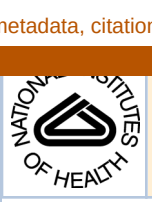

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Global Use of the Practice Environment Scale of the Nursing Work Index

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Abstract

Background—Although the Practice Environment Scale of the Nursing Work Index has been endorsed as a gauge of the quality of the nursing practice environment by several organizations in the United States promoting healthcare quality, there is no literature describing its use in different practice settings and countries.

Objective—To inform research by describing the modifications and use of the scale in a variety of practice settings and countries.

Method—The Cumulative Index to Nursing & Allied Health Literature and PubMed databases were searched for the years 2002-2010 to identify 37 research reports published since 2002 describing use, modification, and scoring variations in different practice settings and countries.

Results—The scale was modified for 10 practice settings in five countries and translated into three languages. Composite scores ranged from 2.48 to 3.17 (on a 1-4 scale). The Staffing and Resource Adequacy subscale most often scored lowest. A new nursing information technology subscale has been developed. New scoring methods to identify the *favorability* of practice environments are described. Over time, the nature of the research conducted using the measure has changed. Overall, most publications report significant associations between scale scores and multiple nurse, patient, and organizational outcomes.

Discussion—Scale use is growing across different clinical settings and countries. Recommendations for future research use include reducing scale length, employing consistent scoring methods, considering the impact of various modifications based on cultural and clinical setting nuances, and using the measure in longitudinal and intervention research designs.

Keywords

nurse work environment; nurse workforce; PES-NWI; practice environment scale; nurse outcomes; patient outcomes; review

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For decades, quality of the nursing practice environment has been associated with nurse recruitment and retention and quality patient outcomes (Aiken, Clarke, Sloane, Lake, & Cheney, 2008; Aiken, Havens, & Sloane, 2000; McClure & Hinshaw, 2002; McClure,

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Poulin, Sovie, & Wandelt, 1983). Because of concerns about the global nurse workforce shortage, appeals are mounting to enhance the quality of nursing practice environments (Finlayson, Aiken, & Nakarada-Kordic, 2007; Kramer & Schmalenberg, 2002; Milisen, Abraham, Siebens, Darras, & Dierckx de Casterle, 2006; Page, 2004). Shaping nursing practice environments to promote desired outcomes requires valid and reliable measures to assess practice environments prior to, during, and following efforts to implement change.

The Practice Environment Scale of the Nursing Work Index (PES-NWI; Lake, 2002) is the most widely reported measure used to gauge the state of nursing practice environments and it is the only measure recommended by several United States organizations promoting quality healthcare. While international use of the PES-NWI is growing across multiple organizational and clinical contexts, no publications have reported modifications and use in different practice settings and countries to inform future research.

Background

According to Lake (2002), the 31-item PES-NWI was developed from the Nursing Work Index (NWI; Kramer & Hafner, 1989). The NWI items were based on an extensive review of the job satisfaction literature (Kramer & Hafner, 1989) and findings from an American Academy of Nursing study identifying characteristics of the original Magnet hospitals associated with job satisfaction for nurses (McClure et al., 1983). Aiken and Patrician (2000) used the NWI items to develop a 46-item measure of professional practice models, the Revised Nurse Work Index (NWI-R), based theoretically on the sociology of organizations, occupations, and work (Aiken & Patrician, 2000; Lake, 2002).

The PES-NWI consists of five subscales derived through factor analysis of the 48 NWI-R items using 1985-1986 data from 16 of the original Magnet hospitals: Nurse Participation in Hospital Affairs; Nursing Foundations for Quality of Care; Nurse Manager Ability, Leadership and Support of Nurses; Staffing and Resource Adequacy; and Collegial Nurse-Physician Relations (Lake, 2002, p.181). According to Lake (2002), two subscales (Nurse Participation in Hospital Affairs and Nursing Foundations for Quality of Care) are used to address facility-level phenomena, while three subscales (Nurse Manager Ability, Leadership and Support; Staffing and Resource Adequacy; and Collegial Nurse-Physician Relations) address unit-level phenomena. However, the scope of the PES-NWI is not all-inclusive (Lake, 2007). The first new subscale (the Nursing Information Technology Subscale) was tested in 2010 in Veterans Affairs hospitals (Moorer, Meterko, Alt-White, & Sullivan, 2010).

Key U.S. organizations promoting quality care have recommended the PES-NWI as a measure of the quality of the nursing practice environment. The National Quality Forum (NQF) endorsed the PES-NWI as a nursing care performance measure of structure at the facility level (NQF, 2004). The Joint Commission included the PES-NWI as a screening indicator for hospital staffing effectiveness in their accreditation standards (The Joint Commission, 2009). Finally, in 2006 the National Database of Nursing Quality Indicators (NDNQI) made the PES-NWI available for inclusion on the annual RN survey completed by participating hospitals, many of which are American Nurses Credentialing Center (ANCC)-recognized Magnet hospitals or hospitals striving for such designation (ANCC, 2009).

The purpose of this presentation is to inform PES-NWI use in the conduct of research. Provided are a comprehensive overview of PES-NWI modifications, use, and scoring variations across numerous clinical practice settings and countries. A report of published scores for several clinical practice settings and countries is provided as well as recommendations for future research using the scale.

Method

A comprehensive search of the Cumulative Index to Nursing & Allied Health Literature (CINAHL) and PubMed (MEDLINE) was conducted. The search terms were *PES-NWI*, *practice environment scale*, *nursing work index*, *NWI*, *nursing work index-revised*, and *NWI-R* for the years 2002 (year of the first publication describing about the instrument) through the first quarter of 2010.

Inclusion Criteria

The search was limited to articles written in English, published in peer-reviewed journals, and focused on use of the PES-NWI to measure features of the nursing practice environment, with one exception. The exception was an article by Gunnarsdottir, Clarke, Rafferty, and Nutbeam (2009), who reported using the Nursing Work Index-Revised (NWI-R). However, their factor analysis of the NWI-R yielded 30 items in five factors very similar to Lake's PES-NWI items and thus Gunnarsdottir et al. concluded that their final solution mirrored the PES-NWI as identified by Lake.

Screening

Electronic databases were searched for abstracts that met the search terms. Subsequently, the full articles were read independently by both authors to validate that the inclusion criteria were met. The initial search yielded 28 articles, of which 23 met the criteria. The exploration was augmented by searches for publications by key authors and hand-searching reference lists of publications discovered through the search, which identified 17 additional publications meeting the criteria, for a total yield of 40 publications. Of the 40 publications, three were review articles comparing the PES-NWI to other work environment measures (Bonneterre, Liaudy, Chatellier, Lang, & deGaudemaris 2008; Cummings, Hayduk, & Estabrooks, 2006; Lake, 2007) and were excluded from the analysis, resulting in 37 articles for review.

Findings

Publications Reporting Use of the Instrument

The 37 articles were published in 23 peer-reviewed U.S. (n = 14) and international (n = 9) journals. The review demonstrated increasing scale use over time. For instance, in the first 4 years after development (2002-2006), nine research articles using the scale were published; whereas in the next 4 years (2007-first quarter of 2010), 28 additional articles using the scale were published. A change in the nature of the research conducted using the PES-NWI since 2009 was noted, including use of primary data versus secondary analyses, development of a new nursing information technology subscale (Moorer et al., 2010), use of interventions such as patient comfort rounds to improve nurse perceptions of the practice environment (Gardner, Woollett, Daly, & Richardson, 2009), and use of the scale to predict adoption of evidence-based pain management (Samuels & Fetzer, 2009; Table 1).

