EOM II and contains 58 items with a four-point Likert-scale for each item (Kramer et al., 2011). According to Kramer and colleagues (2011), the eight subscales of the EOM II are added together to obtain a total work environment score. The subscales of the EOM II measure nurse report of productive work environments, or the ability to provide quality patient care (Schmalenberg & Kramer, 2008). The subscales of

**Language/Country Culture Adoptions**

The EOM II was validated for use in the United Kingdom, the Netherlands, and China (de Brouwer et al., 2014; Lin et al., 2017; Oshdodi et al., 2017). Of note, Lin and colleagues (2017) merged components of the NWI-R and the EOM II to form their instrument, the Taiwan Nursing Work Index. According to Kramer and colleagues (2014), the EOM II has been translated and used in 17 countries.

**Nursing Populations/Specialties**

De Brouwer and colleagues (2017) evaluated the psychometrics of Dutch EOM II for use in nursing homes and determined that five of the eight subscales of the EOM II were reliable and valid for nurses working in Dutch nursing homes. No other unique nursing populations or specialties using the EOM II were identified in this review.

**Dimensions of Magnetism II**

A 2014 publication by Kramer and colleagues updated the EOM by identifying elements that are most essential to nursing practice and created a new instrument called the “Dimensions of Magnetism II” (DOM II). The DOM II asked respondents to use a Likert-scale to indicate the importance of each item to the nurse’s ability to achieve
"desired patient outcomes" (Kramer et al., 2014, P. 572). The results of what nurses deemed important in the administration of this 51-item instrument provided the framework of items that would guide the creation of a new instrument which will be discussed in the next section.

**Essential Professional Nursing Practices**

After holding group discussions with nurse executives and educators and administering the DOM II to direct care nurses, Kramer and colleagues (2017) developed a new 43-item instrument entitled the “Essential Professional Nursing Practices” (EPNP) instrument. The goal of this instrument was to specifically measure the process of nursing care practices, with process presented as an essential component in Donabedian’s structure, process, and outcomes conceptual framework (Donabedian, 1980 as cited in Kramer et al., 2017). The article introducing the EPNP also describes the use of a separate 16-item outcome satisfier instrument, in which nurses were asked to rate their satisfaction with three factors: 1) job satisfaction, 2) practice satisfaction, and 3) patient satisfaction. Direct care nurses were given both instruments to determine their psychometric properties. Eight subscales were identified for the EPNP instrument including: 1) RN, physician, and interdisciplinary collaboration 2) Autonomous decisions 3) Patient advocacy 4) Evidence-based practice 5) Multiple patients 6) Sufficient competent RNs 7) Cohesive team 8) Control over practice (Kramer et al., 2017, p. 281). The Cronbach’s alphas for these subscales ranged from 0.74-0.96. For the three-subscale outcome satisfier instrument, Cronbach’s alpha values ranged from 0.79-0.88 (Kramer et al., 2017).
Summary of Findings

Although all the instruments presented in this article ask for input from nurses, conceptualizations of exactly what is measured differs between the instruments. For instance, the NWI-R was meant to be an all-encompassing list of factors important to nurses’ job satisfaction and ability to provide quality patient care (Aiken & Patrician, 2000). The PES-NWI sought only to measure factors directly associated with the practice environment of nurses (Lake, 2002). The EOM was intended to measure components necessary for “magnetism” in hospitals (Kramer & Schmalenberg, 2004). Based on the results of the DOM II, the EPNP instrument was designed to measure nursing practices only, without measuring structures within the work environment (Kramer et al., 2017).

Although descendent instruments of the NWI may be designed to measure slightly different concepts or areas, many of the subscales or main elements of measurement have remained similar among the instruments. For instance, subscales measuring nurse-physician relations are included in the NWI-R, PES-NWI, EPNP, EOM and EOM II (Aiken & Patrician, 2000; Kramer et al., 2017; Kramer & Schmalenberg, 2004; Lake, 2002; Schmalenberg & Kramer, 2008). Subscales and items related to staffing, autonomy, and control over practice are also consistently present within these instruments (Aiken & Patrician, 2000; Kramer et al., 2017; Kramer & Schmalenberg, 2004; Lake, 2002; Schmalenberg & Kramer, 2008).

Of note, many of the modified or adapted versions did not undergo exploratory or confirmatory factor analysis to determine the factorial structure of the instrument when it was adapted, modified, or translated. As most of the instruments contain subscales, the structural validity of some instruments may be questionable.
Discussion

Based on the results of this literature review, it is evident that the NWE has been a focus of study for the past 40 years. Additionally, the instrument that has been adapted most frequently for measuring the NWE appears to be the PES-NWI. Instruments descended from the NWI have survived over decades of research examining the NWE. Their use in gathering input from nurses to explore both nurse and patient outcomes continues to today (Lake et al., 2019). Researchers interested in measuring aspects of the NWE should clearly identify the concept they desire to measure (i.e., magnetism of the work environment vs only elements of the practice environment). Then, depending on their population (care setting, language spoken, etc.) and consideration of other factors such as survey length, they can then identify which instrument measuring the NWE is best for their purposes. If a researcher’s interest lies in obtaining information about a comprehensive list of NWE items, then the EOM II or NWI-R should be considered. If a researcher needs a more concise instrument or desires to compare their findings with those from a large variety of other studies, then the PES-NWI may be the best choice.

Evidence that the NWE is associated with both nurse and patient outcomes continues to grow and is supported by meta-analysis and extensive literature reviews (Lake et al., 2019; Lee & Scott, 2018; Wei et al., 2018). Therefore, measurement of the NWE must continue and be refined to reflect current nursing practice environments. With the exception of much of Kramer and colleagues recent work (2017), the instruments most frequently used, the PES-NWI and NWI-R, have not had their items significantly examined or updated since their original development. If these instruments continue to be used, future research should examine their applicability to nursing practice today and
determine if additional items are needed to measure the NWE of the 21st century.

Refinement, applicability, and modernization of instruments measuring the NWE was a recommendation in several of the articles included in this review (e.g., Hanrahan, 2007; Liou & Cheng, 2009; Parker et al., 2010; Swiger et al., 2017b).

A validity concern to many of the adapted or modified instruments is that they did not undergo an exploratory or confirmatory factor analysis. While most of the instruments reported a reliability coefficient (Cronbach’s alpha), only factor analysis can determine dimensions of an instrument, which is particularly important if an instrument may have subscales or has multiple components compose a whole construct (Echambadi et al., 2006). Especially when adapting instruments to a new culture with a drastically different health care system, it cannot be automatically assumed that the instrument’s original subscales will hold for the new culture as well. Therefore, this could be an area suitable for additional research, in addition to repeated study of instrument adaptions to ensure consistency of the instrument’s measurability for the specific population.

Considering the present state of NWE measures, most of the instruments in this review lack items pertaining to technology, nursing teamwork, or interdisciplinary collaboration with team members other than physicians. Other instruments measuring work environments in healthcare often includes these or similar measures (Maassen et al., 2020). Due to the complexity of the health care environment, and in light of the call for modernization of the instruments, these areas could be particularly salient for inclusion on future instruments measuring the NWE.
Limitations

The sheer scope of NWE literature over the past 40 years makes it probable that relevant articles have been unintentionally omitted. However, a robust and systematic collection of articles has been included here depicting the family of instruments derived from the original Magnet Hospital Study and the NWI. Additionally, this review focused on NWI descendent instruments, rather than other instruments designed to measure the NWE that did not use the NWI as the basis for their creation. However, the goal of this review was to trace the lineage of NWI instruments, as these are the most commonly used (Norman & Sjetne, 2017).

Conclusion

This article chronicled the lineage of instruments derived from the original Magnet Hospital Study to measure the NWE. The NWE is frequently studied and has gained global attention because of its association with nurse and patient outcomes. Therefore, it is no wonder that so many adaptations, modifications, and alterations have been made to these instruments. From the foundational work set forth in the NWI, hundreds of thousands of nurses have been asked to provide an account of their perception of the NWE. Therefore, the importance of measuring the NWE accurately is essential.

Relevance to Nursing Research

The instruments contained in this review are some of the most frequently used to measure the NWE and have established the NWE’s association with nurse and patient
outcomes. Novice nurse researchers of the NWE and consumers of NWE literature can use the information presented here to help inform themselves about choices they make in developing surveys or learning about NWEs. The findings reported here may assist with choosing which instrument should be used to measure a NWE, understand what is measured with each instrument, and prioritize the areas of the NWE in an organization needing the most immediate improvement.


*Oshodi, T. O., Crockett, R., Bruneau, B., & West, E. (2017). The nursing work environment and quality of care: A cross-sectional study using the Essentials of


<table>
<thead>
<tr>
<th>Purpose of the instrument</th>
<th>Nursing Work Index (NWI)</th>
<th>Revised Nursing Work Index (NWI-R)</th>
<th>Practice Environment Scale of the Nursing Work Index (PES-NWI)</th>
<th>EOM II</th>
</tr>
</thead>
<tbody>
<tr>
<td>“… designed to measure four variables: work values related to staff nurse job satisfaction (JSV) and perceived productivity (PPV), staff nurse job satisfaction (JS), and staff nurse perception of an environment conducive to quality nursing care (PP).” (p. 173)</td>
<td>Measurement of “characteristics of a professional nursing practice environments, p. 146-153)”</td>
<td>“…a scale that would measure the hospital nursing practice environment,” (p. 184).</td>
<td>“… to measure each element essential to a productive work environment,” (p. 3).</td>
<td></td>
</tr>
<tr>
<td>Number of items; subscales</td>
<td>65 items; No subscales, but three value scales</td>
<td>57 items; 3 subscales</td>
<td>31 items 5 subscales</td>
<td>58 items 8 subscales</td>
</tr>
<tr>
<td>Validity Establishment (In original publication)</td>
<td>Content Validity:</td>
<td>Criterion Validity:</td>
<td>Construct Validity:</td>
<td>Structural Validity:</td>
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<tr>
<td>Expert opinion, literature from the 1970s and 80s about job satisfaction</td>
<td>Assumed because it was derived from the NWI</td>
<td>Associations with certain organizational characteristics (i.e. higher scores are associated with Magnet hospitals and AIDS units, which were known for better nurse outcomes)</td>
<td>Known groups approach using Magnet Hospitals</td>
<td>Confirmatory factor analysis</td>
</tr>
<tr>
<td>Content validity:</td>
<td>Criterion Validity:</td>
<td>Construct validity:</td>
<td>Structural validity:</td>
<td></td>
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<tr>
<td>Content validity:</td>
<td>Correlated job satisfaction score with turnover rate from previous year</td>
<td>Known groups; Magnet vs non-Magnet hospitals</td>
<td>Known groups; Magnet vs non-Magnet hospitals</td>
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<td>Reliability Establishment (In original publication)</td>
<td>Internal Consistency:</td>
<td>Representativeness:</td>
<td>Internal Consistency:</td>
<td>Stability:</td>
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<tr>
<td>Cronbach’s alpha: 0.894-0.928</td>
<td>Ensured representativeness of sample</td>
<td>Cronbach’s Alpha: Individual level: 0.82 (composite)</td>
<td>Cronbach’s alpha: 0.96</td>
<td>Comparing results of the 2003 EOM with the 2006 EOM II</td>
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<tr>
<td>Controlling for heterogeneity: Hierarchical linear modeling</td>
<td>Hospital level interitem correlation: 0.69</td>
<td>Mean rater reliability: Intra class correlations: Hospital level: 0.88-0.97</td>
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<tr>
<td>Stability: No significant differences between data used in publications from Kramer and Hafner (1989) and Aiken et al. (1994).</td>
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<tr>
<td>Number of Identified Translations or Adaptions</td>
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<tr>
<td>Number of studies citing the original article via SCOPUS search (December, 2021)</td>
<td>225</td>
<td>542</td>
<td>854</td>
<td>124</td>
</tr>
</tbody>
</table>

**Internal consistency:** Cronbach’s alpha: 0.96
MEASURING THE WORK ENVIRONMENT IN 2022: THE VOICE OF THE STAFF NURSE

by

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Abstract

**Objective:** To obtain direct care hospital nurse input on the relevance of the Practice Environment Scale of the Nursing Work Index (PES-NWI) and to determine if additional items are needed to measure the contemporary nursing work environment (NWE).

**Background:** Instruments accurately measuring the NWE are essential due to the NWE’s association with nurse, patient, and organizational outcomes. However, the most frequently used instrument for measuring the NWE has not been scrutinized by today’s practicing direct care nurses to ensure its current relevancy.

**Methods:** We administered a survey with a modified PES-NWI and open-ended questions to a national sample of direct care hospital nurses.

**Results:** Three items from the PES-NWI may be suitable for removal and additional items may be added to accurately measure the current NWE.

**Conclusion:** Most PES-NWI items remain relevant for modern nursing practice. However, some revisions could enable greater precision in measuring the current NWE.

_**Keywords:** Instrumentation, nursing work environment, job satisfaction, quality patient care_
Measuring the Work Environment in 2022: The Voice of the Staff Nurse

For the better part of four decades, the nursing work environment (NWE) has been a topic of study in the United States (U.S.) (Kramer & Hafner, 1989; McClure et al., 1983; Swiger et al., 2017). As NWE research enters its fifth decade of study, there is a need for empirical evidence from the viewpoint of currently practicing nurses for the work environment factors that are associated with nurse job satisfaction and the ability to provide quality patient care. The primary instruments used to measure the NWE have not changed substantially since their content was created in the 1980s (Aiken & Patrician, 2000; Kramer & Hafner, 1989; Lake, 2002). Therefore, the importance of the instruments’ items to nurses currently practicing in acute care hospitals is called into question.

Background

Aspects of a favorable NWE were first identified in the 1980s during the original Magnet Hospital Study (Kramer & Hafner, 1989; McClure et al., 1983; Swiger et al., 2017). The focus of the Magnet Hospital Study was to determine which elements were most important for retaining and attracting nurses to a hospital (McClure et al., 1983). These elements were later used to create instrumentation to measure the NWE (Kramer & Hafner, 1989).

Since the original Magnet Hospital Study occurred, the associations between favorable NWEs and better patient and nurse outcomes have been well established (Lake et al., 2019; Swiger et al., 2018). In the U.S., national public attention was drawn to the
NWE with the Institute of Medicine’s report recognizing the NWE as an essential component relating to patient safety in hospitals (Institute of Medicine (US) Committee on the Work Environment for Nurses and Patient Safety, 2004). Globally, the importance of better NWEs has recently been highlighted because of its relationship with better patient outcomes (World Health Organization, 2020).

