



Development and Psychometric Evaluation of the Professional Practice Work Environment Inventory

Jeanette Ives Erickson, DNP, RN, FAAN
Mary E. Duffy, PhD, RN, FAAN

Marianne Ditomassi, DNP, RN, MBA
Dorothy Jones, EdD, RN, FAAN

OBJECTIVE: The purpose is to examine the psychometric properties of the professional practice work environment inventory (PPWEI).

BACKGROUND: Derived from the Professional Practice Environment (PPE) and the Revised PPE scales, the PPWEI was designed to measure 8 components of the PPE that can be used to assist nurse administrators in decision-making.

METHODS: A psychometric evaluation was undertaken with 874 nurses who were providing direct care to patients at the Massachusetts General Hospital and who provided no missing data on the newly developed 72-item PPWEI.

RESULTS: Cronbach's α internal consistency reliability of the total score was .93, with 61 items having factor loadings more than .50, the factor loading cutoff used to define the component subscales. Principal component analyses with varimax rotation and Kaiser normalization demonstrated 8 components, explaining 64.6% of variance. Cronbach's α reliability coefficients of the PPWEI subscales ranged from .82 to .93.

CONCLUSION: The multidimensional PPWEI is a psychometrically sound measure of several components of the PPE in the acute care setting and sufficiently reliable and valid for use as independent subscales in healthcare research.

Author Affiliations: Senior Vice President and Chief Nurse (Dr Ives Erickson), Senior Nurse Scientist (Dr Duffy), and Executive Director (Dr Ditomassi), Patient Care Services; and Director (Dr Jones), Yvonne L. Munn Center for Nursing Research, Massachusetts General Hospital, Boston.

The authors declare no conflicts of interest.

Correspondence: Dr Duffy, Yvonne L. Munn Center for Nursing Research, Massachusetts General Hospital, 55 Fruit St, Boston, MA 02114 (pointjude@verizon.net).

DOI: 10.1097/NNA.0000000000000476

Much of the work identifying and describing elements of the professional practice environment (PPE) in acute care institutions have been based on the findings from the first Magnet® hospital study published in 1983.^{1,2} Subsequently, several psychometrically sound instruments measuring specific aspects of the PPE have been published.³⁻⁷ The purpose of this article is to report on the development and psychometric evaluation of the latest measure, the professional practice work environment inventory (PPWEI). Like its predecessors, the PPE scale³ and the Revised PPE (RPPE) scale,⁴ the PPWEI is a conceptually grounded, multidimensional measure of those components of the work environment that best reflect current professional nursing practice.

Background

The first published measures of the PPE were the Nursing Work Index (NWI),² the Revised NWI (NWI-R),⁵ and the Practice Environment Scale of the NWI (PES-NWI).⁶ The NWI, developed by Kramer and Hafner² in 1989, consists of 65 items designed to measure what nurses in Magnet® hospitals believed were important characteristics of their PPEs, namely work values, productivity, job satisfaction, and the environment conducive to quality nursing care. Two scores were obtained: job satisfaction and quality care. In 2000, the NWI was revised by Aiken and Patrician,⁵ producing the NWI-R, a 57-item scale comprising 55 of the original NWI items and 2 additional items. The NWI-R measured 4 subscales: autonomy, control over the work environment, relationship with physicians, and organizational support of caregivers. In 2002, Lake⁶ used factor analytic techniques on the NWI data to develop the 31-item PES-NWI,

which measured 5 components: nurse participation in hospital affairs, nursing foundations for quality of care, nurse manager ability and leadership, support of nursing (including staffing and resource adequacy), and collegial nurse-physician relationships. Also using factor analytic techniques, Estabrooke and colleagues⁸ developed a 1-factor, 26-item scale, the Practice Environment Index, from the NWI-R items.

After a review of the Cumulative Index to Nursing and Allied Health Literature and PubMed databases for the years 2002 to 2010, Estabrooke and colleagues⁸ identified 37 research reports published since 2002, describing use, modification, and scoring variations of the PES-NWI in 10 different practice settings and translated into 3 languages. They concluded that the PES-NWI was the most widely reported measure used to gage the state of nursing practice environments and the only measure recommended by several US organizations promoting quality health-care. The PES-NWI, which reliably measures Magnet® hospital elements, is psychometrically sound at both the individual unit and hospital level.