Study Designs

Except for the single intervention study (Gardner et al., 2009), all publications reported that PES-NWI data were collected using cross-sectional survey designs with sample sizes ranging from 31 to 72,889 nurses. The PES-NWI data were obtained from 27 independent studies. Nineteen articles reported analyses of primary data and the remaining 18 articles reported secondary analyses using eight different datasets. The most frequently used data were collected from a 1998-1999 sample of Pennsylvania nurses (Aiken et al., 2008; Friese, 2005; Friese, Lake, Aiken, Silber, & Sochalski, 2008; Hanrahan, 2007; Hanrahan, Aiken, McClaine, & Hanlon, 2010; Kutney-Lee, Lake, et al., 2009; Lake, 2002; Lucero, Lake, &

Aiken, 2009), a 2005 sample of Michigan nurses (Manojlovich, 2005; Manojlovich, Antonakos, & Ronis, 2009; Manojlovich & DeCicco, 2007; Manojlovich & Laschinger, 2007), and a sample of Canadian nurses participating in the International Study of Hospital Outcomes (Aiken et al., 2001; Spence Laschinger & Leiter, 2006; Leiter & Spence Laschinger, 2006). In 25 articles the nurse was reported as the level of analysis, in 4 the nursing unit was the level of analysis, and 9 considered the organization as the level of analysis.

Use Across Practice Settings and Countries

The PES-NWI has been used to assess numerous clinical practice settings: intensive care units (Manojlovich et al., 2009; Manojlovich & DeCicco, 2007); cardiac, orthopedic, and neurologic telemetry units (Eaton-Spiva et al., 2010); outpatient and inpatient surgical care (Aiken et al., 2008; Eaton-Spiva et al., 2010; Friese et al., 2008); inpatient psychiatric settings (Hanrahan, 2007; Hanrahan et al., 2010); acute care oncology settings (Friese, 2005; Friese et al., 2008); outpatient dialysis centers (Gardner, Thomas-Hawkins, Fogg, & Latham, 2007; Harwood et al., 2007; Thomas-Hawkins, Denno, Currier, & Wick, 2003); and inpatient dialysis units (Harwood et al., 2007). The scale has been used in two types of US government health care organizations: Veterans Affairs medical centers (Moorer et al., 2010) and U.S.-based Army Medical Department hospitals (Patrician, Shang, & Lake, 2010). The PES-NWI has been used to assess the quality of practice environments in the US, Australia, Canada, Iceland, and Taiwan (Table 1).

PES-NWI Modifications

The most common modification was revision of item wording to increase the relevance for the practice environment being assessed. For example, in some variations, references to nursing leadership were modified to match the titles used in the settings being assessed (Chiang & Lin, 2008; Gardner et al., 2007; Gunnarsdottir et al., 2009; Middleton, Griffiths, Fernandez, & Smith, 2008; Thomas-Hawkins et al., 2003). Others revised items to make them more relevant to the organizational entity being assessed. For example, Gardner et al. (2009) and Thomas-Hawkins et al. (2003) changed items to refer to the dialysis setting and Gunnarsdottir et al. (2009) made phrasing modifications such as “patient care ward” to enhance relevancy for Icelandic nurses.

In some secondary analyses, modified versions of the scale were used because the primary data set did not include all of the PES-NWI items (Hanrahan, 2007; Spence Laschinger & Leiter, 2006; Leiter & Spence Laschinger, 2006; McCusker, Dendukuri, Cardinal, Laplante, & Bambonye, 2004). For instance, the Canadian version of the International Study of Hospital Outcomes (Aiken et al., 2001) did not include three PES-NWI items: *Career development/clinical ladder opportunity*, *Use of nursing diagnoses*, and *Supervisors use mistakes as learning opportunities*; therefore, secondary analyses of these data did not include these PES-NWI items (Spence Laschinger & Leiter, 2006; Leiter & Spence Laschinger, 2006). In other studies (Chiang & Lin, 2009; Gunnarsdottir et al., 2009; Hanrahan, 2007), however, additional items found in the NWI (Kramer & Hafner, 1989) and NWI-R (Aiken & Patrician, 2000), but not the PES-NWI, were included such as: Nursing staff are supported in pursuing degrees in nursing, *Nurses participate to control costs*, *Nurses participate in selecting new equipment*, Support for new and innovative ideas about patient care, *Working with experienced nurses*, Opportunity to work on a highly specialized patient care ward, *Flexible shift patterns are available*, and *Physicians give good quality care*. Gunnarsdottir et al. (2009) used 6 items, Hanrahan (2007) 5 items, and Chiang and Lin (2009) 1 item not found in Lake’s PES-NWI.

Other researchers eliminated items viewed as irrelevant to the practice setting being assessed or that overlapped with other measures used. For example, Middleton et al. (2008) deleted *Use of nursing diagnosis*, noting that nursing diagnoses are not relevant to the practice of Australian nurses. Thomas-Hawkins et al. (2003) eliminated A chief nurse executive equal in power and authority to other hospital executives and *Supervisors use mistakes as learning opportunities* because the items were not considered relevant to the outpatient dialysis setting. Manlojlovich (2005) omitted the entire Collegial Nurse-Physician Relations subscale to avoid multicollinearity with the ICU Nurse-Physician Questionnaire (Shortell et al., 1991), used to measure nurse-physician communication. Finally, several studies omitted the Adequate Staffing and Resources (Hanrahan et al., 2010; Kutney-Lee, McHugh, et al., 2009) and Nursing Foundations for Quality Care (Kutney-Lee, McHugh, et al., 2009) subscales due to multicollinearity with alternate measures used in their studies.

International Versions

Bilingual experts used forward translation and independent back-translation processes to translate the PES-NWI into three non-English versions: Chinese (Chiang & Lin, 2009), French (McCusker et al., 2004), and Icelandic (Gunnarsdottir et al., 2009). While Liou and Cheng (2009) did not translate the PES-NWI from English for their sample of Asian nurses working in the US, their final factor analytic solution was similar to that of Chiang and Lin. Of the international versions (Table 2), the Australian version (Middleton et al., 2008) of the PES-NWI is most similar to Lake's original version.

Across all studies, the Staffing and Resource Adequacy subscale factored the most consistently. The only changes were found in the Chinese version were the exclusion of Enough registered nurses to provide quality patient care and inclusion of Good working relationships between nurses and physicians. Likewise, the Chinese version is the only version that does not have a Collegial Nurse Physician Relations subscale; instead, the three nurse-physician relationship items are distributed across the renamed nursing professional development, nursing quality, and staffing and resource adequacy subscales because of the cultural meaning attached to the outcomes of these items (Chiang & Lin, 2009).

More extensive scale modifications include reduction of the number of items or realignment of items into different subscales based on factor analyses with nurse samples from different cultures. In Iceland, Gunnarsdottir et al.'s (2009) factor analysis of 52 NWI-R (Aiken & Patrician, 2000) items yielded a 30-item scale with five subscales similar to Lake's PES-NWI. Chiang and Lin's (2009) analysis of survey data from 842 Taiwanese nurses resulted in a different 30-item, five-factor solution. Finally, McCusker et al.'s (2004) CFA of a 21-item French version of the PES-NWI yielded Lake's original five-subscale solution. In total, psychometric analyses of the PES-NWI were reported in nine articles (Berndt et al., 2010; Chiang & Lin, 2009; Gajewski, Boyle, Miller, Oberhelman, & Dunton, 2010; Gunnarsdottir et al., 2009; Hanrahan, 2007; Kutney-Lee, Lake, et al., 2009; Lake, 2002; Liou & Cheng, 2009; Moorer et al., 2010).

Scoring

Following Lake's (2002) instructions, most researchers directed respondents to rate the extent to which they agreed that each PES-NWI item was present in their current practice environment. All but two versions used Lake's 4-point Likert scale with response choices of 1 (strongly disagree) to 4 (strongly agree). Liou and Grobe (2008) used a 5-point scale and Berndt et al. (2010) used a 7-point response option to standardize the scoring ranges of the multiple scales included in their questionnaires.

Gardner et al. (2007) also asked respondents to affirm whether each item was important to them and their job. Eighty percent of the nurse respondents affirmed that 28 of the 31 PES-NWI items were important to their work. The three items failing to achieve 80% agreement on importance were *Use of nursing diagnoses* (78%), *Patient care assignments promote continuity* (78%), and *Up-to-date nursing care plans* (79%).