Determination of the favorability of work environments for practicing nurses is performed by measurement of the NWE via a variety of survey instruments (e.g. the Revised Nursing Work Index, Practice Environment Index, RN Working Conditions Barometry Index) (Aiken & Patrician, 2000; Estabrooks et al., 2002; Tervo-Heikkinen et al., 2008). Currently, the Practice Environment Scale of the Nursing Work Index (PES-NWI) (Lake, 2002) is the most frequently used instrument worldwide to measure the NWE (Swiger et al., 2017; Zangaro & Jones, 2019).

The Original PES-NWI

The PES-NWI has been used in at least 28 different countries and has been administered to hundreds of thousands of nurses since its publication (Swiger et al., 2017). The original PES-NWI, developed by Lake (2002), contains 31 items and allows nurses to indicate on a four-point Likert scale (1=strongly disagree, 2=disagree, 3=agree, 4=strongly agree) the extent to which they agree that the items are present in their current work environment. The 31 items divide into 5 subscales: 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 (Lake, 2002). For each individual responder, the items in each subscale are averaged to form a subscale score. Then, each subscale score is averaged together to form a composite score. These scores can then be aggregated at the unit or hospital level (Bachnick et al., 2018; Breckenridge-Sproat et al., 2012; Lake, 2002). The PES-NWI displayed adequate psychometric properties as evidenced by validity and reliability assessments including a Cronbach’s alpha of 0.82 for the entire instrument and a range from 0.71 to 0.84 for the subscales (Lake, 2002). Lake derived the items for the PES-NWI directly from the PES-NWI’s parent instrument, the Nursing Work Index (Lake, 2002).

*The Parent Instrument: The Nursing Work Index (NWI)*

Nursing Work Index (NWI) is a 65-item instrument developed from the results of the Magnet Hospital Study and job satisfaction literature from the 1960s through 1980s (Kramer & Hafner, 1989). In addition to measuring the presence of the 65 work environment items, the NWI asks nurses to respond to two value assessments for each item, indicating if the item was important to their job satisfaction and important to their ability to provide quality patient care. Kramer and Hafner reported the NWI displayed adequate psychometric properties, such as Cronbach’s alpha values of 0.894 or greater (Kramer & Hafner, 1989).
Purpose

Because the items on the PES-NWI were derived from nurses and literature of the 1960s-1980s, their relevancy to nurses practicing today is questionable. To ascertain the importance of the PES-NWI’s items to currently practicing nurses, we aimed to re-evaluate the items on the PES-NWI and determine if additional items are needed to encompass elements that would capture what a favorable NWE looks like in the context of contemporary healthcare environments.

Methods

Instrumentation: The Modified PES-NWI

The modified PES-NWI administered in this study contains the original 31 items of the PES-NWI, utilizes the same four-point Likert scale, and asks nurses to agree or disagree that each item is present in their work environment. However, it has several important additions. First, the two value assessments from the NWI were added to the modified PES-NWI (Kramer & Hafner, 1989). The additional two value statements allow nurses to rate their agreement that each item is 1) important to their job satisfaction and 2) important to their ability to provide quality patient care. These value statements are scored on a four-point Likert scale, with a score of one indicating the nurse strongly disagrees that the item is important to either their job satisfaction or ability to provide quality patient care and a score of four indicating that they strongly agree that the item is important. Items added to the PES-NWI are those that relate to technology, (Moorer et al., 2010) medical assistants, (Friese, 2012) and additional items suggested by nursing
experts in this research field. Three other items with updated wording were included to examine if they were perceived more favorably by nurses than the original items. A total of 50 items were contained in this modified PES-NWI. Lastly, three open-ended questions were asked. The first two questions allowed nurses to write in additional factors that they think are important to their job satisfaction or ability to provide quality patient care. The last open-ended question asked nurses what top three factors created a positive work environment. The complete modified PES-NWI can be seen in Table 2 with the analysis results.

**Design and Sample**

We performed a cross-sectional exploratory study. An invitation to participate was sent to hospitals currently or previously participating in Press Ganey’s National Database of Nursing Quality Indicators (NDNQI) annual survey. Interested hospitals were sent a link to an electronic online survey containing the modified PES-NWI which they could distribute to their respective nursing staff. Data collection occurred from May-July of 2021. We obtained additional information from nurse respondents about demographic characteristics, job satisfaction, and their position. For this study, only direct care hospital registered nurses (RN) who provide hands-on patient care greater than 50% of their time at work were included in our sample.


Ethical Considerations

This study was approved by the institutional review board of the first author’s university.

Data Analysis

To determine the relevancy of the items contained on the modified PES-NWI, we calculated item-level content validity indices (I-CVI). An I-CVI is a measure in which item relevance is determined by experts based on calculating a proportion of agreement (Polit & Yang, 2015). Currently practicing direct care nurses were considered the experts to perform this validation procedure, and therefore, we used their responses to calculate I-CVI values. The four-point Likert scale responses used to measure the agreement of an item’s importance to 1) job satisfaction, and 2) the ability to provide quality patient care were dichotomized to simply “agree” or “disagree.” Each item was assessed individually for the percentage that nurses agreed that it was important to their job satisfaction and ability to provide quality patient care. If greater than 80% (I-CVI of 0.80) of nurses agreed that it was important, then the item was considered contemporarily important. I-CVI values as low as 0.78 are considered an excellent amount of agreement (Polit et al., 2007; Polit & Yang, 2015). However, previous literature using a similar method used an 80% cut-off (Flynn et al., 2005). Therefore, we decided to use the 0.80 cut-off point to be congruent with previous literature and to be more critical toward the items in an attempt to keep only those with the most relevance to the greatest number of nurses.
Next, we analyzed the results from the three open-ended questions to determine if the modified instrument left off any items that are particularly salient to nurses’ conceptualization of job satisfaction and ability to provide quality patient care. To this end, the responses were descriptively examined using content analysis for repetitive or similar ideas that could inform additional items to include on a new instrument (Elo & Kyngäs, 2008; Polit & Beck, 2017). Content analysis is a descriptive process that is often used to analyze documents or other written text for overall conceptualizations of ideas (Elo & Kyngäs, 2008; Lune & Berg, 2017). Taking into account the frequency of responses, an inductive approach was utilized by which participant ideas were coded and incorporated into larger categories, which formed potential items to be included on a new instrument (Elo & Kyngäs, 2008; Polit & Beck, 2017).

Results

The sample included responses from 818 direct care nurses in 24 hospitals and 252 unique units. Table 1 contains additional demographic information about the sample and Table 2 contains the I-CVI for each item. Nurses indicated that 28 out of the original 31 items were important for both their job satisfaction and ability to provide quality patient care. The three items that fell below the cut-off of 0.80 on both the job satisfaction and quality of care value scales were: 1) A chief nursing officer equal in power and authority to other top-level hospital executives; 2) Documented, up-to-date nursing care plans for all patients; and 3) Use of nursing diagnoses. Several items failed to achieve the 0.80 I-CVI cut-off on only one of the value scales. “Career development/clinical ladder opportunity,” and “Opportunities for advancement,” scored above 0.80 for job
satisfaction, but not the ability to provide quality patient care. Additionally, “A chief nursing officer who is highly visible and accessible to staff,” barely made the cut-off, with an I-CVI of 0.80 to job satisfaction and 0.71 to providing quality care.

Of the 19 added items, all had values greater than 0.80, and therefore could be suitable for retention. However, 3 of the added items were re-wordings of existing items, all of which had higher I-CVIs than the existing items. Overall, most items scored above 0.90. Specifically, the items pertaining to nursing teamwork and nurse-physician relations all scored above 0.98.

Table 3 contains findings from the content analysis. Overall, 551 nurses (67% of the total respondents) provided a response to the open-ended questions. The most frequently mentioned ideas fell into the categories of Teamwork/Work Relations, Leadership, Staffing, and Pay/Benefits. Based on responses from the content analysis, potential new items may contain ideas related to equipment, staffing based on acuity, interdisciplinary collaboration and teamwork, and items related to patients. Figure 1 contains suggested potential new items to evaluate on future versions of the instrument.

Discussion

Findings from this study support that overall, most items on the PES-NWI have retained their importance over time. However, inclusion of additional items may better describe the current NWE. Future studies will be required to assess a new instrument based on these findings.
Although not necessarily directly part of the work environment, many nurses mentioned pay/benefits and scheduling flexibility/work-life balance were important to their job satisfaction. Rather than including these items as part of a modified instrument, we suggest asking these items as single item measures. Single item measures can provide reliable results for simple concepts, and evidence for using single item measures rather than multi-item scales is supported in survey research (Patrician, 2004; Turon et al., 2019). Nurses reported the items of pay and scheduling items to be important, so asking these separately may allow researchers or administration to collect valuable information about nurse satisfaction with these items.

According to Kramer and Schmalenberg as cited in McClure, (McClure et al., 2002) use of nursing diagnoses and care plans were identified as unimportant to nurses in the magnetism of hospital environments before 2001. This finding is consistent with the low I-CVI values we found in our study for these items. Other contexts have removed the nursing diagnoses item in the past, such as in the Australian adaption of the PES-NWI, which removed the item due to practice irrelevance for Australian nurses (Middleton et al., 2008).

According to Kramer and Hafner, the only answers participants wrote into the original open-ended question of the Nursing Work Index were options for childcare and the ability to participate in research (Kramer & Hafner, 1989). Interestingly, no participants mentioned childcare in this study. Research, however, in the context of evidence-based practice, was mentioned by two participants. More recently, an analysis of comments made on an Essentials of Magnetism II instrument in England found comparable results to ours (Oshodi et al., 2019). Specifically, findings from their study
also illuminated the importance of teamwork and management to practicing nurses (Oshodi et al., 2019).

The items pertaining to nurse teamwork and nurse-physician relations were important to job satisfaction and quality of care for almost 100% of nurses in the sample. Previous research has indicated that nursing teamwork is associated with greater levels of job satisfaction and quality patient care (Kaiser & Westers, 2018; Purdy et al., 2010). Similarly, a previous meta-analysis found that nurse-physician collaboration is positively associated with job satisfaction (Zangaro & Soeken, 2007). Therefore, the nearly 100% agreement among nurses about the importance of teamwork and nurse-physician collaboration is not surprising. Due to the extreme importance of these areas, they may serve as appropriate targets for improvement when attempting to create more favorable NWEs.

Interestingly, our study found the CNO items were not as highly rated as the nurse manager items. The association of nursing leadership and patient outcomes is well established (Akbiyik et al., 2020; Wong et al., 2013). Review of nursing leadership literature indicates that it is specifically relationship-based leadership styles which seem to have a stronger effect on patient outcomes than task-based leadership styles (Akbiyik et al., 2020). Similarly, authentic leadership is associated with outcomes such as improved job satisfaction and decreased levels of bullying, incivility, burnout, and emotional exhaustion (Alilyyani et al., 2018). In light of current leadership literature, perhaps the perceived importance of a CNO seems relatively unimportant to nurses compared to having a leader with a high-quality leadership style. Alternatively, the CNO
position may be so far removed from direct care practicing nurses that they do not understand what CNOs contribute at an organizational level.

Limitations

Data collection occurred from May-July of 2021, during the COVID-19 pandemic. The perspectives of nurses could be influenced by their experience working in the pandemic. Further, in-depth qualitative interviews could have provided more insight into nurses’ actual perception of the items. However, it would be costly and difficult to conduct interviews or focus groups with large numbers of nurses from many different locations in the U.S. who represent many different areas of hospital nursing practice. The current study allowed for a diverse sampling opportunity, despite its being a convenience sample. Lastly, this study was conducted with participants from the U.S., and may not be generalizable to international populations. Further work is required to ensure international relevance of the items.

Implications for Nurse Leaders

Based on these findings, several implications may guide nurse leaders. First, some areas of the NWE continue to be a priority, such as staffing, nursing leadership, and nurse-physician relations. However, additional areas have been identified as important, particularly teamwork, technology, and civility. To best address concerns facing hospital administration, such as nursing shortages after the “mass traumatization” of the nursing workforce due to COVID-19, (International Council of Nurses, 2021) perhaps
intervention in these newly identified areas may be helpful. Consideration of team building and ways to improve civility may enhance nurses’ perceptions of a favorable NWE.

**Conclusion**

While the vast majority of items on the PES-NWI have shown timeless importance to practicing nurses, several new domains of the NWE have been identified to create favorable work environments. Future research must be conducted with the newly developed instrument to establish its psychometric properties, as well as to ensure that it is valid for global use. Precision in measuring the NWE will be of utmost importance in allowing hospitals and leaders to pinpoint improvement efforts that could assist with the improvement of the NWE.