At the same time that the PES-NWI was being formed and used, nurse scientists and clinical specialists at the Massachusetts General Hospital (MGH) developed the PPE scale in the late 1998 to evaluate the effectiveness of their new practice environment in supporting clinicians in their delivery of patient care.³ The 35-item PPE scale was designed to measure 8 clinical practice environment characteristics: leadership and autonomy in clinical practice (5 items), staff relationships with physicians (2 items), control over practice (6 items), communication about patients (3 items), teamwork (4 items), handling disagreement and conflict (8 items), internal work motivation (4 items), and cultural sensitivity (3 items). The 8 dimensions were established via principal component analysis and the scale demonstrated excellent reliability of .93 overall and Cronbach's α ranging from .78 to .88 across the subscales.³

PPE Subscale Definitions and Content Validity

The 8 PPE characteristics in the first PPE were defined as follows³: *leadership and autonomy in clinical practice* is the quality or state of being self-governing and exercising professional judgment in a timely fashion. *Staff relationships with physicians* are those associations with physicians that facilitate the exchange of important clinical information. *Control over practice* denotes sufficient status within the organization to influence others and deploy resources when they are needed for good patient care. *Communication about patients* is defined as the degree to which patient information is related promptly to the people who need to be informed through open channels of interchange.

Teamwork is viewed as a conscious activity aimed at achieving unity of effort in the pursuit of shared objectives. *Handling disagreement and conflict* represents the degree to which managing discord is addressed using a problem-solving approach. *Internal work motivation* is defined as self-generated encouragement completely independent of external factors such as pay, supervision, or coworkers. *Cultural sensitivity* is a set of attitudes, practices, and/or policies that respects and accepts cultural differences.⁷

All PPE items were then reviewed by 7 MGH staff members for readability, clarity, meaning, and congruence with the conceptual category each was designed to measure. After minor editing, all items were retained and placed on a 4-point Likert scale of strongly agree, agree, disagree, and strongly disagree for participants' responses. This version of the PPE scale was used from 1999 through 2001 to evaluate the effectiveness of the MGH PPE and to monitor changes made in the environment in response to previous data. At the end of this time, we evaluated the internal consistency of the PPE subscales and noted that the internal work motivation scale composed of 4 items had a low Cronbach's α coefficient ($r = .63$), most likely because of high homogeneity of staff responses on these items. To improve reliability and better response variation, we added 4 new items to this subscale. In addition, there was 1 item in the handling disagreement and conflict subscale that contained 2 ideas. This item was edited to form 2 items to eliminate possible confusion for respondents, making the PPE scale 40 items in length. Because there are unequal numbers of items defining each subscale, average scores were used so that all subscale scores have equal weight.⁹ The development, theoretical underpinnings, and psychometric evaluation of the PPE scale were published in the *Journal of Nursing Scholarship* in 2004.³

Development of the RPPE Scale

In 2005, the 40-item PPE scale underwent further modification when the MGH senior vice president for patient care services and associate chief nurses and directors revised strategic goals. Nursing leadership reviewed all items and edited them for clarity. They added 2 additional items to the handling disagreement and conflict subscale, namely, "most conflicts occur with members from my own discipline" and "most conflicts occur with members from other disciplines." It was hoped that these items would identify where conflicts and disagreements originated. In addition, the now 42-item RPPE scale was developed as an online version so as to provide greater ease in respondent participation and decrease mailing costs and data preparation because the surveys would

be completed electronically using Qualtrics Research Suite (Qyualtrics, Provo, Utah),⁸ a software program that permits development, implementation, and storage of survey data that can be easily downloaded into a statistical database for subsequent analyses. The 42-item RPPE was the version used in the MGH 2006 staff perceptions of the PPE on which its psychometric evaluation was done.⁴ With an overall Cronbach's α internal consistency reliability of .92, the RPPE demonstrated all 8 subscales via principal components analysis with Cronbach's α subscale coefficients, ranging from .80 to .88. The RPPE scale was judged to be a reliable scale to measure the PPE. The development and revision of the RPPE was published in the *Journal of Nursing Administration*.⁷

Development of the PPWEI

After several years of use, nurse researchers in the MGH Yvonne L. Munn Center for Nursing Research undertook an evaluation of the RPPE scale to determine if it needed revision to more fully capture the elements of the current PPE. They concluded that the scale required more items in some of the subscales to enhance internal consistency reliability and to more fully cover the specific aspects of the subscale being measured. Moreover, a subscale that measured supportive leadership behavior was needed. They then renamed 3 subscales, defined them, and wrote additional items to measure them.

The PPWEI is designed to measure 9 components of the PPE: autonomy and control over practice; communication about patients; cultural sensitivity; handling disagreement and conflict; staff relations with physicians, staff, and hospital groups; sufficient staff, time, and resources for quality patient care; supportive leadership; teamwork; and work motivation. The PPWEI components for communication about patients, cultural sensitivity, handling disagreement and conflict, teamwork, and work motivation retained their original definitions. *Autonomy and control over practice* was defined as the quality or state of being self-governing and exercising professional judgment in a timely fashion¹ with sufficient intraorganizational status to influence others and deploy resources when necessary for good patient care. *Sufficient staff, time, and resources for quality patient care* is characterized by a highly reliable healthcare work environment that has enough providers as well as work hours and materials for delivering high-level patient care. *Supportive leadership* consists of behavior department heads/managers exhibit that shows concern for followers and their individual needs and indicates that they will work through tasks with those assigned to them to improve skills and talent until the department head/manager does not need to worry about

a task being done correctly and the employee is fully empowered in a particular area.¹⁰ The PPWEI data were collected as part of the most recent Staff Perceptions of the PPE (SPPPE) survey conducted in May 2015. The MGH staff was sent an initial e-mail inviting them to participate in the SPPPE survey and 3 reminder e-mails containing the uniform resource locator (URL) to the survey 1 week apart during the data collection period.