All publications reported averaging item responses across respondents to derive mean item scores. Most also derived mean subscale scores by averaging item means for each subscale (Lake, 2002). In four publications, mean scores were calculated, yet the reported mean subscale scores exceeded 4.0 (Berndt et al., 2010; Chiang & Lin, 2009; Kim, Capezuti, Boltz, & Fairchild, 2009; Wade et al., 2008), suggesting that item mean scores were summed to create subscale mean scores.

Lake and Friese (2006) introduced a scoring innovation to categorize the favorability of practice environments. Practice environments were classified as favorable if four or five subscale mean scores were greater than 2.5, mixed if two or three subscale means were greater than 2.5, and unfavorable if none or one of the five subscales achieved a mean score of 2.5. This technique was reported in three additional publications (Aiken et al., 2008; Friese et al., 2008; Kutney-Lee, McHugh, et al., 2009). Finally, Kutney-Lee et al. (2009) combined PES-NWI subscale scores with measures of registered nurse expertise to create a new composite score representing *nurse surveillance capacity*.

Reported PES-NWI Scores

Only thirteen publications reported PES-NWI composite scores, which ranged from 2.48 to 3.17. Acute care nurses working in non-Magnet hospitals in Pennsylvania in 1998-1999 reported the lowest composite score (2.48; Lake, 2002), while outpatient dialysis nurses who planned to remain in their current jobs reported the highest composite scores (3.17; Gardner et al., 2007). Of the remaining U.S. publications, two used different Likert scale ranges (Berndt et al., 2010; Liou & Grobe, 2008), two did not report mean scores on a 1-4 scale (Kim et al., 2009; Wade et al., 2008), and seven did not report any scores (Gajewski et al., 2010; Hanrahan, 2007; Kutney-Lee, Lake, et al., 2009; Manojlovich, 2005; Manojlovich et al., 2009; Manojlovich & DeCicco, 2007; Samuels & Fetzer, 2009). Based on the reported scores, it appears that at the end of the 1990s, nurses working in Magnet hospitals scored their practice environments higher (2.92-2.99; Lake & Friese, 2006) than all other reported acute care U.S. practice environments. In comparing the more recent composite scores, general surgical nurses in the northeast scored their environments as 2.83 (Samuels & Fetzer, 2009), telemetry nurses in the northeast scored their environment as 2.81 (Eaton-Spiva et al., 2010), and Michigan ICU nurses rated their practice environments as 2.60 (Manojlovich et al., 2009).

Non-U.S. studies are even more difficult to compare given the various factor analysis solutions, item revisions, and cultural variations. Composite scores reported by Canadian nurses ranged from 2.51 to 2.63 (Armstrong & Laschinger, 2006; Armstrong, Laschinger, & Wong, 2009; Laschinger, 2008). The 67 Australian nurses working in one hospital reported a composite score of 2.69 (Middleton et al., 2008). However, the scales used in these studies were different in item composition from the U.S. studies, limiting comparisons across countries.

The highest scores in this review were reported by nurses working in an outpatient dialysis facility (Gardner et al., 2007). These nurses scored their practice environments as 3.09 in aggregate and 3.17 among those nurses who reported being content with their positions. While the sample size of 199 nurses working in a single company limits generalizability, these subscale scores are higher than those reported by 383 outpatient dialysis nurses

identified through the American Nephrology Nurses Association (Thomas-Hawkins et al., 2003) and 31 Canadian dialysis nurses (Harwood et al., 2007).

In comparing the subscale scores by rank order, nurses working in U.S. acute care and Veterans Affairs settings most often scored the Foundations for Quality subscale highest. Nurses working in non-U.S. settings most often scored the Collegial Nurse-Physician subscale highest and the Foundations for Quality subscale second highest. The Adequate Staffing and Resources subscale was most often scored the lowest of the subscales across all settings (Table 3).

Associations Between the PES-NWI Scores and Other Variables

All except five studies (Eaton-Spiva et al., 2010; Gajewski et al., 2010; Hanrahan, 2007; Liou & Cheng, 2009; Moorer et al., 2010) used PES-NWI scores to examine associations with organizational features, nurse outcomes, or patient outcomes (Table 4).

PES-NWI and Organizational Variables

Associations between PES-NWI scores and organizational variables were tested in 16 studies. Only four examined associations between organizational structure variables such as facility location, bed size, teaching status, profit status, acuity, and staffing ratios and PES-NWI scores (Friese et al., 2008; Lake & Friese, 2006; Manojlovich et al., 2009; Thomas-Hawkins, Currier, Denno, & Wick, 2003). Of these organizational variables, staffing ratios were correlated positively and low teaching status was correlated negatively with PES-NWI scores. Four studies reported positive correlations between PES-NWI scores and recognitions of organizational excellence such as ANCC's Magnet recognition (Friese, 2005; Lake, 2002; Lake & Friese, 2006) and National Cancer Institute designation (Friese et al., 2008). Middleton et al. (2008) compared the PES-NWI scores from their study of a single Australian hospital with scores reported by Lake (2002). The Australian composite score and the Nursing Foundations for Quality Care, Staffing and Resource Adequacy, and Collegial Nurse-Physician Relations subscale scores were significantly lower than U.S. Magnet hospitals and higher than the U.S. non-Magnet hospital scores.

Six publications reported associations between PES-NWI scores and mediators such as patient safety climate and nurse-physician Communication. Two reported significant positive associations between the practice environment, empowerment, and nurse-reported patient safety climate, with the combination of practice environment and nurse empowerment together explaining 46% (Armstrong & Laschinger, 2006) and 50% (Armstrong, Laschinger, & Wong, 2009) of the variance in the patient safety climate. Positive associations were reported also between the practice environment and nurse-physician communication (Manojlovich, 2005; Manojlovich et al., 2009; Manojlovich & DeCicco, 2007).

The last type of organizational measure explored was human resources outcome data. Scale scores were correlated negatively with nurse turnover (Chiang & Lin, 2008; Gardner et al., 2007) and absenteeism (McCusker et al., 2004).

PES-NWI and Nurse Outcomes

The majority (n = 23) of the studies used the PES-NWI to test associations between the quality of the nurse practice environment and nurse outcomes. Significant positive associations were reported between PES-NWI scores and nurse empowerment (Armstrong & Laschinger, 2006; Armstrong et al., 2009; Harwood et al., 2007; Laschinger, 2008; Manojlovich et al., 2009; Manojlovich & DeCicco, 2007; Manojlovich & Laschinger, 2007), job satisfaction (Gunnarsdottir et al., 2009; Laschinger, 2008; Manojlovich, 2005;

Manojlovich & Laschinger, 2007), job enjoyment (Wade et al., 2008), and organizational commitment (Liou & Grobe, 2008). The subscales most frequently associated with nurse satisfaction were Staffing and Resource Adequacy; Nurse Manager Ability, Leadership and Support; and Collegial Nurse-Physician Relations (Friese, 2005; Gunnarsdottir et al., 2009; Kim et al., 2009; Laschinger, 2008; McCusker et al., 2004). Conversely, significant negative associations were reported between PES-NWI scores and nurse burnout, job dissatisfaction, and reported intent to resign (Aiken et al., 2008; Friese, 2005; Gardner et al., 2007; Hanrahan et al., 2010; Laschinger & Leiter, 2006; Leiter & Laschinger, 2006; Liou & Grobe, 2008; Patrician et al., 2010; Thomas-Hawkins et al., 2003). In addition to measures of nurse satisfaction, significant positive correlations were found between PES-NWI scores and measures of clinical autonomy and control over nursing practice (Berndt et al., 2010). Scores on the PES-NWI were not associated significantly with use of evidence-based pain management by nurses (Samuels & Fetzer, 2009).