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Table 1  
Demographics (n=662-815)  

<table>
<thead>
<tr>
<th>Variables</th>
<th>Freq</th>
<th>%</th>
<th>Variables</th>
<th>Freq</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong> (n=794)</td>
<td></td>
<td></td>
<td><strong>Work Type</strong> (n=800)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>668</td>
<td>84.1</td>
<td>Full-time</td>
<td>649</td>
<td>81.1</td>
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<tr>
<td>Male</td>
<td>83</td>
<td>10.5</td>
<td>Part-time</td>
<td>115</td>
<td>14.4</td>
</tr>
<tr>
<td>Prefer not to disclose</td>
<td>38</td>
<td>4.8</td>
<td>Per diem</td>
<td>36</td>
<td>4.5</td>
</tr>
<tr>
<td>Gender-non conforming/other</td>
<td>5</td>
<td>0.7</td>
<td><strong>Unit Type</strong> (n=662)</td>
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<td></td>
</tr>
<tr>
<td><strong>Race</strong> (n=776)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>American Indian or Alaska Native</td>
<td>6</td>
<td>0.8</td>
<td>Medical Surgical</td>
<td>232</td>
<td>35.0</td>
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<tr>
<td>Asian/ Pacific Islander</td>
<td>94</td>
<td>12.1</td>
<td>Others</td>
<td>317</td>
<td>47.9</td>
</tr>
<tr>
<td>Black/African American</td>
<td>29</td>
<td>3.7</td>
<td><strong>Job Satisfaction</strong> (n=815)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic/Latina(o)</td>
<td>71</td>
<td>9.1</td>
<td>Very dissatisfied</td>
<td>46</td>
<td>5.6</td>
</tr>
<tr>
<td>White</td>
<td>517</td>
<td>66.6</td>
<td>Somewhat dissatisfied</td>
<td>119</td>
<td>14.6</td>
</tr>
<tr>
<td>Other/Mixed</td>
<td>59</td>
<td>7.6</td>
<td>Somewhat satisfied</td>
<td>368</td>
<td>45.2</td>
</tr>
<tr>
<td><strong>License</strong> (n=805)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Registered Nurse</td>
<td>786</td>
<td>97.6</td>
<td><strong>Quality of Nursing Care</strong> (n=815)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Advanced Practice Degree</td>
<td>19</td>
<td>2.4</td>
<td>Poor</td>
<td>9</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Education</strong> (n=790)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diploma</td>
<td>13</td>
<td>1.6</td>
<td>Good</td>
<td>350</td>
<td>42.9</td>
</tr>
<tr>
<td>Associate Degree</td>
<td>124</td>
<td>15.7</td>
<td>Excellent</td>
<td>381</td>
<td>46.7</td>
</tr>
<tr>
<td>Baccalaureate Degree</td>
<td>590</td>
<td>74.7</td>
<td><strong>N</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Master’s Degree</td>
<td>60</td>
<td>7.6</td>
<td><strong>Age</strong></td>
<td>731</td>
<td>41.0 (12.6)</td>
</tr>
<tr>
<td>Doctoral Degree</td>
<td>3</td>
<td>0.4</td>
<td><strong>Years as RN</strong></td>
<td>785</td>
<td>16.8 (12.1)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Years on Unit</strong></td>
<td>784</td>
<td>9.0 (7.2)</td>
</tr>
</tbody>
</table>
Table 2

*Item Level Content Validity Indices (n=791-817)*

<table>
<thead>
<tr>
<th>Item</th>
<th>I-CVI JS</th>
<th>I-CVI QOC</th>
<th>Remove?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Career development/clinical ladder opportunity.</td>
<td>0.86</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>2. Opportunity for staff nurses to participate in policy decisions.</td>
<td>0.93</td>
<td>0.93</td>
<td></td>
</tr>
<tr>
<td>3. A chief nursing officer who is highly visible and accessible to staff.</td>
<td>0.80</td>
<td>0.71</td>
<td></td>
</tr>
<tr>
<td>4. A chief nursing officer equal in power and authority to other top-level hospital executives.</td>
<td>0.77</td>
<td>0.75</td>
<td>X</td>
</tr>
<tr>
<td>5. Opportunities for advancement.</td>
<td>0.89</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>6. An administration that listens and responds to employee concerns.</td>
<td>0.95</td>
<td>0.93</td>
<td></td>
</tr>
<tr>
<td>7. Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees).</td>
<td>0.91</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td>8a. Staff nurses have the opportunity to serve on hospital and nursing committees.</td>
<td>0.88</td>
<td>0.89</td>
<td></td>
</tr>
<tr>
<td>8b. Staff nurses have the opportunity to influence the outcomes of hospital and nursing decisions made by committees.</td>
<td>0.91</td>
<td>0.91</td>
<td></td>
</tr>
<tr>
<td>9. Nursing managers consult with staff on daily problems and procedures.</td>
<td>0.96</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>10. Active staff development or continuing education programs for nurses.</td>
<td>0.95</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>11. High standards of nursing care are expected by the administration.</td>
<td>0.97</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td>12. A clear philosophy of nursing that pervades the patient care environment.</td>
<td>0.94</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>13. Working with nurses who are clinically competent.</td>
<td>0.98</td>
<td>0.98</td>
<td></td>
</tr>
<tr>
<td>14. An active performance improvement or evidence-based practice program.</td>
<td>0.93</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>15a. A preceptor program for newly hired RNs.</td>
<td>0.94</td>
<td>0.95</td>
<td></td>
</tr>
<tr>
<td>15b. Nurses are supported as they transition into new roles.</td>
<td>0.97</td>
<td>0.96</td>
<td></td>
</tr>
<tr>
<td>16a. Nursing care is based on a nursing, rather than a medical, model.</td>
<td>0.93</td>
<td>0.93</td>
<td></td>
</tr>
</tbody>
</table>
16b. Nursing care is based on nursing knowledge and judgment rather than primary reliance on a medical model. 0.95 0.95

17. Documented, up-to-date nursing care plans for all patients. 0.71 0.75 X

18. Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next when possible. 0.89 0.90

19. Use of nursing diagnoses. 0.64 0.68 X

20. A supervisory staff that is supportive of the nurses. 0.97 0.95

21. Nurse managers use mistakes as learning opportunities, not criticism. 0.98 0.97

22. A nurse manager who is a good manager and leader. 0.98 0.96

23. Praise and recognition for a job well done. 0.95 0.90

24. A nurse manager who backs up the nursing staff in decision-making, even if the conflict is with a physician. 0.97 0.96

25. Support services allow me to spend adequate time with my patients. 0.96 0.95

26. Enough time and opportunity to discuss patient care problems with other nurses. 0.96 0.96

27. Enough registered nurses to provide quality patient care. 0.95 0.95

28. Enough staff to get the work done. 0.95 0.95

29. Unlicensed assistive personnel who help the care team. 0.94 0.94

30. Unlicensed assistive personnel who contribute to quality patient care. 0.93 0.94

31. Physicians and nurses have good working relationships. 0.99 0.98

32. A lot of teamwork between nurses and physicians. 0.99 0.99

33. Collaboration between nurses and physicians. 0.99 0.99

34. RNs count on each other to pitch in and help when things get busy. 0.99 0.99

35. There is a good deal of teamwork among RNs in my work area. 0.99 0.99

36. RNs in my work area support each other. 0.99 0.99

37. Access to computerized patient care information at the point of care. 0.98 0.99
<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>JS</th>
<th>QOC</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.</td>
<td>Information technology systems that are up-and-running when needed.</td>
<td>0.99</td>
<td>0.99</td>
</tr>
<tr>
<td>39.</td>
<td>A computerized healthcare record system that supports nursing practice.</td>
<td>0.99</td>
<td>0.99</td>
</tr>
<tr>
<td>40.</td>
<td>Effective training on new technology.</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td>41.</td>
<td>The information systems available support quality patient care.</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td>42.</td>
<td>Nursing has input into changes to the EHR (e.g. customizing features, creating templates).</td>
<td>0.92</td>
<td>0.92</td>
</tr>
<tr>
<td>43.</td>
<td>Nurses IT needs are a priority for the organization.</td>
<td>0.96</td>
<td>0.96</td>
</tr>
<tr>
<td>44.</td>
<td>Nurses are treated with civility and respect.</td>
<td>0.98</td>
<td>0.97</td>
</tr>
<tr>
<td>45.</td>
<td>Members of the healthcare team respect the work of nurses in this organization.</td>
<td>0.98</td>
<td>0.97</td>
</tr>
<tr>
<td>46.</td>
<td>The organizational leaders respect nurses’ opinions.</td>
<td>0.96</td>
<td>0.95</td>
</tr>
<tr>
<td>47.</td>
<td>Organizational leaders empower nurses to make decisions that affect their work.</td>
<td>0.96</td>
<td>0.95</td>
</tr>
<tr>
<td>48.</td>
<td>Good communication among interprofessional team members.</td>
<td>0.98</td>
<td>0.98</td>
</tr>
<tr>
<td>49.</td>
<td>Organizational information is easily accessible.</td>
<td>0.95</td>
<td>0.95</td>
</tr>
<tr>
<td>50.</td>
<td>Information is shared routinely across the organization.</td>
<td>0.95</td>
<td>0.95</td>
</tr>
</tbody>
</table>

Note. I-CVI= item-level content validity index. JS= job satisfaction. QOC= quality of care. X=eligible for elimination per a priori 0.80 cut-off value. Items 1-28 and 31-33 are original items from the PES-NWI, where b is the re-wording of a. Items 29, 30, and 34-50 are new added items.
<table>
<thead>
<tr>
<th>Theme</th>
<th>Ideas/Phrases</th>
<th>Number and (Percent) of Respondents Saying Important to JS</th>
<th>Number and (Percent) of Respondents Saying Important to QOC</th>
<th>Number and (Percent) of Respondents Putting item in their top 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teamwork/Relations</td>
<td>Teamwork, collaboration, interdisciplinary (but primarily MD), communication, respect, RN to RN, positive team members</td>
<td>101 (18%)</td>
<td>71 (13%)</td>
<td>439 (80%)</td>
</tr>
<tr>
<td>Leadership</td>
<td>Supportive, fair, communicative, listening, respectful, praise, and recognition</td>
<td>181 (33%)</td>
<td>50 (9%)</td>
<td>294 (53%)</td>
</tr>
<tr>
<td>Appropriate Staffing</td>
<td>Nurse to patient ratios, enough support staff (UAPs, environmental, transport, etc.), acuity-based staffing, time to provide patient care</td>
<td>142 (26%)</td>
<td>230 (42%)</td>
<td>191 (35%)</td>
</tr>
<tr>
<td>Pay/ benefits</td>
<td>Raises, retirement or health care benefits</td>
<td>157 (28%)</td>
<td>11 (2%)</td>
<td>46 (8%)</td>
</tr>
<tr>
<td>Work-life balance</td>
<td>Flexibility in scheduling, taking breaks at work, able to get vacation time approved, getting out on time</td>
<td>48 (9%)</td>
<td>10 (2%)</td>
<td>26 (5%)</td>
</tr>
<tr>
<td>Education</td>
<td>In-services, high quality education options, training on equipment</td>
<td>32 (6%)</td>
<td>49 (9%)</td>
<td>16 (3%)</td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
<td>JS</td>
<td>QOC</td>
<td>JS</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td>Technology</td>
<td>Access to IT support; up-to-date technology; functioning computers; documentation burden</td>
<td>9 (2%)</td>
<td>24 (4%)</td>
<td>7 (1%)</td>
</tr>
<tr>
<td>Resources/Equipment</td>
<td>Up to date, functioning equipment, access to the equipment (not having to hunt for it), enough equipment</td>
<td>25 (5%)</td>
<td>93 (17%)</td>
<td>54 (10%)</td>
</tr>
<tr>
<td>Patient/Related Patient Care</td>
<td>Provision of quality patient care, respect and appreciation from patients</td>
<td>14 (3%)</td>
<td>11 (2%)</td>
<td>17 (3%)</td>
</tr>
<tr>
<td>Career Advancement</td>
<td>Advancement, growth/promotion opportunities</td>
<td>10 (2%)</td>
<td>0 (0%)</td>
<td>10 (2%)</td>
</tr>
<tr>
<td>Ability to do the work of nursing</td>
<td>Autonomy, have voice heard, input in change, workflow, perform the mission of nursing, EBP, decreased &quot;admin&quot; work, satisfaction with work</td>
<td>19 (3%)</td>
<td>17 (3%)</td>
<td>28 (5%)</td>
</tr>
<tr>
<td>Environment</td>
<td>Clean, safe, positive</td>
<td>14 (3%)</td>
<td>14 (3%)</td>
<td>19 (3%)</td>
</tr>
</tbody>
</table>

*Note. JS= job satisfaction. QOC= quality of care.*
Figure 1
Potential New Items to Include on Future Versions of the PES-NWI

- Refinement of staffing item or addition of an item to include “acuity” of patient
  - Given patient acuity, there is enough staff to get the work done.

- Interdisciplinary collaboration/teamwork
  - There is good teamwork among the interdisciplinary team.

- Items related to patients
  - Patients treat me with respect.
  - Patients appreciate the care I provide.
  - I am able to provide high quality care to patients.

- Items related to equipment
  - Access to up-to-date equipment.
  - Access to functioning equipment.
  - Access to the equipment I need to care for patients.

- Personal satisfaction items
  - Pay/benefits
  - Scheduling
A REVISED INSTRUMENT FOR MEASURING THE CONTEMPORARY NURSING WORK ENVIRONMENT

by

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Format adapted for dissertation
ARTICLE THREE

A REVISED INSTRUMENT FOR MEASURING THE CONTEMPORARY NURSING WORK ENVIRONMENT

ABSTRACT

Many years of research has established a relationship between favorable nursing work environments (NWE) and better nurse, patient, and organizational outcomes. However, the instrument most frequently used to measure the NWE, the Practice Environment Scale of the Nursing Work Index (PES-NWI), has not had its items significantly updated or revalidated since the 1980s. Therefore, the purpose of this research study was to examine the psychometric properties of an updated Practice Environment Scale of the Nursing Work Index (PES-NWI) and create a new instrument which will be suitable for further testing and refinement to measure the present-day NWE. We administered a modified PES-NWI to a national sample of direct care hospital nurses in the United States and received 818 valid responses. We then assessed the psychometric properties of the instrument using various methods for establishing validity and reliability. While the modified PES-NWI displayed mostly adequate validity and reliability properties, further testing and refinement of the instrument is necessary to ensure its strength as a measure of the contemporary work environment. With this updated measure of the NWE, researchers and hospital leaders can identify modifiable opportunities for improvement in present-day hospital NWEs which may enhance nurse and patient outcomes.
**Keywords:** Instrument development, nursing work environment, psychometrics
Introduction

There are almost four million nurses in the United States (U.S.) today, making it the largest sector of health care professionals in the country (American Association of Colleges of Nursing, 2019). Approximately 60% of these nurses practice in hospitals, many providing direct care to patients (Bureau for Labor Statistics, 2020). The hospital environment in which nurses practice professionally is called the nursing work environment (NWE), which is defined as “factors that enhance or attenuate a nurse’s ability to practice nursing skillfully and deliver high quality care,” (Swiger et al., 2017, p. 77). Attributes of hospital NWEs which influence nurses’ attraction to and retention in hospitals were first studied almost 40 years ago (McClure et al., 1983). Since that time, study of the NWE has proliferated (Norman & Sjetne, 2017; Swiger et al., 2017; Warshawsky et al., 2011; Wei et al., 2018). However, the primary quantitative instrument used to measure the NWE today, the Practice Environment Scale of the Nursing Work Index (PES-NWI), has retained items originally developed in the 1980s (Aiken & Patrician, 2000; Lake, 2002; Swiger et al., 2017). Therefore, it is necessary to ensure that this instrument designed to assess the work environment is appropriate and well-suited for a contemporary context.