PES-NWI and Patient Outcomes

Associations between the PES-NWI and patient outcomes were explored in 16 studies. Nurse-rated quality of care was the most frequently measured patient outcome. Significant positive associations between PES-NWI scores and nurse-rated quality were reported in five of the 16 studies (Aiken et al., 2008; Gardner et al., 2009; Gunnarsdottir et al., 2009; Laschinger, 2008; Laschinger & Leiter, 2006). Two additional studies reported significant associations between unfavorable practice environments (defined as one or no subscale with PES-NWI mean scores of 2.50 or above) and poor quality of care (Kutney-Lee, McHugh, et al., 2009; Patrician et al., 2010). Three studies reported mixed associations between the PES-NWI scores and nurse-rated quality of patient care. In two of these studies, only three subscales (Nurse Manager Ability, Leadership, and Support; Staffing and Resource Adequacy; and Collegial Nurse-Physician Relations) were associated with nurse-rated quality of care (Friese, 2005; McCusker et al., 2004). Kim et al. (2009) reported a significant positive association between Nurse Participation in Hospital Affairs and quality of care, and significant negative associations between the Staffing and Resource Adequacy and Nursing Foundations for Quality of Care subscales and quality of care.

Associations between PES-NWI scores and adverse patient events varied across studies. Two studies reported that patients cared for in hospitals with “unfavorable” practice environments were at higher risk for postoperative complications, failure to rescue, and mortality (Aiken et al., 2008; Friese et al., 2008). Gardner et al. (2007) reported that dialysis patients were more likely to be hospitalized during their first 90 days of treatment in dialysis facilities with lower nurse-physician collaboration subscale scores. Three studies found significant negative associations between PES-NWI scores and nurse-reported nosocomial infections, patient falls with injury, catheter-line sepsis, and medication errors (Kutney-Lee, Lake et al., 2009; Laschinger & Leiter, 2006; Manojlovich & DeCicco, 2007). Three studies reported nonsignificant associations between PES-NWI scores and nurse-reported incidence of ventilator-associated pneumonia, medication errors, nosocomial infections, and patient and family satisfaction (Gardner et al., 2007; Manojlovich & DeCicco, 2007; McCusker et al., 2004). Finally, Manojlovich et al. (2009) reported nonsignificant associations between PES-NWI scores and pressure ulcers, ventilator-associated pneumonia, and bloodstream infection rates calculated from organizational data.

Discussion

The PES-NWI is a measure to assess the nursing practice environment that has been endorsed by U.S. organizations promoting quality. This article is the first to explore the use of the PES-NWI across numerous clinical practice settings and countries since its development by Lake in 2002. The intent of this presentation is to add to knowledge about

how the PES-NWI has been used to assess the quality of the nursing practice environment to inform future research on the organization of nursing globally.

In the review, 37 publications were identified reporting research using the PES-NWI. The majority of the articles (n = 28) were published between 2007 and 2010, suggesting that the use of PES-NWI is growing in various practice settings and countries, perhaps reflecting Lake's (2007) review recommending it over other practice environment measures, endorsement by the National Quality Forum, the Joint Commission, use by National Database of Nursing Quality Indicators, and growing concerns about enhancing the quality of the nursing practice environment to stem the global nurse workforce shortage.

Early studies using the scale were mostly secondary analyses of data collected in the late 1990s, while more recent publications report original research designs collecting primary data, the first intervention study to enhance perceptions of the nurse work environment (Gardner et al., 2009), and development and testing of a new PES-NWI subscale focused on nursing information technology (Moorer et al., 2010).

Across the publications, the highest PES-NWI scores were reported by nurses working in a single U.S. outpatient dialysis company, with a composite average of 3.09 (on a 1-4 scale). Nurses working in a small number of some of the first U.S. ANCC-recognized Magnet hospitals reported average hospital level composite scores of 2.99 and 3.00, indicating agreement but not the theoretically ideal strong agreement that the items were present in their organizations. While the Magnet hospital scores provide a benchmark for the first ANCC Magnets, note that these Magnet scores were for only the first seven ANCC-recognized Magnet hospitals, while there are now more than 350 recognized Magnet hospitals (ANCC, 2009). Thus, caution should be employed when attempting to generalize to the contemporary Magnet hospital set because of the numerous changes in the healthcare environment, nursing, and even the ANCC Magnet program since program development in the early 1990s.

The majority of the publications reviewed focused on associations between PES-NWI scores and nurse outcomes with reports of PES-NWI scores consistently being associated with measures of nurse well-being measured through a variety of scales: job enjoyment, satisfaction, dissatisfaction, and burnout. The PES-NWI scores were associated also with actions nurses take based on their level of satisfaction such as organizational commitment or resignation from organizations. The PES-NWI subscales that were associated most closely with nurse satisfaction hold importance for policies at the organization and national levels: adequacy of staffing and resources; the quality of nurse managers' ability, leadership, and support; and the quality of nurse-physician relationships. Positive nurse practice environments, and in particular organizations committed to quality, demonstrated by high scores on the nursing foundations for quality subscale, were associated with higher levels of nurse job satisfaction. This is consistent with the literature reporting that nurses prefer working with competent staff and in organizations committed to providing quality care (Kramer & Schmalenberg, 2002).

Associations between the nurse practice environment and patient outcomes varied, perhaps because of level of analysis issues, sample sizes, or measurement issues. The variations suggest that patient outcomes may be associated indirectly with nurse practice environments through unidentified mediating variables such as processes of care or nurse outcomes. Although associations with patient outcomes were inconsistent, positive associations were reported between the practice environment and patient safety climates and nurse-physician communication. Understanding the determinants of patient outcomes is a complex undertaking.

Based on this review, several recommendations are suggested for future research using the PES-NWI. All but one of the publications reviewed reported on studies using cross-sectional survey designs. Only Gardner et al. (2009) tested the PES-NWI in an intervention study. Significant differences in the Nursing Foundations for Quality, Staffing and Resource Adequacy, and Collegial Nurse-Physician Relations subscale scores measured pre- and postintervention suggest the PES-NWI may be sensitive to change over time. Certainly, the limitation of a single intervention study highlights an area for additional research. Increased use of longitudinal designs using the PES-NWI to monitor change over time will help to establish causal links between characteristics of the nursing practice environment and outcomes.

Only Gardner et al. (2007) assessed the ongoing relevance of the scale items, suggesting that at least in outpatient dialysis settings, the majority of the PES-NWI items retain their relevance for nursing practice over time. Additional research is recommended to test the relevance of items across different practice settings and cultural contexts. Likewise, given the item variations across different versions of the scale, future research might explore opportunities to reduce the number of items included in the PES-NWI while maintaining conceptual relevance.

Scoring and reporting of the PES-NWI has taken a variety of forms, including use of composite scores, subscale scores, “favorability scores,” and individual item scores (percentages indicating the presence of the item in respondents’ work settings). Such variation limits comparison of scores across studies; therefore, it is recommended that future research using the PES-NWI employ consistent and standardized scoring methods. Research exploring more consistent use of the scale, the items, and the subscales across various settings and locales would promote meaningful comparison of findings and facilitate important policy initiatives to enhance the nursing practice environment, and thus quality.

Level of scale use and analysis (the nurse, nursing unit, or hospital) has not been consistent across studies. Given Lake’s (2002) report that three subscales were conceptualized to reflect the nursing unit environment and two reflect the hospital environment, increased use of multi-level modeling might more closely mirror the theoretical composition of the practice environment: nurse, nursing unit, and organizational level factors. Careful attention should be paid to unit of analysis issues in future research, specifically testing the performance of subscales and the composite scale at multiple levels.

Likewise, future research focused on building and advancing theory about the nursing practice environment will be an important contribution to the science. Analytic techniques such as structural equation modeling will help to advance this important initiative.

Finally, more research is needed to explore the associations of practice environments (including mediating and moderating variables) with outcomes--especially patient outcomes. If consistent clear links between positive practice environments and improved outcomes can be shown, the costs of programs to develop and sustain such environments will be justified.

This review has several limitations. First, data was not available to validate the findings reported in the publications reviewed. However, when questions arose, attempts were made to contact authors to verify processes and clarify details. Second, potential variations or nuances in data collection methods may not have been reported for the nurse samples surveyed in different settings and countries. Additionally, there may have been publications excluded from the review because they were published in a language other than English. Third, variations in items among versions of the PES-NWI may have affected the reported scores, limiting ability to compare the reported findings. Nevertheless, this review provides

the first comprehensive descriptive and comparative information that can be used by those interested in using the PES-NWI to assess the nursing practice environment.

Conclusion

Recognizing the universal importance of the quality of the nurse practice environment, the International Council of Nurses (ICN) has called for the creation of positive practice environments that "…support excellence, attract and retain nurses, and positively affect both patient outcomes and nurse satisfaction" (ICN, 2007). Toward this end, the ICN encourages national nursing organizations to disseminate information on the working conditions of nurses. While more work is needed, the PES-NWI is one tool available to support the attainment of the ICN goals. Using the findings and recommendations made in this review, nurse researchers can use the PES-NWI to assess nursing practice environments and provide meaningful comparison data.

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References

Aiken LH, Clarke SP, Sloane DM, Lake ET, Cheney T. Effects of hospital environment on patient mortality and nurse outcomes. Journal of Nursing Administration 2008;38(5):223–229. [PubMed: 18469615]

Aiken LH, Clarke SP, Sloane DM, Sochalski JA, Busse R, Clarke H, et al. Nurses' reports on hospital care in five countries. Health Affairs 2001;20(3):43–53. [PubMed: 11585181]

Aiken LH, Havens DS, Sloane DM. The Magnet nursing services recognition program. The American Journal of Nursing 2000;100(3):35–36. [PubMed: 10823166]

Aiken LH, Patrician PA. Measuring organizational traits of hospitals: The Revised Nursing Work Index. Nursing Research 2000;49(3):146–153. [PubMed: 10882319]

American Nurses Credentialing Center. ANCC Magnet Recognition Program. 2009. Retrieved from http://www.nursecredentialing.org/Magnet.aspx

Armstrong KJ, Laschinger H. Structural empowerment, magnet hospital characteristics, and patient safety culture: Making the link. Journal of Nursing Care Quality 2006;21(2):124–132. [PubMed: 16540780]

Armstrong K, Laschinger H, Wong C. Workplace empowerment and Magnet hospital characteristics as predictors of patient safety climate. Journal of Nursing Care Quality 2009;24(1):55–62. [PubMed: 19092480]

Berndt AE, Parsons ML, Paper B, Browne JA. Preliminary evaluation of the Healthy Workplace Index. Critical Care Nursing Quarterly 2010;32(4):335–344.

Bonneterre V, Liaudy S, Chatellier G, Lang T, deGaudemaris R. Reliability, validity, and health issues arising from questionnaires used to measure psychosocial and organizational work factors (POWFs) among hospital nurses: A critical review. Journal of Nursing Measurement 2008;16(3):207–230. [PubMed: 19886473]

Chiang H-Y, Lin S-Y. Psychometric testing of the Chinese version of nursing practice environment scale. Journal of Clinical Nursing 2009;18(6):919–929. [PubMed: 19017371]

Cummings GG, Hayduk L, Estabrooks CA. Is the Nursing Work Index measuring up? Moving beyond reliability to testing validity. Nursing Research 2006;55(2):82–93. [PubMed: 16601620]

Eaton-Spiva L, Buitrago P, Trotter L, Macy A, Lariscy M, Johnson D. Assessing and redesigning the nursing practice environment. The Journal of Nurisng Administration 2010;40(1):36–42.

Finlayson M, Aiken L, Nakarada-Kordic I. New Zealand nurses' reports on hospital care: An international comparison. Nursing Praxis in New Zealand 2007;23(1):17–28.

Friese CR. Nurse practice environments and outcomes: Implications for oncology nursing. Oncology Nursing Forum 2005;32(4):765–772. [PubMed: 15990906]

Friese CR, Lake ET, Aiken LH, Silber JH, Sochalski J. Hospital nurse practice environments and outcomes for surgical oncology patients. Health Services Research 2008;43(4):1145–1163. [PubMed: 18248404]

Gajewski BJ, Boyle DK, Miller PA, Oberhelman F, Dunton N. A multilevel confirmatory factor analysis of the Practice Environment Scale: A case study. Nursing Research 2010;59(2):147–153. [PubMed: 20216017]

Gardner G, Woollett K, Daly N, Richardson B. Measuring the effect of patient comfort rounds on practice environment and patient satisfaction: A pilot study. International Journal of Nursing Practice 2009;15(4):287–293. [PubMed: 19703045]

Gardner JK, Thomas-Hawkins C, Fogg L, Latham CE. The relationships between nurses' perceptions of the hemodialysis unit work environment and nurse turnover, patient satisfaction, and hospitalizations. Nephrology Nursing Journal 2007;34(3):271–281. [PubMed: 17644871]

Gunnarsdottir S, Clarke SP, Rafferty AM, Nutbeam D. Front-line management, staffing and nurse-doctor relationships as predictors of nurse and patient outcomes. A survey of Icelandic hospital nurses. International Journal of Nursing Studies 2009;46(7):920–927. [PubMed: 17229425]

Hanrahan NP. Measuring inpatient psychiatric environments: Psychometric properties of the Practice Environment Scale-Nursing Work Index. The International Journal of Psychiatric Nursing Research 2007;12(3):1521–1528. [PubMed: 17682592]

Hanrahan NP, Aiken LH, McClaine L, Hanlon AL. Relationship between psychiatric nurse work environments and nurse burnout in acute care general hospitals. Issues in Mental Health Nursing 2010;31(3):198–207. [PubMed: 20144031]

Harwood L, Ridley J, Lawrence-Murphy JA, Spence-Laschinger HK, White S, Bevan J, et al. Nurses' perceptions of the impact of a renal professional practice model on nursing outcomes, characteristics of practice environments and empowerment: Part I. CANNT Journal 2007;17(1): 22–29. [PubMed: 17405392]

International Council of Nurses. Positive practice environments: Quality workplaces = quality care. In: Bauman, A., editor. Information and action toolkit. Author; Geneva, Switzerland: 2007.

The Joint Commission. Current staffing effectiveness standard PI.04.01.01. 2009. Retrieved from http://www.jointcommission.org/standards

Kim H, Capezuti E, Boltz M, Fairchild S. The nursing practice environment and nurse-perceived quality of geriatric care in hospitals. Western Journal of Nursing Research 2009;31(4):480–495. [PubMed: 19282271]

Kramer M, Hafner LP. Shared values: Impact on staff nurse job satisfaction and perceived productivity. Nursing Research 1989;38(3):172–177. [PubMed: 2717441]

Kramer, M.; Schmalenberg, C. Staff nurses identify essentials of magnetism. In: McClure, M.; Hinshaw, AS., editors. Magnet hospitals revisited: Attraction and retention of professional nurses. American Nurse Association; Silver Spring, MD: 2002.