Background

Because of the importance of the NWE to both patient and nurse outcomes, the world’s attention has been drawn to ensuring more favorable NWEs (World Health Organization, 2020). Favorable NWEs have been associated with better nurse outcomes, such as increased job satisfaction and intent to stay in a position (Lake et al., 2019; Wei
et al., 2018). Additionally, favorable NWEs are associated with better patient outcomes, such as reduced 30-day mortality and adverse events (Lake et al., 2019; Lee & Scott, 2018; Wei et al., 2018). Lastly, better NWE’s are also associated with better organizational outcomes, such as reduced readmission rates and less nurse turnover (Ma et al., 2015; Mat et al., 2014; Wei et al., 2018).

Much of what is known about favorable NWEs was learned from the original Magnet Hospital Study in the 1980s (McClure et al., 1983; Warshawsky, 2019). The intent of the Magnet Hospital Study was to determine which aspects in a hospital were important to nurse recruitment and retention during a severe nursing shortage in the U.S. (McClure et al., 1983). Since that time, multiple instruments have been created to measure the NWE (Norman and Sjetne, 2017). To date, the instrument most frequently used nationally and internationally is the Practice Environment Scale of the Nursing Work Index (PES-NWI) (Swiger et al., 2017; Zangaro & Jones, 2019). The PES-NWI was derived from a parent instrument, the Nursing Work Index, developed by Kramer and Hafner (1989). Items on the Nursing Work Index were culled from job satisfaction literature of the 1960s through the 1980s and the results of the original Magnet Hospital Study in the U.S. (Kramer & Hafner, 1989). According to Lake (2002), the subset of items selected from the Nursing Work Index were not extensively changed from the original items developed by Kramer and Hafner.

Potential changes in values and preferences for the NWE among generations, as well as vast historical, social, and technological transformations in the way healthcare is provided, may mean that nurses working today define a favorable work environment differently (Campbell & Patrician, 2020; Inglehart, 2008). Therefore, the purpose of this
study is to examine the psychometric properties of a modified PES-NWI and create a new instrument, the PES-v2021, which will be suitable for further testing and refinement to measure the present-day nursing work environment.

**Methods**

**Sample**

We invited hospitals who currently or previously participated in the National Database of Nursing Quality Indicators (NDNQI) to share an online survey questionnaire link with the registered nurses working in their hospitals. The link took participants to a questionnaire containing a modified version of the PES-NWI as well as questions about demographic information and other content typically gathered in the annual NDNQI survey. For our sample, we included only those nurses who spend more than 50% of their time at work in direct patient care (total n=818). Responding hospitals included Magnet®, non-Magnet, and hospitals who had applied for Magnet® Status.

**Instrumentation**

The modified PES-NWI contained the original 31 items from the original PES-NWI, three re-worded items, and 19 additional items. We re-worded items in an attempt to better describe factors pertinent to the contemporary work environment (for example, the ability to “influence” rather than only “serve” on hospital and nursing committees). The additional items were those which had been included in prior studies using the PES-NWI and whose inclusion was supported by expert opinion and literature (Archibald et al., 2018; Crawford et al., 2019; Friese, 2012; Kalisch et al., 2009; Kalisch et al., 2010;
Kamimura et al., 2012; Krick et al., 2019; Maalouf et al., 2018; Moorer et al., 2010; Purdy et al., 2010; Regan et al., 2016; Wagner, 2018; Wang et al., 2020). The additional items pertained to technology, medical assistants, organizational communication, civility, respect, and nursing teamwork. The modified PES-NWI asked each nurse to examine an item on the instrument (for example, “enough staff to get the work done”) with a 4-point Likert-scale of agreement, and make three judgments about the item: 1) Is the item present in your current job? 2) Is the item important to your job satisfaction? 3) Is the item important to your ability to provide quality patient care? Scales two and three (important to job satisfaction and important to ability to provide quality patient care) are referred to as “value scales” in this article for consistency.

The original PES-NWI is scored by obtaining an average score for each subscale, then averaging all subscale scores to form a composite score (Lake, 2002). To maintain consistency, ease of interpretation, and ease of calculation, we decided that the resulting instrument from this study would be scored in the same way as the original. All statistical analyses were performed in SPSS and R.

Validity

We established the validity of the instrument through several different mechanisms. Prior to wide-scale survey administration, we determined face validity for the instrument by pilot testing it with a small sample of currently or formerly practicing direct care nurses (n=7) and by subjecting the instrument to review by experts (n=4) who measure the NWE with the PES-NWI. To establish content validity for the instrument, we asked nurses participating in this study (n=818) to indicate if each item of the
modified PES-NWI was important to their job satisfaction and ability to provide patient care using the value scales. We then created item-level content validity indices (I-CVI) for each item, retaining only those items that had I-CVI values of 0.80 or greater for both value scales. The 0.80 cut-off was a value determined based on previous literature (Flynn et al., 2005; Polit & Beck, 2007; Polit & Yang, 2016). More about the results from the administration of the modified PES-NWI, including the identification of eight new items derived from the findings of the study, can be found elsewhere (Author, Under Review). Table 1 contains the final set of items contained on the modified PES-NWI and used for analysis.

To ensure that the items on the modified PES-NWI had adequate construct validity, we planned to assess its discriminative validity using a known-groups approach. Based on literature, Magnet® hospitals have better NWEs than non-Magnet (Kelly et al., 2011; Márquez-Hernández et al., 2020). Lake (2002) used the known-groups approach in her development of the PES-NWI as well. Therefore, a priori, we intended to compare composite hospital-level scores between both Magnet® and non-Magnet hospitals in order to ensure discriminative validity of the instrument. We performed a Welch’s t-test to assess the difference in composite scores of Magnet® and non-Magnet hospitals.

We also assessed the structural validity of the instrument to further support its construct validity. To first explore the factorial structure of the instrument, we performed an exploratory factor analysis (EFA) with varimax rotation (Tabachnik & Fiddell, 2013). A combination of techniques (e.g. eigenvalues, scree plot) were used to determine how many factors should be retained (Watkins, 2018). Factor loadings with values of at least 0.32 indicated an item could be fit for inclusion on a factor (Polit & Yang, 2016). As
noted by Polit and Yang (2016), a confirmatory factor analysis (CFA) should be performed on a different sample than was used for the EFA to ensure that the results are most accurate and are not subject to problems due to abnormalities in a single sample. Due to the small sample size, a CFA on a separate dataset was not achievable. However, we decided to perform a CFA on the same dataset to see if the model achieved satisfactory goodness-of-fit, knowing these CFA results would not be adequate for establishing structural validity of the instrument. Traditionally, acceptable comparative fit indices (CFI) should be larger than 0.95, root mean square error approximations (RMSEA) less than 0.06, and standardized root mean square residuals (SRMR) less than 0.08 (Tabachnik & Fidell, 2013).

Lastly, we aimed to establish criterion validity for the instrument by a concurrent validity approach. Using single item measures inquiring about overall job satisfaction and nurse assessed quality of care on the unit, we correlated composite scores of the modified PES-NWI with the scores from these two measures. As previous literature supports the association between these concepts and measures of the work environment (Anzai et al., 2014; Lu et al., 2019; Wei et al., 2018), we expected a moderate to strong correlation between the modified PES-NWI composite score and results from the single items measures.

**Reliability**

Reliability, in the context of instrument development, refers to the ability of an instrument to consistently provide a measure of the same construct (McNeish, 2018). Most commonly, Cronbach’s alpha is used to serve as a measure of internal consistency
and has been regularly used to establish the reliability of the PES-NWI (Lake, 2002; Zangaro & Jones, 2019). However, Cronbach’s alpha relies on four assumptions that are frequently violated according to instrument development literature: “1) the scale adheres to tau equivalence, 2) scale items are on a continuous scale and normally distributed, 3) the errors of the items do not covary, 4) the scale is unidimensional,” (McNeish, 2018, p. 414-415). When assessing the data for the assumptions outlined, we found that the data could potentially violate the necessary assumptions for Cronbach’s alpha for two reasons: 1) adherence to tau equivalence and 2) because the items were scored via a Likert-scale, and scoring them as continuous can be debatable (McNeish, 2018). Therefore, we performed a Cronbach’s alpha, but believe it could underestimate the reliability of the instrument (McNeish, 2018). Consequently, we performed an assessment of coefficient omega as a secondary measure of reliability, as it can provide a more accurate measure of reliability in circumstances where tau equivalence is not assumed and items vary in their factor loading values (McNeish, 2018; Padilla & Divers, 2016).

As an additional measure of reliability, we assessed interrater reliability. Interrater reliability is an evaluation in which multiple participants respond to an instrument and their responses are expected to display consistency (Polit & Yang, 2016). We performed this by using data aggregated at the unit level and calculating an intraclass correlation (ICC). The variability between units in a hospital is expected to be greater than the variability within units when measuring the presence of certain aspects of the NWE (Breckenridge-Sproat et al., 2012; Patrician et al., 2010). Therefore, measuring interrater reliability at the unit was more appropriate than at the hospital level. Previous research has utilized this unit-level aggregation approach, as nurses working on the same unit
should report the same characteristics being present, producing similar scores for their practice environment (Bachnick et al., 2018; Breckenridge-Sproat, et al., 2012; Swiger, 2018). Based on prior NWE literature aggregating PES-NWI responses, a cut-off of 0.60 was considered an adequate level of interrater reliability (Park et al., 2018; Swiger et al., 2018).

Development of a Final Instrument Fit for Future Testing

Finally, we created a “report card”, serving as a decision-making aid for assessing the items of the modified PES-NWI (Supplemental File 1). This report card provided numeric scores for various criteria which ultimately determined a final score for each item to assist in decisions to remove or retain items for a new, concise instrument, entitled the PES-v2021. The decision to strive toward a concise (fewer item) instrument, rather than stopping with the current, modified PES-NWI, which may be more precise (more items, with items being more descriptive) resulted from discussion of the need to keep the instrument shorter to enhance response rates and reduce burden on participants.

We used the EFA results from the modified PES-NWI as a guide for the some of the criteria on the report card (i.e., factor loadings, inter-item correlations, alpha if deleted). Other criteria depended on each item’s importance to nurses as measured by the individual item’s scores on the value scales for job satisfaction and ability to provide quality patient care. Lastly, we calculated average scores for the value scales by assigning Likert-scale scores (1-4) to the items, similar to the original PES-NWI. A heavier emphasis (and therefore, higher scoring) was placed on the I-CVI values and average scores, as these items ensured both face and content validity as determined by nurses.
As mentioned previously, we decided to remove items due to poor I-CVI performance consistent with prior literature (Flynn et al., 2005; Polit & Beck, 2007; Polit & Yang, 2016). For re-worded items, scores on the report card and discussion among team members determined which items to retain and which to remove. For other items, we examined inter-item correlations within the factors determined by the EFA of the modified PES-NWI. Items with inter-item correlations >0.70 were considered redundant and therefore deemed potentially appropriate for removal (Knapp & Brown, 1995; Tsogbadrakh et al., 2021).

Results

Most of the respondents were female (84%), white (67%) registered nurses with a bachelor’s degree (75%) working full-time (81%) in a specialized type of unit (ED, labor and delivery, rehab, psychiatics, etc.) (48%). Most nurses reported being satisfied with their job (80%) and that the quality of nursing care on their unit was either good or excellent (90%). On average, nurses were 41 years old, had been a nurse for almost 17 years, and had spent 9 years on their unit.

Validity

The results of the validity testing suggested adequate face validity and content validity based on the feedback from experts and nurses. Three items were removed prior to conducting the EFA due to low I-CVI values (<0.80): 1) A chief nursing officer equal in power and authority to other top-level hospital executives; 2) Documented, up-to-date nursing care plans for all patients; 3) Use of nursing diagnoses.
Upon analyzing the data, we realized that the known-groups approach to ascertain discriminative validity between Magnet® Hospitals and non-Magnet hospitals could not be performed. There was no significant difference between the mean composite scores of Magnet® Hospitals ($M=2.94$, $SD=0.51$) and non-Magnet hospitals ($M=2.90$, $SD=0.43$) on the composite score of the modified PES-NWI ($t_{313}=-1.12$, $p=0.26$). To ensure this was not an issue with only the modified PES-NWI, we also performed a t-test using the composite score of the original PES-NWI. However, we found that the difference in mean composite scores between Magnet® ($M=2.90$, $SD=0.54$) and non-Magnet hospitals ($M=2.90$, $SD=0.45$) using the composite score of the original PES-NWI remained non-significant ($t_{318}=0.16$, $p=0.87$).

The results of EFA yielded a nine-factor model with 2-9 items on each factor (Table 1). Factor loadings ranged in values from 0.35 to 0.89. However, the CFA could not fully establish the structural validity of the modified PES-NWI based on the model fit indices including CFI of 0.86, RMSEA of 0.07, and SRMR of 0.08.

Criterion validity was supported for the modified PES-NWI based on the concurrent validity approach of correlating the composite score with single-item measures of job satisfaction and nurse reported quality of care. The composite score was significantly correlated to both job satisfaction ($r=0.62$, $p<0.001$) and nurse reported quality of care ($r=0.45$, $p<0.001$)

**Reliability**

Table 2 provides values of reliability for the instrument at both the individual and unit level. For reliability, both Cronbach’s alpha and Omega was assessed. These values
supported the reliability of the factors and composite measure. Cronbach’s alpha values for the nine factors ranged from 0.84 to 0.93, and the Omega scores produced equivalent results, from 0.84 to 0.93. The composite scores for Cronbach’s alpha and Omega were 0.90 and 0.90 respectively. IRR inconsistently supported unit level reliability among respondents, with ICC(2) values of ranging from 0.48-0.70 among the factors, and 0.62 for the composite score. Table 3 summarizes the overall results of the modified PES-NWI at the individual level.

The PES-v2021 for Future Testing

Based on discussion of the items and examination of their performance on the report card, 17 items were removed. The resulting instrument can be seen in Table 4, and a table with rationales for item removal can be found in Supplemental File 2. The final instrument, the PES-v2021, contains 33 items from the modified PES-NWI, and suggests 8 additional items identified through the use of content analysis in a prior study (Author, Under Review). However, the PES-v2021 requires further testing with a new sample to assess its psychometric properties.

Discussion

Results from this study enabled the creation of the PES-v2021, suitable for further testing and refinement. Additionally, this study illuminated the difficulty of assessing model fit via CFA to establish structural validity for the modified PES-NWI. Lastly, an unexpected finding from this study was the inability to use a known-groups approach for
establishing construct validity due to the similar composite scores of Magnet® and non-
Magnet hospitals.

The PES-v2021 remains very similar to its parent instrument, the PES-NWI. Many items on the PES-NWI both retained their relevance to the contemporary NWE and remained psychometrically appropriate for retention on the PES-v2021. The inclusion of additional items on the modified PES-NWI, however, mirrors the length and comprehensiveness of the Nursing Work Index- Revised (Aiken & Patrician, 2000).

Previously, Cummings and colleagues (2006) found that three instruments developed from the Nursing Work Index, including the PES-NWI, all failed to achieve satisfactory modeling fit using structural equation modeling. Findings like these are consistent with survey research in other fields. Instruments which rely on Likert-scale type responses are often categorical but ordered, resulting in potential inaccuracy of CFA modeling as it is intended for continuous data (Xia & Yang, 2019). In general, multi-factor instruments typically perform poorly in goodness-of fit assessments (Marsh et al., 2004). Additionally, correlated errors can contribute to the failure of goodness-of-fit modeling (Hopwood & Donnellan, 2010). However, failure to achieve appropriate CFA values is not an indication that an instrument is useless (Marsh et al., 2004). Data familiarity and interpretation can allow nurse scientists to ultimately decide what is useful and appropriate for measuring the NWE (Marsh et al., 2004).

The known groups assessment of validity could not be performed due to the non-significant differences in composite scores of Magnet® and non-Magnet hospitals. According to the American Nurses Credentialing Center, which offers Magnet® designation, benefits of becoming a Magnet ® facility include ensuring a focus on
nursing excellence and the importance of nurses (American Nurses Credentialing Center, n.d.). Literature reviews about the benefits of Magnet® hospitals are conflicting, with some concluding inconsistent findings and other supporting the benefits of Magnet® designation (Petit dit Driel & Regnaux, 2015; Rodríguez-García et al., 2020). In the current study, any typically seen benefits of the Magnet® designation may have been overshadowed by the context and time in which data were collected—namely, the COVID-19 pandemic. The reason for equivalent work environment scores in this sample could be a result of a type of “surveillance bias”, wherein Magnet® hospital nurses are accustomed to higher standards, and therefore, recognize poorer work environments (Pierce et al., 2008). In this study, Magnet-aspiring hospitals were grouped with non-magnet hospitals to have a clear delineation between those who had achieved full Magnet® status and those who had not. Magnet® aspiring hospitals typically score somewhere between the Magnet® and the non-magnet hospitals (Patrician et al., 2022). However, a post-hoc ANOVA of the Magnet®, Magnet®-aspiring, and non-magnet hospitals in this study revealed no significant difference in the composite score means among any of the hospital types.

**Limitations**

A major concern of this study is the potential risk for historical bias. The timeframe in which data were collected (May-July of 2021), was shortly after a large increase of COVID cases in a winter surge of the COVID-19 pandemic (Maragakis, 2021), and may have altered nurse perspective of the work environment. Additionally, the sample lacked identifiable representation from the western portion of the U.S.,
namely California, which is the only state to have mandated nurse to patient ratios (AB 394, as cited in Kasprack, 2004; United States Census Bureau, 2021). The ability to definitively include the western portion of the U.S. in the sample could have been beneficial. Further, hospitals included in the sample were those that currently or previously have participated in NDNQI data collection. Hospitals that participate in NDNQI have different characteristics than the general hospital population of the U.S., including a higher number of hospitals with Magnet® status and that are located in metropolitan areas (Nelson-Brantley et al., 2018; Park et al., 2018). Additionally, hospitals who participate in NDNQI data collection already focus on nursing quality, and therefore, may be more attuned to the value and impact of nursing within the organization compared to non-NDNQI hospitals. Lastly, the nurses here all practice in the U.S., and therefore, generalizing these results to an international population may not be feasible. Additional testing in different countries will be necessary to ensure that the instrument is well-suited for measuring the NWE internationally.

**Implications for Practice**

With additional testing, the PES-v2021 could provide a more contemporary measure of the NWE. In a competitive market when recruiting nurses may be challenging for some hospitals, nurse managers could provide future possible nurse employees with scores from work environment measures to demonstrate the unit or hospital’s commitment to providing a safe, positive, and professionally rewarding environment for their nursing staff. Additionally, this instrument will remain public domain. With additional testing, the PES-v2021 can be administered by nurse managers or staff nurses
themselves to determine the favorability of their work environment, opportunities for improvement, and future directions for their unit to improve both nurse and patient outcomes. Therefore, the power of this instrument can extend beyond the hands of nurse scientists and be passed into the hands of the hard-working nurses who care for patients every day.
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### Table 1

*Results of the Exploratory Factor Analysis Using the 50 Important Items of the Modified PES-NWI*

<table>
<thead>
<tr>
<th>Item</th>
<th>Loading Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NURSE LEADERSHIP</strong></td>
<td></td>
</tr>
<tr>
<td>A nurse manager who is a good manager and leader.</td>
<td>0.806</td>
</tr>
<tr>
<td>A nurse manager who backs up the nursing staff in decision-making,</td>
<td>0.768</td>
</tr>
<tr>
<td>even if the conflict is with a physician.</td>
<td></td>
</tr>
<tr>
<td>Nurse managers use mistakes as learning opportunities, not criticism.</td>
<td>0.746</td>
</tr>
<tr>
<td>Nursing managers consult with staff on daily problems and procedures.</td>
<td>0.727</td>
</tr>
<tr>
<td>Praise and recognition for a job well done.</td>
<td>0.687</td>
</tr>
<tr>
<td>A supervisory staff that is supportive of the nurses.</td>
<td>0.662</td>
</tr>
<tr>
<td>An administration that listens and responds to employee concerns.</td>
<td>0.515</td>
</tr>
<tr>
<td><strong>IT/TECHNOLOGY</strong></td>
<td></td>
</tr>
<tr>
<td>The information systems available support quality patient care.</td>
<td>0.806</td>
</tr>
<tr>
<td>A computerized healthcare record system that supports nursing practice.</td>
<td>0.803</td>
</tr>
<tr>
<td>Information technology systems that are up-and-running when needed.</td>
<td>0.748</td>
</tr>
<tr>
<td>Effective training on new technology.</td>
<td>0.633</td>
</tr>
<tr>
<td>Nurses IT needs are a priority for the organization.</td>
<td>0.597</td>
</tr>
<tr>
<td>Access to computerized patient care information at the point of care.</td>
<td>0.584</td>
</tr>
<tr>
<td>Organizational information is easily accessible.</td>
<td>0.529</td>
</tr>
<tr>
<td>Nursing has input into changes to the EHR (e.g. customizing features, creating templates).</td>
<td>0.519</td>
</tr>
<tr>
<td>The information systems available support quality patient care.</td>
<td></td>
</tr>
<tr>
<td><strong>NURSING AT THE ORGANIZATIONAL LEVEL</strong></td>
<td></td>
</tr>
<tr>
<td>Information is shared routinely across the organization.</td>
<td>0.465</td>
</tr>
<tr>
<td>Organizational leaders empower nurses to make decisions that affect their work.</td>
<td>0.638</td>
</tr>
<tr>
<td>The organizational leaders respect nurses’ opinions.</td>
<td>0.637</td>
</tr>
<tr>
<td>Staff nurses have the opportunity to influence the outcomes of hospital and nursing decisions made by committees.</td>
<td>0.492</td>
</tr>
<tr>
<td>A chief nursing officer who is highly visible and accessible to staff.</td>
<td>0.485</td>
</tr>
<tr>
<td>Members of the healthcare team respect the work of nurses in this organization.</td>
<td>0.470</td>
</tr>
<tr>
<td>Nurses are treated with civility and respect.</td>
<td>0.454</td>
</tr>
<tr>
<td>Information is shared routinely across the organization.</td>
<td></td>
</tr>
<tr>
<td><strong>AUTHORITY OF NURSING</strong></td>
<td></td>
</tr>
<tr>
<td>A preceptor program for newly hired RNs.</td>
<td>0.643</td>
</tr>
<tr>
<td>Nursing care is based on a nursing, rather than a medical, model.</td>
<td>0.608</td>
</tr>
<tr>
<td>Nursing care is based on nursing knowledge and judgment rather than primary reliance on a medical model.</td>
<td>0.595</td>
</tr>
<tr>
<td>High standards of nursing care are expected by the administration.</td>
<td>0.567</td>
</tr>
</tbody>
</table>
An active performance improvement or evidence-based practice program.  
A clear philosophy of nursing that pervades the patient care environment.  
Nurses are supported as they transition into new roles.  
Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next when possible.  

**STAFFING**  
Enough registered nurses to provide quality patient care.  
Enough staff to get the work done.  
Support services allow me to spend adequate time with my patients.  
Enough time and opportunity to discuss patient care problems with other nurses.  

**CAREER ADVANCEMENT**  
Career development/clinical ladder opportunity.  
Opportunities for advancement.  
Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees).  
Opportunity for staff nurses to participate in policy decisions.  
Staff nurses have the opportunity to serve on hospital and nursing committees.  
Active staff development or continuing education programs for nurses.  

**RN TEAMWORK AND RELATIONS**  
There is a good deal of teamwork among RNs in my work area.  
RNs in my work area support each other.  
RNs count on each other to pitch in and help when things get busy.  
Working with nurses who are clinically competent.  

**INTERPROFESSIONAL TEAMWORK AND RELATIONS**  
A lot of teamwork between nurses and physicians.  
Collaboration between nurses and physicians.  
Physicians and nurses have good working relationships.  
Good communication among interprofessional team members.  

**UNLICENSED ASSISTIVE PERSONNEL**  
Unlicensed assistive personnel who contribute to quality patient care.  
Unlicensed assistive personnel who help the care team.
**Table 2**  
*Reliability Indices*

<table>
<thead>
<tr>
<th>Factor</th>
<th>Number of Items</th>
<th>Cronbach’s alpha</th>
<th>Omega</th>
<th>ICC(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Leadership</td>
<td>7</td>
<td>0.93</td>
<td>0.93</td>
<td>0.70</td>
</tr>
<tr>
<td>IT/Technology</td>
<td>8</td>
<td>0.89</td>
<td>0.89</td>
<td>0.48</td>
</tr>
<tr>
<td>Nurses and the Organization</td>
<td>7</td>
<td>0.90</td>
<td>0.90</td>
<td>0.57</td>
</tr>
<tr>
<td>The Authority of Nursing</td>
<td>8</td>
<td>0.87</td>
<td>0.87</td>
<td>0.63</td>
</tr>
<tr>
<td>Staffing</td>
<td>4</td>
<td>0.90</td>
<td>0.89</td>
<td>0.69</td>
</tr>
<tr>
<td>Career Advancement</td>
<td>6</td>
<td>0.84</td>
<td>0.84</td>
<td>0.68</td>
</tr>
<tr>
<td>RN</td>
<td>4</td>
<td>0.89</td>
<td>0.90</td>
<td>0.58</td>
</tr>
<tr>
<td>Teamwork/Relations</td>
<td>4</td>
<td>0.90</td>
<td>0.90</td>
<td>0.59</td>
</tr>
<tr>
<td>Interprofessional Relations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UAPs</td>
<td>2</td>
<td>0.91</td>
<td>N/A*</td>
<td>0.51</td>
</tr>
<tr>
<td>COMPOSITE</td>
<td>50</td>
<td>0.90</td>
<td>0.90</td>
<td>0.62</td>
</tr>
</tbody>
</table>

Note. *Omega cannot be run on less than 3 items. UAPs= unlicensed assistive personnel.*
Table 3

*Overall Results of the modified PES-NWI at the Individual Level*

<table>
<thead>
<tr>
<th>Factor/Composite</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing Leadership</td>
<td>2.91</td>
<td>0.77</td>
</tr>
<tr>
<td>IT/Technology</td>
<td>2.95</td>
<td>0.56</td>
</tr>
<tr>
<td>Nurses and the Organization</td>
<td>2.80</td>
<td>0.65</td>
</tr>
<tr>
<td>The Authority of Nursing</td>
<td>3.06</td>
<td>0.54</td>
</tr>
<tr>
<td>Staffing</td>
<td>2.50</td>
<td>0.76</td>
</tr>
<tr>
<td>Career Advancement</td>
<td>2.98</td>
<td>0.56</td>
</tr>
<tr>
<td>RN Teamwork/Relations</td>
<td>3.37</td>
<td>0.60</td>
</tr>
<tr>
<td>Interprofessional Relations</td>
<td>3.06</td>
<td>0.61</td>
</tr>
<tr>
<td>UAPs</td>
<td>2.72</td>
<td>0.83</td>
</tr>
<tr>
<td>COMPOSITE</td>
<td>2.93</td>
<td>0.49</td>
</tr>
</tbody>
</table>

*Note:* SD= standard deviation; UAPs= unlicensed assistive personnel
Table 4
The PES-v2021: In Need of Testing and Refinement

PES-v2021

1. A nurse manager who is a good manager and leader.
2. Praise and recognition for a job well done.
3. A supervisory staff that is supportive of the nurses.
4. An administration that listens and responds to employee concerns.
5. A computerized healthcare record system that supports nursing practice.
6. Information technology systems that are up-and-running when needed.
7. Access to computerized patient care information at the point of care.
8. Effective training on new technology.
9. Nurses IT needs are a priority for the organization.
10. Organizational information is easily accessible.
11. Information is shared routinely across the organization.
12. A chief nursing officer who is highly visible and accessible to staff.
13. Organizational leaders empower nurses to make decisions that affect their work.
14. Staff nurses have the opportunity to influence the outcomes of hospital and nursing decisions made by committees.
15. Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees).
16. Nurses are treated with civility and respect.
17. Nursing care is based on nursing knowledge and judgment rather than primary reliance on a medical model.
18. A preceptor program for newly hired RNs.
19. An active performance improvement or evidence-based practice program.
20. A clear philosophy of nursing that pervades the patient care environment.
21. High standards of nursing care are expected by the administration.
22. Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next when possible.
23. Enough staff to get the work done.
24. Support services allow me to spend adequate time with my patients.
25. Career development/clinical ladder opportunity.
26. Opportunities for advancement.
27. Active staff development or continuing education programs for nurses.
28. Opportunity for staff nurses to participate in policy decisions.
29. There is a good deal of teamwork among RNs in my work area.
30. Working with nurses who are clinically competent.
31. A lot of teamwork between nurses and physicians.
32. Good communication among interprofessional team members.
33. Unlicensed assistive personnel who help the care team.