Kutney-Lee A, Lake ET, Aiken LH. Development of the Hospital Nurse Surveillance Capacity Profile. Research in Nursing & Health 2009;32(2):217–228. [PubMed: 19161172]

Kutney-Lee A, McHugh MD, Sloane DM, Cimiotti JP, Flynn L, Neff DF, et al. Nursing: A key to patient satisfaction. Health Affairs 2009;28(4):w669–w677. [PubMed: 19525287]

Lake ET. Development of the practice environment scale of the Nursing Work Index. Research in Nursing & Health 2002;25(3):176–188. [PubMed: 12015780]

Lake ET. The nursing practice environment: Measurement and evidence. Medical Care Research and Review 2007;64(2 Suppl):104S–122S. [PubMed: 17406014]

Lake ET, Friese CR. Variations in nursing practice environments: Relation to staffing and hospital characteristics. Nursing Research 2006;55(1):1–9. [PubMed: 16439923]

Leiter MP, Laschinger H. K. Spence. Relationships of work and practice environment to professional burnout. Nursing Research 2006;55(2):137–146. [PubMed: 16601626]

Liou S-R, Cheng C-Y. Using the Practice Environment Scale of the Nursing Work Index on Asian nurses. Nursing Research 2009;58(3):218–225. [PubMed: 19448526]

Liou S-R, Grobe SJ. Perceptions of practice environment, organizational commitment, and intention to leave among Asian nurses working in U.S. hospitals. Journal for Nurses in Staff Development 2008;24(6):276–282. [PubMed: 19060659]

Lucero RJ, Lake ET, Aiken LH. Variations in nursing care quality across hospitals. Journal of Advanced Nursing 2009;65(11):2299–2310. [PubMed: 19737326]

Manojlovich M. Linking the practice environment to nurses' job satisfaction through nurse-physician communication. Journal of Nursing Scholarship 2005;37(4):367–373. [PubMed: 16396411]

Manojlovich M, Antonakos CL, Ronis DL. Intensive care units, communication between nurses and physicians, and patients' outcomes. American Journal of Critical Care 2009;18(1):21–30. [PubMed: 19116401]

Manojlovich M, DeCicco B. Healthy work environments, nurse-physician communication, and patients' outcomes. American Journal of Critical Care 2007;16(6):536–543. [PubMed: 17962497]

Manojlovich M, Laschinger H. The Nursing Worklife Model: Extending and refining a new theory. Journal of Nursing Management 2007;15(3):256–263. [PubMed: 17359425]

McClure, M.; Hinshaw, AS., editors. Magnet hospitals revisited: Attraction and retention of professional nurses. American Nurses Association; Silver Spring, MD: 2002.

McClure, M.; Poulin, M.; Sovie, M.; Wandelt, M. Magnet hospitals: Attraction and retention of professional nurses. American Nurses Association; Kansas City, MO: 1983.

McCusker J, Dendukuri N, Cardinal L, Laplante J, Bambonye L. Nursing work environment and quality of care: Differences between units at the same hospital. International Journal of Health Care Quality Assurance 2004;17(6):313–322.

Middleton S, Griffiths R, Fernandez R, Smith B. Nursing practice environment: How does one Australian hospital compare with magnet hospitals? International Journal of Nursing Practice 2008;14(5):366–372. [PubMed: 18808537]

Milisen K, Abraham I, Siebens K, Darras E, de Casterle B. Dierckx. Work environment and workforce problems: A cross-sectional questionnaire of hospital nurses in Belgium. International Journal of Nursing Studies 2006;43(6):745–754. [PubMed: 16321387]

Moorer OW, Meterko M, Alt-White AC, Sullivan JL. Adding a nursing information technology subscale to the practice environment scale of the Nurse Work Index. Research in Nursing & Health 2010;33(1):48–59. [PubMed: 20014031]

National Quality Forum. Current NQF-endorsed measures. 2004. Retrieved from http://www.qualityforum.org/

Page, A., editor. Keeping patients safe: Transforming the work environment of nurses. The National Academies Press; Washington, DC: 2004.

Patrician PA, Shang J, Lake ET. Organizational determinants of work outcomes and quality care ratings among Army Medical Department registered nurses. Research in Nursing & Health 2010;33(2):99–110. [PubMed: 20151409]

Samuels JG, Fetzer SJ. Evidence-based pain management: Analyzing the practice environment and clinical expertise. Clinical Nurse Specialist 2009;23(5):245–251. [PubMed: 19710570]

Shortell SM, Rousseau DM, Gillies RR, Devers KJ, Simons TI. Organizational assessment in intensive care units (ICUs): Construct development, reliability, and validity of the ICU nurse-physician questionnaire. Medical Care 1991;29(8):709–726. [PubMed: 1875739]

Laschinger, H. K. Spence Effect of empowerment on professional practice environments, work satisfaction, and patient care quality: Further testing the nursing worklife model. Journal of Nursing Care Quality 2008;23(4):322–330. [PubMed: 18431259]

Laschinger, H. K. Spence; Leiter, MP. The impact of nursing work environments on patient safety outcomes: The mediating role of burnout/engagement. The Journal of Nursing Administration 2006;36(5):259–267. [PubMed: 16705307]

Thomas-Hawkins C, Denno M, Currier H, Wick G. Staff nurses' perceptions of the work environment in freestanding hemodialysis facilities. Nephrology Nursing Journal 2003;30(4):377–386. [PubMed: 14712845]

Wade GH, Osgood B, Avino K, Bucher G, Bucher L, Foraker T, et al. Influence of organizational characteristics and caring attributes of managers on nurses' job enjoyment. Journal of Advanced Nursing 2008;64(4):344–353. [PubMed: 18990113]

Table 1

Samples, PES-NWI Mean Scores, Data Sources, and Level of Analysis

Author	Data Source (Data Year)	Level of Analysis	Sample	n	Subscale Mean Scores: Nurse Participation in Organization Affairs	Nursing Foundation for Quality Care	Nurse Manager Ability, Leadership and Support	Staffing and Resource Adequacy	Collegial Nurse-MD Relations	PES-NWI Composite Score M (SD)
					U.S. Acute Care Nurse Practice Environment					
Aiken et al., 2008	Secondary (1998-99)	Nurse	PA RNs	10,184	NR	2.20	2.40	NR	2.80	NR
Berndt et al., 2009	Primary	Nurse	Southwest RNs	160	43.39[b]	52.43[b]	25.11[b]	17.76[b]	16.50[b]	NR
			Nurses	46						
Eaton-Spiva et al., 2010	Primary	Nursing Unit	Nursing Units	4	2.76	2.97	3.21	2.56	2.54	2.81 (0.50)
			Non-Magnet, Non-Oncology	896	2.72	3.09	2.74	2.35	2.90	NR
			Non-Magnet, Oncology	150	2.6	3.03	2.63	2.31	3.07	NR
			Magnet, Non-Oncology	755	2.98	3.35	2.93	2.77	2.99	NR
Friese, 2005	Secondary (1998-99)	Nurse & Organization	Magnet, Oncology	155	2.90	3.26	2.86	2.88	3.09	NR
Friese et al, 2008	Secondary (1998-99)	Organization	PA Nurses	NR	2.33	2.84	2.38	2.20	2.75	NR
		Nurse	NDNQI RNs	72,889						
Gajewski et al., 2010	Secondary 2007	Unit	NDNQI Units	4,783	NR	NR	NR	NR	NR	NR
Hanrahan, 2007 [a]	Secondary (1998-99)	Nurse	PA In-Patient Psychiatric Nurses	456	NR	NR	NR	NR	NR	NR
Hanrahan, 2010	Secondary (1998-99)	Nurse	PA In-Patient Psychiatric Nurses	177	2.42	2.94	2.34	Not used	2.83	2.58 (.30)
Kim et al., 2009	Secondary (NR)	Nurse	New York State Geriatric Nurses	192	18.3[d]	20.4[d]	9.8[d]	10.5[d]	6.2[d]	NR
			PA Hospitals Total Sample	174	2.33	2.83	2.36	2.19	2.74	NR
Kutney-Lee et al., 2009	Secondary (1998-99)	Organization	Highest Decile	15	2.62	3.07	2.68	2.56	2.89	NR