Additional items identified for possible inclusion based on other results from this study (Author, Under Review)

34. Given patient acuity, there is enough staff to get the work done.
35. There is good teamwork among the interdisciplinary team.
36. Patients treat me with respect.
37. Patients appreciate the care I provide.
38. I am able to provide high quality care to patients
39. Access to up-to-date equipment.
40. Access to functioning equipment.
41. Access to the equipment I need to care for patients.
### Supplemental File 1

*Report Card (Decision Aid) to Evaluate the Items on the modified Practice Environment Scale of the Nursing Work Index*

<table>
<thead>
<tr>
<th>Item</th>
<th>Avg imp JS</th>
<th>Avg imp QOC</th>
<th>Top 3 of write-in</th>
<th>Factor load &gt; 0.40</th>
<th>Loads onto &gt; 1 factor</th>
<th>Inter-item correlation</th>
<th>Alpha if deleted</th>
<th>ICVI JS</th>
<th>ICVI QOC</th>
<th><strong>Total Score</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>A nurse manager who is a good manager and leader.</td>
<td>3.57</td>
<td>3.51</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>16.08</td>
</tr>
<tr>
<td>A nurse manager who backs up the nursing staff in decision-making, even if the conflict is with a physician.</td>
<td>3.51</td>
<td>3.47</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>16.98</td>
</tr>
<tr>
<td>Nurse managers use mistakes as learning opportunities, not criticism.</td>
<td>3.46</td>
<td>3.46</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>17.92</td>
</tr>
<tr>
<td>Nursing managers consult with staff on daily problems and procedures.</td>
<td>3.41</td>
<td>3.41</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>17.82</td>
</tr>
<tr>
<td>Category</td>
<td>Rating 1</td>
<td>Rating 2</td>
<td>Rating 3</td>
<td>Rating 4</td>
<td>Rating 5</td>
<td>Rating 6</td>
<td>Rating 7</td>
<td>Rating 8</td>
<td>Rating 9</td>
<td>Rating 10</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Praise and recognition for a job well done.</td>
<td>3.46</td>
<td>3.32</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>A supervisory staff that is supportive of the nurses.</td>
<td>3.52</td>
<td>3.46</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>An administration that listens and responds to employee concerns.</td>
<td>3.5</td>
<td>3.44</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>The information systems available support quality patient care.</td>
<td>3.39</td>
<td>3.4</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>A computerized healthcare record system that supports nursing practice.</td>
<td>3.45</td>
<td>3.46</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Information technology systems that are up-and-running when needed.</td>
<td>3.48</td>
<td>3.51</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Effective training on new technology.</td>
<td>3.41</td>
<td>3.44</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Nurses IT needs are a priority for the organization.</td>
<td>3.34</td>
<td>3.35</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Access to computerized patient care information at the point of care.</td>
<td>3.46</td>
<td>3.5</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>16.96</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Organizational information is easily accessible.</td>
<td>3.33</td>
<td>3.33</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>15.66</td>
</tr>
<tr>
<td>Nursing has input into changes to the EHR (e.g. customizing features, creating templates).</td>
<td>3.27</td>
<td>3.28</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>11.55 *Only loaded on last sub-scale</td>
</tr>
<tr>
<td>Information is shared routinely across the organization.</td>
<td>3.32</td>
<td>3.33</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>15.65</td>
</tr>
<tr>
<td>Organizational leaders empower nurses to make decisions that affect their work.</td>
<td>3.4</td>
<td>3.39</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>17.79</td>
</tr>
<tr>
<td>The organizational leaders respect nurses’ opinions.</td>
<td>3.44</td>
<td>3.41</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>16.85</td>
</tr>
<tr>
<td>Staff nurses have the opportunity to influence the outcomes of hospital and nursing</td>
<td>3.21</td>
<td>3.22</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>15.43</td>
</tr>
</tbody>
</table>
decisions made by committees.

<p>| A chief nursing officer who is highly visible and accessible to staff. | 3.02 | 2.89 | 2 | 1 | 1 | 2 | 1 | 2 | 0 | 14.91 |
| Members of the healthcare team respect the work of nurses in this organization. | 3.47 | 3.44 | 2 | 1 | 0 | 1 | 2 | 2 | 2 | 16.91 |
| Nurses are treated with civility and respect. | 3.5 | 3.46 | 2 | 1 | 0 | 1 | 2 | 2 | 2 | 16.96 |
| A preceptor program for newly hired RNs. | 3.37 | 3.44 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | 16.81 |
| Nursing care is based on a nursing, rather than a medical, model. | 3.27 | 3.29 | 0 | 1 | 0 | 1 | 2 | 2 | 2 | 14.56 |
| Nursing care is based on nursing knowledge and judgment rather than primary reliance on a medical model. | 3.28 | 3.29 | 0 | 1 | 0 | 1 | 2 | 2 | 2 | 14.57 |
| High standards of nursing care are expected by the administration. | 3.41 | 3.44 | 2 | 1 | 0 | 2 | 2 | 2 | 2 | 17.85 |
| An active performance improvement or evidence-based practice program. | 3.28 | 3.34 | 0 | 1 | 0 | 2 | 2 | 2 | 2 | 15.62 |
| A clear philosophy of nursing that pervades the patient care environment. | 3.25 | 3.26 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | 16.51 |
| Nurses are supported as they transition into new roles. | 3.4 | 3.4 | 0 | 1 | 0 | 2 | 2 | 2 | 2 | 15.8 |
| Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next when possible. | 3.2 | 3.26 | 0 | 1 | 1 | 2 | 2 | 2 | 2 | 16.46 |
| Enough registered nurses to provide quality patient care. | 3.52 | 3.54 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 18.06 |
| Enough staff to get the work done. | 3.53 | 3.55 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 18.08 |
| Support services allow me to spend adequate time with my patients. | 3.41 | 3.45 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 17.86 |</p>
<table>
<thead>
<tr>
<th>Description</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enough time and opportunity to discuss patient care problems with other nurses.</td>
<td>3.35</td>
<td>3.38</td>
</tr>
<tr>
<td>Career development/clinical ladder opportunity.</td>
<td>3.17</td>
<td>2.96</td>
</tr>
<tr>
<td>Opportunities for advancement.</td>
<td>3.21</td>
<td>3.01</td>
</tr>
<tr>
<td>Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees).</td>
<td>3.22</td>
<td>3.25</td>
</tr>
<tr>
<td>Opportunity for staff nurses to participate in policy decisions.</td>
<td>3.28</td>
<td>3.31</td>
</tr>
<tr>
<td>Staff nurses have the opportunity to serve on hospital and nursing committees.</td>
<td>3.18</td>
<td>3.21</td>
</tr>
<tr>
<td>Active staff development or continuing education programs for nurses.</td>
<td>3.31</td>
<td>3.37</td>
</tr>
<tr>
<td>Statement</td>
<td>Value1</td>
<td>Value2</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>There is a good deal of teamwork among RNs in my work area.</td>
<td>3.66</td>
<td>3.67</td>
</tr>
<tr>
<td>RNs in my work area support each other.</td>
<td>3.66</td>
<td>3.66</td>
</tr>
<tr>
<td>RNs count on each other to pitch in and help when things get busy.</td>
<td>3.65</td>
<td>3.66</td>
</tr>
<tr>
<td>Working with nurses who are clinically competent.</td>
<td>3.58</td>
<td>3.61</td>
</tr>
<tr>
<td>A lot of teamwork between nurses and physicians.</td>
<td>3.53</td>
<td>3.57</td>
</tr>
<tr>
<td>Collaboration between nurses and physicians.</td>
<td>3.52</td>
<td>3.56</td>
</tr>
<tr>
<td>Physicians and nurses have good working relationships.</td>
<td>3.54</td>
<td>3.56</td>
</tr>
<tr>
<td>Good communication among interprofessional team members.</td>
<td>3.44</td>
<td>3.47</td>
</tr>
<tr>
<td>Keeps alpha down for scale.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.97</td>
<td>2.96</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Unlicensed assistive personnel who contribute to quality patient care.</td>
<td>3.42</td>
<td>3.44</td>
</tr>
<tr>
<td>Unlicensed assistive personnel who help the care team.</td>
<td>3.43</td>
<td>3.45</td>
</tr>
<tr>
<td>A chief nursing officer equal in power and authority to other top-level hospital executives.</td>
<td>2.97</td>
<td>2.96</td>
</tr>
<tr>
<td>Documented, up-to-date nursing care plans for all patients.</td>
<td>2.84</td>
<td>2.92</td>
</tr>
<tr>
<td>Use of nursing diagnoses.</td>
<td>2.68</td>
<td>2.75</td>
</tr>
<tr>
<td><strong>KEY:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
</tr>
</tbody>
</table>
| **I-CVI values** | 0= Below 0.80 in both values  
2= at or above 0.80 |
| **Pertains to top 3 write-in responses**  
(teamwork/relations, relations, staffing) | No=0  
Yes=2 |
| **Factor loading:** | >0.40= 1  
<0.40=0 |
|  | Loads onto more than 1 factor= 0  
Loads onto only 1 factor=1 |
| **Inter-item correlations:** | 2 or more correlations >0.7=0  
1 or more correlation >0.70=1  
No correlations >0.70=2 |
| **Alpha if item deleted:** | Drops alpha below 0.80=0  
Alpha remains above 0.90=1  
Alpha remains 0.80-0.90=2 |

*Note.* Highest total score possible: 20. Assigned higher point values to those criteria that ensure relevance/importance, as these are evidence of content/face validity, not just mathematical relevance.
Supplemental File 2:

*Rationales for Including or Excluding Items from the modified Practice Environment Scale of the Nursing Work Index*

<table>
<thead>
<tr>
<th>Item</th>
<th>NOTES FOR WHY REMOVED/KEPT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NURSE LEADERSHIP</strong></td>
<td></td>
</tr>
<tr>
<td>1. A nurse manager who is a good manager and leader.</td>
<td></td>
</tr>
<tr>
<td>2. A nurse manager who backs up the nursing staff in decision-making, even if the conflict is with a physician.</td>
<td>Highly correlated to #1, but would shorten instrument by excluding these three more descriptive items</td>
</tr>
<tr>
<td>3. Nurse managers use mistakes as learning opportunities, not criticism.</td>
<td></td>
</tr>
<tr>
<td>4. Nursing managers consult with staff on daily problems and procedures.</td>
<td></td>
</tr>
<tr>
<td>5. Praise and recognition for a job well done.</td>
<td>Though highly correlated to #1, kept because would describe higher leader support of nurses</td>
</tr>
<tr>
<td>6. A supervisory staff that is supportive of the nurses.</td>
<td></td>
</tr>
<tr>
<td>7. An administration that listens and responds to employee concerns.</td>
<td></td>
</tr>
<tr>
<td><strong>IT/TECHNOLOGY</strong></td>
<td></td>
</tr>
<tr>
<td>8. A computerized healthcare record system that supports nursing practice.</td>
<td>Highly correlated to #8, but performed lower on report card in both overall score and average importance</td>
</tr>
<tr>
<td>9. The information systems available support quality patient care.</td>
<td></td>
</tr>
<tr>
<td>10. Information technology systems that are up-and-running when needed.</td>
<td></td>
</tr>
<tr>
<td>11. Access to computerized patient care information at the point of care.</td>
<td></td>
</tr>
<tr>
<td>12. Effective training on new technology.</td>
<td></td>
</tr>
<tr>
<td>13. Nurses IT needs are a priority for the organization.</td>
<td></td>
</tr>
<tr>
<td>14. Organizational information is easily accessible.</td>
<td></td>
</tr>
</tbody>
</table>
15. Information is shared routinely across the organization.

**NURSING AT THE ORGANIZATIONAL LEVEL**

16. A chief nursing officer equal in power and authority to other top-level hospital executives.

17. The organizational leaders respect nurses’ opinions.

18. A chief nursing officer who is highly visible and accessible to staff.

19. Organizational leaders empower nurses to make decisions that affect their work.

20. Staff nurses have the opportunity to influence the outcomes of hospital and nursing decisions made by committees.

21. Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees).

22. Nurses are treated with civility and respect.

23. Members of the healthcare team respect the work of nurses in this organization.

**PROFESSIONAL NURSING**

24. Documented, up-to-date nursing care plans for all patients.

25. Nursing care is based on a nursing, rather than a medical, model.

26. Nursing care is based on nursing knowledge and judgment rather than primary reliance on a medical model.

27. A preceptor program for newly hired RNs.

28. An active performance improvement or evidence-based practice program.

29. Use of nursing diagnoses.

30. A clear philosophy of nursing that pervades the patient care environment.

31. High standards of nursing care are expected by the administration.
32. Nurses are supported as they transition into new roles.
33. Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next when possible.

**STAFFING**

34. Enough registered nurses to provide quality patient care.
35. Enough staff to get the work done.
36. Support services allow me to spend adequate time with my patients.
37. Enough time and opportunity to discuss patient care problems with other nurses.

**PROFESSIONAL DEVELOPMENT**

38. Career development/clinical ladder opportunity.
39. Opportunities for advancement.
40. Active staff development or continuing education programs for nurses.
41. Staff nurses have the opportunity to serve on hospital and nursing committees.
42. Opportunity for staff nurses to participate in policy decisions.

**RN TEAMWORK AND RELATIONS**

43. There is a good deal of teamwork among RNs in my work area.
44. RNs in my work area support each other.
45. RNs count on each other to pitch in and help when things get busy.
46. Working with nurses who are clinically competent.

**INTERPROFESSIONAL TEAMWORK AND RELATIONS**

47. A lot of teamwork between nurses and physicians.

48. Collaboration between nurses and physicians.

49. Physicians and nurses have good working relationships.

50. Good communication among interprofessional team members.

**UNLICENSED ASSISTIVE PERSONNEL**

51. Unlicensed assistive personnel who help the care team.

52. Unlicensed assistive personnel who contribute to quality patient care.

**OTHER**

53. Nursing has input into changes to the EHR (e.g. customizing features, creating templates).

#48 and #49 were highly correlated to #47, but #47 performed better on report card than #49, and equal to #48. However, the phrase “teamwork” appeared more in content analysis (Author, Under Review), and therefore may have greater salience to nurses.

Highly correlated to #51 but performed poorer on the report card.

Removed because only item on a factor where other items loaded higher elsewhere and was one of lowest performing items on report card.

Note. Highly correlated indicates the items have an interitem correlation >0.70. JS= job satisfaction; QOC= quality of care
CHAPTER 5

DISCUSSION

The purpose of this dissertation was to evaluate and revise the PES-NWI for use in today’s nursing workforce. This was achieved by a thorough, systematic literature review and quantitative survey administration. Article One described the findings of a literature review tracing the lineage of instruments descended from the NWI. Article Two provided the findings from the two value scales (i.e.: importance to job satisfaction and ability to provide quality patient care) and open-ended questions that were administered to nurses on the modified PES-NWI. Article 3 described the psychometric properties of the modified PES-NWI instrument and presented a new instrument ready for further testing: the PES-v2021. The purpose of this final chapter is to offer an overview of findings from all three papers, discuss limitations of the study, and provide directions for future research.

Overview of Study Findings

Article One Findings

The purpose of Article One was to trace the lineage of instruments descended from the NWI. A total of 40 articles were included for review. Results of the review indicated that descendent instruments of the NWI have been used extensively around the world.
Three main branches of instruments descended from the NWI. Variations of the instruments have been translated into many different languages and modified or adapted for different care contexts. Moreover, the PES-NWI appeared to be the instrument most commonly and broadly used for measurement of the nursing work environment (Swiger et al., 2017; Zangaro & Jones, 2019). Calls for future research included revision and modernization of the instrument, as well as a need for ensuring structural validity of instruments when they were adapted, modified, or translated to ensure the structure (i.e., subscales) holds true for different contexts (Hanrahan, 2007; Liou & Cheng, 2009; Parker et al., 2010; Swiger et al., 2017).

**Article Two Findings**

The purpose of Article 2 was to report the findings from the administration of the modified PES-NWI. The modified PES-NWI contained the original 31 items of the PES-NWI and 19 newly added items pertaining to teamwork, interdisciplinary communication, technology, civility/respect, organizational communication, and UAPs. Additionally, it asked three open-ended questions to allow nurses to share anything else they felt was important to their job satisfaction and ability to provide quality patient care. Lastly, it asked nurses to name the top three items that were most important to the creation of a favorable work environment. This modified PES-NWI contained a total of 53 items, plus the three open-ended questions, and can be seen in Appendix C.

Article 2 provided the results of the item level-content validity indices (I-CVIs) of the original PES-NWI and the newly added items. Additionally, Article 2 conveyed the results of the content analysis of open-ended questions on the modified PES-NWI.
Ultimately, Article 2 reported that 3 items on the original PES-NWI may have lost their importance to current nursing practice based on the I-CVI values: 1) A chief nursing officer equal in power and authority to other top-level hospital executives; 2) Documented, up-to-date nursing care plans for all patients; and 3) Use of nursing diagnoses. The I-CVIs indicate that all other items have retained their importance to nurses who currently practice as direct bedside care nurses. Additionally, the results supported that the newly added items were salient to contemporary nursing practice. The content analysis of the two open ended questions indicate that several new areas should be explored to better assess the NWE: interdisciplinary collaboration/teamwork, patient interaction with RNs, equipment and physical resources, and personal satisfaction items. Based on the results of the open-ended questions, the staffing subscale may benefit from refinement to reflect patient acuity.

**Article Three Findings**

Article 3 reports on the results of the psychometric evaluation of a modified PES-NWI. Based on EFA, a 9-factor instrument resulted, with a total of 50 included items. Face, content, and criterion validity were supported. Construct validity could not definitively be established for two reasons: 1) the CFA for structural validity was run on the same dataset as the EFA and 2) the planned known-groups approach for discriminative validity could not be performed as mean scores of Magnet® and non-Magnet hospitals were too similar. While the results of the CFA could not be used to support structural validity, the CFA suggested potential model adequacy depending on the goodness-of-fit-index examined.
In the reliability assessments, internal consistency reliability of the composite score and factors of the modified PES-NWI was adequate, with values of 0.84 to 0.93. Interrater reliability at the unit level yielded values of 0.48 to 0.70 for the factors and the overall composite, indicating that most factors, as well as the composite, achieve adequate interrater reliability at the unit level.

Ultimately, based on consensus from experts in the field of NWE measurement, it was decided that the instrument needed to be further shortened from 50 items to improve response rates and reduce burden on participants. Using a novel “report card” approach, scores were given to each item based on its: I-CVI values, selection in the “top 3” of important elements in the NWE as rated by nurses, inter-item correlations on the modified PES-NWI (used to identify potential redundancy in a subscale), and other select criteria as seen in the supplemental files of Article Three. This led to the creation of the PES-v2021, which is ready to undergo further testing with a new sample.

Overall Findings

Overall findings from this dissertation support the importance of the NWE to present-day bedside nurses. Additionally, findings from this dissertation provide evidence that most items from the PES-NWI remain relevant to practicing nurses. The modified PES-NWI, at 50 items, achieves adequate psychometric properties to be administered in the future. However, based on consensus from experts in the field of measuring the NWE, it was decided that the instrument needed to be shortened. Consequently, the PES-v2021 was developed and is suitable for further testing as a more concise measure of the current NWE.
Discussion of the Three PES-NWI Items Which Were Removed

From the perspective of nurses, three items on the original PES-NWI were unimportant to job satisfaction and to the nurses’ ability to provide quality patient care: the use of nursing diagnoses, use of care plans, and a chief nursing officer having the same power and authority as other hospital executives.

Leadership

In this study, nurses indicated that items pertaining to the CNO fell at or below the a priori cut-off for item retention, suggesting nurses have less agreement about the importance of CNOs than other aspects of the work environment. Previous review supports that nursing leadership is associated with both nurse and patient outcomes (Akbiyik et al., 2020; Taylor-Clark et al., 2022; Wong et al., 2013). This study found that leadership was a concept frequently cited by nurses among the “top three” items for creating a favorable work environment. The perceived unimportance of the CNO items, however, could be a reflection that nurses feel too far removed from the CNO position to understand its importance. Alternatively, as current literature suggests relationship-based leadership styles, particularly authentic leadership, have significant impact on nurse outcomes, perhaps staff nurses focus only on their direct leadership (i.e.: nurse manager or charge nurse) in the work environment (Akbiyik et al., 2020; Alilyyani et al., 2018).

Care Plans and Nursing Diagnoses

Ballantyne (2016) gives the history of nursing care plans. In the 1950s, nursing care planning was not a common task, but by 1978, it was discussed regularly in the
nursing profession. Interestingly, the care plan item included on the PES-NWI would have been developed in the early 1980s, right as nursing care plans were becoming a central idea to professional nursing. Recent review of care plan use indicated it was beneficial to the standardization of nursing language, particularly as EHR use becomes the norm globally (Johnson et al., 2018). If nursing care plans are integrated into EHRs, future research will need to explore nurse perception of them and the utility of planning nursing care through the EHR.

Arguments for keeping nursing diagnoses are similar to those for care plans. Proponents of nursing diagnoses argue nursing diagnoses are useful for language and patient care standardization (Cachón-Pérez et al., 2021). However, recent qualitative inquiry into the use of nursing diagnoses in Spain found nurses perceived nursing diagnoses negatively (Cachón-Pérez et al., 2021). Specifically, nurses reported nursing diagnoses were difficult to understand and implement as part of daily patient care (Cachón-Pérez et al., 2021). Interestingly, the present study found that nurses find both nursing diagnoses and care plans to be unimportant to their job satisfaction and, perhaps more importantly, to their ability to provide quality patient care. Further study may examine these two items for the inconsistencies between nurses’ perception of these items and evidence-based benefits of using them.

Discussion of the Added Items

Based on prior research and expert opinion, this dissertation added 19 additional items to the PES-NWI pertaining to: UAPs, RN teamwork, interprofessional communication, organizational communication, technology, and civility and respect.
Nurses indicated that all these additional items were important to their job satisfaction and to their ability to provide quality patient care.

**Teamwork and UAPs**

Teamwork has been consistently associated with outcomes, such as reduced missed patient care (Zhao et al., 2021). Prior study has also indicated that nurses who report greater levels of teamwork were less likely to leave their position (Kaiser & Westers, 2018). The role of UAPs is closely associated with teamwork, as RNs may rely on UAPs for assistance with basic care tasks (Zhao et al., 2021). Based on prior research and findings from the present study, teamwork and use of UAPs is justified as a component of the NWE. Teamwork, specifically, seems to be a component of utmost importance to nurses.

**Interprofessional Communication**

Another item added to the modified PES-NWI and subsequently included on the PES-v2021 pertained to interprofessional communication. Good communication is central to the provision of patient care, with inadequate communication cited as one of the most frequent root causes of sentinel events in hospitals (Joint Commission, 2021). Nurse perception of physician communication mediates relationships between the NWE and job satisfaction (Al-Hamdan et al., 2018). Additionally, communication satisfaction has been found to be associated with measures of job satisfaction, burnout, and the intention to stay in a position (Vermeir et al., 2018). In the present study, the importance of interprofessional communication was verified, and also determined to perform well
psychometrically on the modified PES-NWI. Based on the content analysis results, it may be worthwhile to expand the inquiry of interprofessional relations by asking additional items about teamwork among interprofessional healthcare providers. However, future study will be necessary to determine the appropriateness of adding such additional items.

**Organizational Communication**

The importance of organizational communication may have renewed importance due to the advent of the COVID-19 pandemic, particularly as hospital employees received information from their institutions about personal protective equipment, up-to-date knowledge of the virus, and current hospital census of COVID-19 patients (Cho et al., 2021; Ripp et al., 2020). The nurses in this study confirmed the importance of communication within the organization, with approximately 95% of nurses agreeing on the importance of these items. Particularly during stressful and unknown situations, such as those experienced during the COVID-19 pandemic, effective communication can alleviate staff concerns and lead to better trust in an organization and their leaders (Prestia et al., 2020; Ripp et al., 2020). Organizations may benefit from reevaluating their communication plans to ensure it best fits the needs of nurses in their organization.

**Technology**

The current healthcare environment relies on technology in new and innovative ways by comparison to the 1980s, when the items of the PES-NWI were first conceptualized. Therefore, inclusion of items pertaining to technology on the modified PES-NWI was an important addition. Further, nurses indicated all of these items were
important to their job satisfaction and ability to provide quality patient care. Technology continues to rapidly progress and expand. Recently, studies pertaining to robots and information/communication technologies have rapidly proliferated in the literature (Krick et al., 2019). The technology items contained on the modified PES-NWI will likely need to undergo continuous refinement as the technological systems used by nurses continue to advance.

**Civility and Respect**

The essentiality of civility and respect to the work of nursing is multifaceted and prevalent in multiple areas. Rates of bullying in the nursing profession have remained the same for over two decades (Crawford et al., 2019). Outcomes of bullying and incivility can have a substantial effect on the NWE; however, nursing leadership may be able to intervene in these situations and help to create better working environments for nurses (Bagnasco et al., 2018; Crawford et al., 2019). Mutual respect between nurses and patients has been described as an essential attribute for therapeutic communication between nurses and patients (Xue et al., 2021). Communication between nurses and physicians is improved when both sides show respect towards one another (Tan et al., 2017). Nurse leaders can effectively communicate with their staff nurses by being respectful in their communication, which has become particularly important during the COVID-19 pandemic (Prestia et al., 2020). The importance of civility and respect are evident in multiple areas of nurses interactions with patients, leaders, and the interdisciplinary team. As indicated by the results of the present study, the inclusion of
these items helps create a broader assessment of civility and respect in nurses’ workplaces and was confirmed as highly important to nurses in their practice.

Methodological Challenges Identified in this Study

Difficulties in Establishing Structural Validity of an Instrument

Originally, the plan for data analysis in this dissertation was to split the dataset received from Press Ganey in two, with an EFA performed on one half of the data, and a CFA on the other. After dataset refinement based on the sample inclusion criteria, however, this was not possible. Splitting the data set would not have yielded a large enough sample for two separate factor analyses (Tabachnik & Fidell, 2013). Therefore, the EFA and CFA were performed using the same data, which is not best practice due to the potential for sampling error (Tabachnik & Fidell, 2013).

Findings from the CFA itself provided some results slightly out of range of typically recommended cut-off values. The comparative fit index of 0.86 failed to show adequate goodness-of-fit, as most recommended this value should be larger than 0.95 (Tabachnik & Fidell, 2013). The root mean square error of approximation of 0.07 was slightly higher than the traditional 0.06 cut-off. The standardized root mean square error fell within normal acceptable limits, with a value of 0.08, which is precisely the traditional cut-off (Tabachnik & Fidell, 2013).

Findings in other fields of study reveal that failure to achieve structural validity using CFA with complex survey instrumentation is common (Marsh et al., 2004; Xia & Yang, 2019). In part, this has to do with use of ordinal data in procedures intended for continuous data (Xia & Yang, 2019). What may further contribute to the failure to
achieve adequate results is the fact that the instrument contains multiple factors (Marsh et al., 2004). The modified PES-NWI includes both of these criteria, and therefore, may always fail to achieve adequate goodness-of-fit indices. Consequently, conceptual and clinical relevance will be essential to the interpretation of its results in the future (Marsh et al., 2004).

**Using ICC(2) for Interrater Reliability**

An intraclass correlation coefficient (ICC) is often used as a measure justifying the aggregation of data to a particular level and for showing an adequate amount of interrater agreement (Polit & Yang, 2016; Woehr et al., 2015). Traditional methods of ICC(2) often suggest having an ICC(2) of greater than 0.70 (Polit & Yang, 2016). However, Woehr and colleagues (2015) suggest using ICC(2) values from one’s own field of study. Based on this suggestion, literature using ICC(2) to examine responses on the PES-NWI was reviewed. Two recent studies supported the use of 0.60 as an appropriate amount agreement among nurses on the PES-NWI (Park et al., 2018; Swiger et al., 2018). Future work may continue to use this value as it is specific to nurses and the PES-NWI.

**Limitations**

In terms of limitations, it is necessary to mention that this was a cross-sectional survey relying on nurse self-report. Additionally, because of the timeframe in which data was collected (June-August 2021), there is a risk of historical bias due to the influence of COVID-19 on the nursing workforce. One limitation of the data itself is the fact that
some hospitals lacked a census region. This was a fault in the dataset, as hospitals are required to enter a special identification code to match hospitals to responses. Based on evaluation of the known census regions, the dataset may be completely missing representation from the Western portion of the U.S. This is significant, particularly as California is the only U.S. state to have mandated nurse to patient ratios and houses a considerable portion of the U.S. population (AB 394, as cited in Kasprak, 2004; United States Census Bureau, 2021). Lastly, an EFA and CFA for the modified PES-NWI were performed on the same dataset. As mentioned previously, this is not ideal, as there may irregularities within the sample. Additional administration of the modified PES-NWI with different samples will be required to ensure its adequacy.