					Subscale Mean Scores					
Author	**Data Source (Data Year)**	**Level of Analysis**	**Sample**	**n**	**Nurse Participation in Organization Affairs**	**Nursing Foundation for Quality Care**	**Nurse Manager Ability, Leadership and Support**	**Staffing and Resource Adequacy**	**Collegial Nurse-MD Relations**	**PES-NWI Composite Score M (SD)**
			Lowest Decile	15	2.12	2.55	2.08	1.87	2.56	NR
			Nurses	20,984						
Kutney-Lee et al., 2009	Secondary (2006-07)	Organization	Hospitals in PA, CA, NJ, FL	430	NR	NR	NR	NR	NR	NR
	Secondary (1989 & 1998)		Magnet	1,610	2.76	3.09	3.00	2.88	2.99	2.95 (0.40)
Lake, 2002		Organization	Non-Magnet	689	2.44	2.83	2.68	2.49	2.82	2.65 (0.37)
			PA Hospitals	156	2.30	2.81	2.36	2.18	2.75	2.48 (0.18)
			ANCC Magnet Hospitals	7	2.96	3.32	2.91	2.77	3.02	2.99 (0.12)
Lake & Friese, 2006	Secondary (1989 & 1998-99)	Organization	Reputation Magnet Hospitals	16	2.75	3.07	2.99	2.82	2.96	2.92 (0.17)
Liou & Cheng, 2009	Primary	Nurse	Asian RNs in US	231	NR	NR	NR	NR	NR	NR
Liou & Grobe, 2008	Primary	Nurse	Asian Nurses in US Hospitals	35	3.37[b]	3.79[b]	3.53[b]	2.79[b]	3.31[b]	3.45 (0.86)[b]
	Secondary (1998-99)	Nurse & Organization	PA Nurses	10,184						
Lucero et al., 2009			PA Hospitals	168	2.30	2.80	2.40	2.20	2.80	NR
Manojlovich, 2005	Primary		Michigan Nurses	332	NR	NR	NR	NR	NR	NR
Manojlovich et al., 2009	Secondary (2005)	Intensive Care Unit	Michigan ICUs	25	NR	NR	NR	NR	NR	2.60(0.21)
Manojlovich & DeCicco, 2007	Secondary (2005)		Michigan ICU Nurses	462	NR	NR	NR	NR	NR	NR
Manojlovich & Laschinger, 2007	Secondary (2004)	Nurse	Michigan Nurses	276	2.47	2.82	2.53	2.54	2.69	NR
Samuels & Fetzer, 2009	Primary	Nurse	Northeast RNs in Surgical units	85	NR	NR	NR	NR	NR	2.83(0.35)
Wade et al., 2008	Primary	Nurse	Mid-Atlantic Region Nurses	731	24.09[d]	29.62[d]	11.34[d]	10.58[d]	8.79[d]	NR
					US Federal Hospital Practice Environments					
Moorer et al., 2010	Primary	Nurse	Acute Care	631	2.47	2.83	2.69	2.33	2.80	NR

					Subscale Mean Scores					
Author	**Data Source (Data Year)**	**Level of Analysis**	**Sample**	**n**	**Nurse Participation in Organization Affairs**	**Nursing Foundation for Quality Care**	**Nurse Manager Ability, Leadership and Support**	**Staffing and Resource Adequacy**	**Collegial Nurse-MD Relations**	**PES-NWI Composite Score M (SD)**
			Nurses in VA Hospitals							
			Total Sample	955	2.52	2.85	2.57	2.61	2.99	2.71(0.56)
			Army RNs	357	2.72	2.90	2.58	2.55	2.99	2.75(0.54)
Patrician et al., 2010	Primary	Nurse	Civilian RNs	598	2.40	2.82	2.57	2.64	3.00	2.68(0.57)
					International Acute Care Nurse Practice Environment					
Armstrong & Laschinger, 2006	Primary	Organization	Canadian, Community Hospital	40	2.51	2.70	2.42	2.55	2.32	2.51(0.64)
Armstrong, Laschinger, & Wong, 2009	Primary	Nurse	Canadian Nurses	153	2.36	2.77	2.48	2.40	2.93	2.59(0.42)
Chiang & Lin, 2008 [a]	Primary	Nurse	Taiwan Nurses	842	2.49	2.78	c	2.35	c	NR
G. Gardner, 2009	Primary	Nurse	Australian Nurses	49	NR	NR	NR	NR	NR	NR
Gunnarsdottir et al., 2009 [a]	Primary	Nurse	Icelandic Nurses	695	c	2.90	c	2.60	3.00	NR
Laschinger, 2008	Primary	Nurse	Ontario Nurses	234	2.46	2.84	2.51	2.38	2.99	2.63 (0.48)
Lashinger & Leiter, 2006 [a]	Secondary (1998-99)	Nurse	Canadian Nurses	8,560	2.38	2.71	2.46	2.32	2.82	NR
Leiter & Laschinger, 2006 [a]	Secondary (1998-99)	Nurse	Canadian Nurses	4,298	2.38	2.71	2.46	2.24	2.82	NR
McCusker et al., 2004 [a]	Secondary (2001)	Nursing Unit	Quebec, Canadian Nurses (French)	246	2.43	2.69	2.49	2.03	2.79	NR
Middleton et al., 2008 [a]	Primary	Nurse	Australian Metropolitan Nurses	67	2.71	2.95	2.94	2.07	2.81	2.69 (0.36)
					Nephrology Nurse Practice Environments					
			US Outpatient Dialysis: Total Sample	199	2.87	3.26	3.28	2.80	3.22	3.09
			Plan to Quit	16	2.33	3.03	2.57	2.19	3.17	2.66
J. Gardner et al. 2007	Primary	Nurse & Organization	Plan to Stay	183	2.96	3.31	3.42	2.90	3.26	3.17

					Subscale Mean Scores					
Author	**Data Source (Data Year)**	**Level of Analysis**	**Sample**	**n**	**Nurse Participation in Organization Affairs**	**Nursing Foundation for Quality Care**	**Nurse Manager Ability, Leadership and Support**	**Staffing and Resource Adequacy**	**Collegial Nurse-MD Relations**	**PES-NWI Composite Score M (SD)**
Harwood et al. 2007	Primary	Nurse	Canadian Dialysis	31	2.25	2.93	2.26	2.63	2.68	NR
			US Outpatient Dialysis: Total Sample	383	2.25	2.73	2.62	2.28	2.90	NR
			Plan to Quit	73	1.98	2.46	2.19	2.09	2.77	NR
Thomas-Hawkins et al. 2003	Primary	Nurse	Plan to Stay	303	2.32	2.81	2.74	2.34	2.93	NR

Notes. NR = Not Reported;

[a] = Items differ somewhat compared to original 31 items described by Lake (2002);

[b] = Did not use a 4-point Likert scale;

[c] = Factor analysis yielded different subscales;

[d] = Authors reported summed item mean scores by subscale.

Table 2

Factor Analyses of PES-NWI Across Countries

Country	**Australia**	**Ontario**	**Quebec**	**Asian RNs in USA**	**Taiwan**	**Iceland**
Language	**English**	**English**	**French**	**English**	**Chinese**	**Icelandic**
			Number of Items			
PES-NWI Items by Subscale(USA)	**30**	**28**	**21**	**31**	**31**	**30**
Nurse Participation in Hospital Affairs Subscale (9 items)						
Staff nurses are involved in the internal governance of the hospital	HA	HA		HA	HA	HS
Opportunity for staff nurses to participate in policy decisions	HA	HA	HA	HA	HA	
Opportunities for advancement	HA	HA		HA	PD	
Administration that listens and responds to employee concerns	HA	HA	HA	NM	ML	HS
A chief nursing officer who is highly visible and accessible to staff	HA	HA		NM	ML	HS
Career development/clinical ladder opportunity	HA			HA	PD	
Nursing administrators consult with staff on daily problems and procedures	HA	HA	HA	NM	ML	HS
Staff nurses have the opportunity to serve on hospital and nursing committees	HA	HA	HA	HA	HA	HS
A chief nursing officer equal in power and authority to other top-level hospital executives	HA	HA		NM	ML	
Nursing Foundations for Quality of Care Subscale (10 items)						
Use of nursing diagnoses				FQ		PP
An active quality assurance program	FQ	FQ	FQ	NM	PD	HS
A preceptor program for newly hired nurses	FQ	FQ	FQ	HA	PD	US
Nursing care is based on a nursing, rather than medical model	FQ	FQ		FQ	NQ	PP

Country	Australia	Ontario	Quebec	Asian RNs in USA	Taiwan	Iceland
Language	English	English	French	English	Chinese	Icelandic
	Number of Items					
PES-NWI Items by Subscale(USA)	**30**	**28**	**21**	**31**	**31**	**30**
Patient care assignments that foster continuity of care	FQ	FQ	FQ	FQ	NQ	
A clear philosophy of nursing that pervades the patient care environment	FQ	FQ	FQ	HA	NQ	PP
Written up-to-date care plans for all patients	FQ	FQ		FQ	NQ	PP
High standards of nursing care are expected by the administration	FQ	FQ		HA	NQ	
Active staff development or continuing education programs for nurses	FQ	FQ	FQ	HA	PD	US
Working with nurses who are clinically competent	FQ	FQ	FQ	HA	ML	
Nurse Manager Ability, Leadership and Support of Nurses Subscale (5 items)						
A nurse manager who is a good manager and leader	NM	NM	NM	NM	ML	US
A nurse manager who backs up the nursing staff in decision-making, even if the conflict is with a physician	NM	NM	NM	NM	ML	US
Supervisors use mistakes as learning opportunities, not criticism	NM			NM	ML	
A supervisory staff that is supportive of the nurses	NM	NM	NM	NM	ML	US
Praise and recognition for a job well done	NM	NM	NM	NM	ML	US
Staffing and Resource Adequacy Subscale (4 items)						
Enough staff to get the work done	SR	SR	SR	SR	SR	SR
Enough registered nurses to provide quality patient care	SR	SR	SR	SR		SR
Adequate support services allow me to spend time with my patients	SR	SR	SR	SR	SR	SR

Country	Australia	Ontario	Quebec	Asian RNs in USA	Taiwan	Iceland
Language	**English**	**English**	**French**	**English**	**Chinese**	**Icelandic**
			Number of Items			
PES-NWI Items by Subscale(USA)	**30**	**28**	**21**	**31**	**31**	**30**
Enough time and opportunity to discuss patient care problems with other nurses	SR	SR	SR	SR	SR	SR
Collegial Nurse-Physician Relationships Subscale (3 items)						
A lot of teamwork between nurses and physicians	CR	CR	CR	HA	PD	CR
Physicians and nurses have good working relationships	CR	CR	CR	CR	SR	CR
Collaboration (joint practice) between nurses and physicians	CR	CR	CR	HA	NQ	CR

Notes. CR=Collegial Nurse-Physician Relationships FQ=Nursing Foundations for Quality Care HA= Nurse Participation in Hospital Affairs HS=Hospital Level Support ML=Management and Leadership NM=Nurse Manager Ability, Leadership and Support of Nurses NQ=Nursing Quality PD=Nursing Professional Development PP=Philosophy of Practice SR=Staffing and Resource Adequacy US=Unit Level Support Blank Space=Item not used in scale

Adapted from "Development of the practice environment scale of the Nursing Work Index" by E. T. Lake, 2002, *Research in Nursing and Health, 25*, p. 181. This table is excluded from copyright.

This table includes only items found in Lake's (2002) original scale. The results of the specified countries were reported in the following citations: USA: Lake, 2002; Australia: Middleton, Griffiths et al., 2008; Ontario: Laschinger & Leiter, 2006; Quebec: McCuscker, Dendukuri et al., 2004; Asian nurses in the US: Liou & Cheng, 2009; Taiwan: Chiang & Lin, 2008; Iceland: Gunnarsdottir et al., 2009.

Table 3

Score Ranges (Studies reporting scores on a 4-point Likert Scale n = 22)

Measure	Score Range
Subscale	
Collegial RN-MD Relations	2.32 – 3.26
Nursing Foundations for Quality Care	2.20 – 3.35
Nurse Manager Ability, Leadership, & Support	2.08 – 3.42
Nurse Participation in Hospital Affairs	1.98 – 2.98
Staffing & Resource Adequacy	1.87 – 2.90
Composite	2.48 – 3.17

Table 4

Reported Associations Between PES-NWI Measures and Other Variables

Author	Nurse Outcome	Patient Outcome	Organizational Variables
Aiken et al., 2008	− Burnout	− Mortality	
	− Job Dissatisfaction	− Failure to Rescue	
	− Intent to Leave Job	+ Nurse Rated Quality of Care	
Armstrong & Laschinger, 2006	+ Empowerment		+ Patient Safety Climate
Armstrong, Laschinger, Wong, 2008	+ Empowerment		+ Patient Safety Climate
Berndt et al. 2009	+ Clinical Autonomy		
	+ Control over Nursing Practice		
Chiang & Lin, 2008			− Nurse Turnover
Friese, 2005	− Emotional Exhaustion	m Nurse Rated Quality of Care	+ Oncology Specialty
	− Job Dissatisfaction		+ Magnet Hospital
Friese et al, 2008		− Mortality	+ National Cancer Institute
		− Complications	+ Nurse-to-Patient Ratio
		− Failure to Rescue	
G. Gardner et al., 2009	Patient Comfort Round	Patient Comfort Round Intervention	Patient Comfort Round Intervention
	Intervention	+ Perceived Quality of Care	+ Perceived Professional Relations
	+ Perceived Staffing Adequacy		
J. Gardner et al. 2007	− Intent to Leave Job	− Hospitalizations	− Turnover Rate
		ns Patient Satisfaction	
Gunnarsdottir et al., 2009	+ Job Satisfaction	+ Nurse Rated Quality of Care	
	− Burnout		
Hanrahan, 2010	− Emotional Exhaustion		
	− Depersonalization		
Harwood et al. 2007	+ Empowerment		
Kim et al., 2009		m Nurse Rated Quality of Care	
Kutney-Lee, Lake, & Aiken, 2009		Nurse Rated:	
		− Poor Quality of Care	
		− Nosocomial Infections	
		− Falls with Injury	
Kutney-Lee et al., 2009		+ Patient Satisfaction (HCAHPS)	
Lake, 2002			+ Magnet Hospital
Lake & Friese, 2006			+ Magnet Status
			+ Staffing
			ns Metropolitan Svc Area
			ns Hospital Size
Laschinger, 2008	+ Job Satisfaction	+ Nurse Rated Quality of Care	
	+ Empowerment		

Author	Nurse Outcome	Patient Outcome	Organizational Variables
Lashinger & Leiter, 2006	− Burnout	Nurse Rated:	
		− Falls	
		− Nosocomial Infections	
		− Medication Errors	
		− Patient Complaints	
Leiter & Laschinger, 2006	− Burnout		
Liou & Grobe, 2008	− Intent to Leave Job		
	+ Organizational Commitment		
	+ Collectivist Orientation		
Lucero et al., 2009		Unmet Care Needs	
Manojlovich, 2005	+ Job Satisfaction		+ RN-MD Communication
Manojlovich & DeCicco, 2007	+ Empowerment	Nurse Rated:	+ RN-MD Communication
		ns Ventilator-associated Pneumonia	
		− Catheter-associated Sepsis	
		− Medication Errors	
Manojlovich & Laschinger, 2007	+ Job Satisfaction		
	+ Empowerment		
Manojlovich et al., 2009	+ Empowerment	ns Pressure Ulcer Rate	+ Communication between RN & MD's
		ns Ventilator Associated Pneumonia Rate	
		ns Blood Stream Infection Rate	ns Acuity
McCusker et al., 2004	ns Verbal Abuse	Nurse Rated:	m Absenteeism Rate due to Illness
	ns Work-related Injuries	m Quality of Care	
		ns Wrong Medication	
		ns Nosocomial Infection	
		ns Patient & Family Complaints	
Middleton et al., 2008			m Magnet Hospitals
Patrician et al., 2010	− Job Dissatisfaction	− RN Rated Quality of Care	
	− Emotional Exhaustion		
	− Intent to Leave Job		
Samuels & Fetzer, 2009	ns Evidence-Based Pain Mgmt		
Thomas-Hawkins et al. 2003	− Intent to Leave Job		ns Facility Location
			m Profit Status
Wade et al., 2008	+ Job Enjoyment		

Notes. (+) = significant positive association; (−) = significant negative association; m = mixed findings; ns = non-significant findings