Future Research

While the study here has started the process of modernizing the PES-NWI, more work awaits to be done. Using findings generated in this study, future research should aim toward continued instrument refinement. Potential new items have been developed (see Figure 1, Chapter 3) and should be assessed for performance on future versions of the instrument. Additionally, the PES-v2021 needs to be assessed in different populations, to ensure its generalizability to other samples of U.S. nurses, as well as international nurses or specific nursing specialties.

Qualitative work with the newly developed PES-v2021 or modified PES-NWI may be beneficial. Qualitative work may allow for capturing more detail from nurses on which items are most important, and therefore, may lead to better understanding of why certain items are no longer important to nurses in measurement of a NWE. Further, it
may allow for precise refinement of the instrument, decreasing the number of items to include only those that are most essential to creating a favorable NWE.

**Implications**

Measure of the NWE has frequently occurred since Kramer and Hafner’s (1989) seminal work. After four decades of study, research has identified a consistent association between the NWE and nurse, patient, and organizational outcomes (Lake et al., 2019; Swiger et al., 2017; Wei et al., 2018). For researchers of the NWE, findings from this dissertation supports continued study of the NWE, continued refinement of instrumentation measuring the NWE, and the need to continually improve the NWE itself. As such, there will soon be a need to move from cross-sectional association research to interventional study on the most effective methods for improving NWEs (Swiger et al., 2017; Warshawsky et al., 2011).

For nursing leadership, the findings in this dissertation support the essential importance of leadership to direct care nurses. Recent study supports that nursing leadership, in particular, plays an important role in nurse retention (Taylor-Clark et al., 2022). Additionally, nurses substantially support the need for intra and interdisciplinary teamwork, collaboration, communication, and civility. Leadership can be directly involved with this area, by being intolerant to bullying (Anusiewicz et al., 2020), supporting nurses in collaboration with physicians and other interdisciplinary team members (Kramer, et al., 2010), and having a management style conducive to open communication (Kramer et al., 2010). In this way, these items are interrelated, as are most items on the PES-v2021.
Another key finding in this dissertation highlights the importance of teamwork and appropriate, safe staffing levels. Interestingly, nursing teamwork has been shown to explain much of nurses’ perception of staffing (Kramer et al., 2010). Teamwork was also found to be of primary importance in this study. In the absence of resources to hire additional staff members, researchers may want to explore the effect of team building for improvements in perceived staffing adequacy. Implementation of the TeamSTEPPS program may be one actionable method leaders can use to create better communication and team skills with nurses and other members of the interdisciplinary team (Agency for Healthcare Research and Quality, n.d.)

For nurses, findings from this study support their voice in measuring the NWE by what they need for themselves and their provision of patient care. For almost 40 years, the items on the NWI instruments have not been returned to the hands of practicing nurses to ensure their knowledge, opinions, and expertise are represented on the instrument. The modified PES-NWI listened to their responses, considered their voice, and in conjunction with empirical methodologies, formed the PES-v2021. Now, the PES-v2021 can move forward with further testing to become a modernized instrument for measuring the NWE of the 21st century.

Conclusion

There are over four million nurses in the U.S. and approximately 28 million in the world (Smiley et al., 2021; World Health Organization, 2020). Providing these nurses with a NWE conducive to their own needs and those of their patients is essential for the provision of quality patient care. To assess the NWE, however, there must be a measure
which can be easily administered and interpreted to identify strengths and weaknesses in an organization’s NWE. Measure refinement for the NWE will remain an ongoing process, but the current study marks the first known attempt at modernization of the PES-NWI in twenty years. With continued testing and refinement, the PES-v2021 can assist leaders and researchers to serve nurses and patients.
GENERAL LIST OF REFERENCES


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APPENDIX A

THE PRACTICE ENVIRONMENT SCALE OF THE NURSING WORK INDEX
(PES-NWI)
The Practice Environment Scale of the Nursing Work Index (PES-NWI)

For each item in this section, please indicate the extent to which you agree that the following items are present in your current job. Indicate your degree of agreement by placing an “x” in the box that best describes your agreement/disagreement with each statement.

<table>
<thead>
<tr>
<th>The following are present in your current job:</th>
<th>Strongly Disagree</th>
<th>Somewhat Disagree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Adequate support services allow me to spend time with my patients.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>2. Physicians and nurses have good working relationships.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>3. A supervisory staff that is supportive of the nurses.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>4. Active staff development or continuing education programs for nurses.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>5. Career development/ clinical ladder opportunity.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>6. Opportunity for staff nurses to participate in policy decisions.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>7. Supervisors use mistakes as learning opportunities, not criticism.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>8. Enough time and opportunity to discuss patient care problems with other nurses.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>9. Enough registered nurses to provide quality patient care.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>10. A nurse manager who is a good manager and leader.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>11. A chief nursing officer who is highly visible and accessible to staff.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>12. Enough staff to get the work done.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>13. Praise and recognition for a job well done.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>14. High standards of nursing care are expected by the administration.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>15. A chief nursing officer equal in power and authority to other top-level hospital executives.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>16. A lot of teamwork between nurses and physicians.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>17. Opportunities for advancement.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>18. A clear philosophy of nursing that pervades the patient care environment.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>19. Working with nurses who are clinically competent.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>20. A nurse manager who backs up the nursing staff in decision-making, even if the conflict is with a physician.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>21. Administration that listens and responds to employee concerns.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>22. An active performance improvement program.</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>23. Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees).</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
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<td></td>
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<td>---</td>
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</tr>
<tr>
<td>24. Collaboration (joint practice) between nurses and physicians.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. A preceptor program for newly hired RNs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. Nursing care is based on a nursing rather than a medical model.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. Staff nurses have the opportunity to serve on hospital and nursing committees.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. Nurse managers consult with staff on daily problems and procedures.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29. Written, up-to-date nursing care plans for all patients.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30. Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31. Use of nursing diagnoses.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX B

SAMPLE FORMAT OF THE MODIFIED PES-NWI
Sample of Format of the modified PES-NWI

(Only the first five questions are included for sake of space)

Q0 For each item in this section, please indicate the extent to which you agree that the following items are present in your current job. Indicate your degree of agreement by placing an “x” in the box that best describes your agreement/disagreement with each statement.

<table>
<thead>
<tr>
<th>Q1 Adequate support services allow me to spend time with my patients.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present in current job (1)</td>
</tr>
<tr>
<td>Important to your job satisfaction (2)</td>
</tr>
<tr>
<td>Important to your ability to provide quality care (3)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q2 Physicians and nurses have good working relationships.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present in current job (1)</td>
</tr>
<tr>
<td>Important to your job satisfaction (2)</td>
</tr>
<tr>
<td>Important to your ability to provide quality care (3)</td>
</tr>
</tbody>
</table>
Q3 A supervisory staff that is supportive of the nurses.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree (1)</th>
<th>Somewhat disagree (2)</th>
<th>Somewhat agree (3)</th>
<th>Strongly agree (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present in current job (1)</td>
<td>·</td>
<td>·</td>
<td>·</td>
<td>·</td>
</tr>
<tr>
<td>Important to your job satisfaction (2)</td>
<td>·</td>
<td>·</td>
<td>·</td>
<td>·</td>
</tr>
<tr>
<td>Important to your ability to provide quality care (3)</td>
<td>·</td>
<td>·</td>
<td>·</td>
<td>·</td>
</tr>
</tbody>
</table>

Q4 Active staff development or continuing education programs for nurses.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree (1)</th>
<th>Somewhat disagree (2)</th>
<th>Somewhat agree (3)</th>
<th>Strongly agree (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present in current job (1)</td>
<td>·</td>
<td>·</td>
<td>·</td>
<td>·</td>
</tr>
<tr>
<td>Important to your job satisfaction (2)</td>
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<td>·</td>
<td>·</td>
<td>·</td>
</tr>
<tr>
<td>Important to your ability to provide quality care (3)</td>
<td>·</td>
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</tr>
</tbody>
</table>
Q5 Career development/clinical ladder opportunity.

<table>
<thead>
<tr>
<th></th>
<th>Strongly disagree (1)</th>
<th>Somewhat disagree (2)</th>
<th>Somewhat agree (3)</th>
<th>Strongly agree (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Present in current job (1)</td>
<td>•</td>
<td>•</td>
<td>•</td>
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</tr>
<tr>
<td>Important to your job satisfaction (2)</td>
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<td>•</td>
<td>•</td>
<td>•</td>
</tr>
<tr>
<td>Important to your ability to provide quality care (3)</td>
<td>•</td>
<td>•</td>
<td>•</td>
<td>•</td>
</tr>
</tbody>
</table>
APPENDIX C

THE MODIFIED PRACTICE ENVIRONMENT SCALE OF THE NURSING WORK INDEX (PES-NWI)
The Modified Practice Environment Scale of the Nursing Work Index (PES-NWI)
For each item in this section, please indicate the extent to which you agree that the following items/factors are present in your current job, are important to your job satisfaction, and are important to your ability to provide quality patient care. Indicate your degree of agreement by placing an “x” in the box that best describes your agreement/disagreement with each statement.

1. Support services allow me to spend adequate time with my patients.
2. Physicians and nurses have good working relationships.
3. A supervisory staff that is supportive of the nurses.
4. Active staff development or continuing education programs for nurses.
5. Career development / clinical ladder opportunity.
6. Opportunity for staff nurses to participate in policy decisions.
7. Nurse managers use mistakes as learning opportunities, not criticism.
8. Enough time and opportunity to discuss patient care problems with other nurses.
9. Enough registered nurses to provide quality patient care.
10. A nurse manager who is a good manager and leader.
11. A chief nursing officer who is highly visible and accessible to staff.
12. Enough staff to get the work done.
13. Praise and recognition for a job well done.
14. High standards of nursing care are expected by the administration.
15. A chief nursing officer equal in power and authority to other top-level hospital executives.
16. A lot of team work between nurses and physicians.
17. Opportunities for advancement.
18. A clear philosophy of nursing that pervades the patient care environment.
19. Working with nurses who are clinically competent.
20. A nurse manager who backs up the nursing staff in decision-making, even if the conflict is with a physician.
21. An administration that listens and responds to employee concerns.
22. An active performance improvement or evidence-based practice program.
23. Staff nurses are involved in the internal governance of the hospital (e.g., practice and policy committees).
25a. A preceptor program for newly hired RNs.
25b. Nurses are supported as they transition into new roles.
26a. Nursing care is based on a nursing knowledge and judgment rather than primary reliance on a medical model.
26b. Nursing care is based on a nursing rather than a medical model.
27a. Staff nurses have the opportunity to serve on hospital and nursing committees.
27b. Staff nurses have the opportunity to influence the outcomes of hospital and nursing decisions made by committees.
28. Nurse managers consult with staff on daily problems and procedures.
29. Documented, up-to-date nursing care plans for all patients.
30. Patient care assignments that foster continuity of care, i.e., the same nurse cares for the patient from one day to the next when possible.
31. Use of nursing diagnoses.
32. RNs count on each other to pitch in and help when things get busy.
33. There is a good deal of teamwork among RNs in my work area.
34. RNs in my work area support each other.
35. Access to computerized patient care information at the point of care.
36. Information technology systems that are up-and-running when needed.
37. A computerized healthcare record system that supports nursing practice.
38. Effective training on new technology.
39. The information systems available support quality patient care.
40. Unlicensed assistive personnel who help the care team.
41. Unlicensed assistive personnel contribute to quality patient care.
42. Nurses are treated with civility and respect.
43. Members of the healthcare team respect the work of nurses in this organization.
44. The organizational leaders respect nurses’ opinions.
45. Organizational leaders empower nurses to make decisions that affect their work.
46. Nurses have input into changes to the EHR (i.e. customizing features, creating templates, etc.)
47. Nurses IT needs are a priority for the organization.
48. Good communication among interprofessional team members.
49. Organizational information is easily accessible.
50. Information is shared routinely across the organization

**Open-Ended Questions:**
1. What other factors are important to your job satisfaction?
2. What other factors are important to your ability to provide quality patient care?
3. What are the top three factors you feel make up a positive work environment?

**Notes:**
Numbers 32-34 are Press Ganey teamwork questions.
Numbers 35-39 are from Moorer et al., 2010.
Numbers 40-41 are from Friese, 2012.
Numbers 42-45 are from personal communication with Dr. Warshawsky and pertain to civility and respect.
Numbers 46-47 are from personal communication with Dr. Warshawsky and pertain to IT services.
Number 48 was developed by Dr. Patrician and Caitlin Campbell.
Numbers 49-50 are from Dr. Swiger and relate to organizational communication.
APPENDIX D

VARIABLES REQUESTED FROM PRESS GANEY©/UNIVERSITY OF KANSAS MEDICAL CENTER:
Variables Requested:

1. The results from the modified PES-NWI
2. Job Enjoyment Scale
3. Unit RN job plans for next year/ next 3 years
4. Unit perceived quality of care
5. Missed care
6. Description of unit last shift
7. Gender
8. Race/ethnicity
9. Age
10. Role (we only want staff nurses)
11. Education level
12. Years of experience as RN in the U.S.
13. Years on unit
14. Hospital type (urban, rural, Magnet, vs non, small, medium, or large, profit, not for profit, government)
15. Hospital identifier (de-identified)
16. Unit type
17. Unit identifier (de-identified)
APPENDIX E

UNIVERSITY OF ALABAMA AT BIRMINGHAM
INSTITUTIONAL REVIEW BOARD APPROVAL LETTER
Campbell, Caitlin M

University of Alabama at Birmingham Institutional Review Board
Federalwide Assurance # FWA00005960
IORG Registration # IRB00000196 (IRB 01)
IORG Registration # IRB00000726 (IRB 02)
IORG Registration # IRB00012550 (IRB 03)

22-Oct-2020

IRB-300005963
Revision and Revalidation of the Practice Environment Scale of the Nursing Work Index

The Office of the IRB has reviewed your Application for Not Human Subjects Research Designation for the above referenced project.

The reviewer has determined this project is not subject to FDA regulations and is not Human Subjects Research. Note that any changes to the project should be resubmitted to the Office of the IRB for determination.

If you have questions or concerns, please contact the Office of the IRB at 205-934-3789.

Additional Comments:
De-identified survey data from Press Ganey/University of Kansas (DUA).