Each of the 72 PPWEI items is rated on a 6-point scale (strongly disagree, moderately disagree, disagree, agree, moderately agree, and strongly agree). A brief set of instructions guides hospital staff test-takers to check the response that best indicates the amount of agreement that they have on each item. Respondents could choose to not answer any item and could stop the survey at any time, then return to the place in the survey where they stopped by clicking on the e-mail URL, during the 4 weeks of data collection. The MGH staff members received 3 reminder e-mails 1 week apart in addition to the invitation e-mail.

Because unequal numbers of items define each subscale, average scores are used so that all subscale scores have equal weighting. Maximum range is 1 to 6 points in mean subscales, with high scores representing greater amounts of the measured construct. The psychometric results are reported here in after.

Methods

Sample

A psychometric evaluation was undertaken with 874 MGH staff nurses who had no missing data on the 72-item PPWEI. As Table 1 shows, the typical MGH nurse respondent was female (92%), white (89%), and almost 42 years old, with 18 years of nursing experience and is working for 13.5 years at the MGH. More than 71% of these nurses held a bachelor's degree in nursing, and more than 72% worked full time at the institution. This sample size ($N = 874$) was judged as more than adequate to undertake principal components analyses, with a more than 20:1 case-to-variable ratio.^{11,12}

Results

Psychometric evaluation of the PPWEI included internal consistency reliability using Cronbach's α and item analyses, Principal Components Analyses with varimax rotation and Kaiser normalization procedures, and Cronbach's α internal consistency reliability of resulting components.

Initial Reliability Estimates and Item Analyses

The Cronbach's α for the 72-item PPWEI was .93, with 61 items having item-total correlations of 0.50

Table 1. Demographic Characteristics of MGH Nursing Staff, 2015 (N = 874)

Characteristic	Mean	SD	Frequency	%
Age	41.8	11.8	—	—
Nursing experience, y	18.0	11.7	—	—
Years at MGH	13.5	10.4	—	—
Sex				
Male	—	—	46	5.3
Female	—	—	806	92.2
Missing	—	—	22	2.5
Race/ethnicity				
Asian	—	—	29	3.3
Black/African American	—	—	—	—
Hispanic	—	—	24	2.7
White	—	—	13	1.5
Missing	—	—	779	89.2
Highest education				
Associate degree—nursing	—	—	29	3.3
Diploma—nursing	—	—	—	—
Bachelor's degree—nursing	—	—	24	2.7
Bachelor's degree—other field than nursing	—	—	13	1.5
Master's degree—nursing	—	—	779	89.2
Master's degree—other field than nursing	—	—	29	3.3
Doctorate (PhD, DNP)	—	—	—	—
Missing	—	—	3	0.3
Current work status				
Full time	—	—	17	1.9
Part time	—	—	76	8.7
Per diem	—	—	28	3.2
Missing	—	—	622	71.2

Abbreviations: DNP, doctor of nursing practice; MGH, Massachusetts General Hospital; PhD, doctor of philosophy.

or more, the cutoff for determining what items would form the component. Because of the multidimensional nature of the PPWEI construct, we decided to include all items in principal components analyses to determine how well they would fare. Table 2 reports this information in greater detail.

Principal Components Analyses

Principal components analysis followed by varimax rotation and Kaiser normalization was next performed on the sample (N = 874) specifying 8 components. Examination of the rotated component matrix revealed a parsimonious and interpretable solution. All but 11 items loaded more than the 0.50 component loading cutoff on one of the 8 components. There were very few substantial side loadings.

Table 2 displays the PPWEI items and their 8 component loadings, which accounted for a total of 64.6% of initially extracted common variance. Component 1, initially called supportive leadership, autonomy, and control over practice, consisted of 18 items and explained 19% of variance. Ten items were supportive leadership items, and 8 items were autonomy and control over practice items. The Cronbach's α for the 18-item component scale was .92. Because the scale contained so many items for the formation

of 2 rationally derived subscales, Cronbach's α coefficients were computed for the 10-item supportive leadership items and for the 8 items of the autonomy and control over practice items. The supportive leadership subscale Cronbach's α was .88, and the Cronbach's α for the autonomy and control over practice subscale was .89. Thus, these 2 subscales could be used to produce more information about these components.

Component 2, accounting for 9.2% of variance, was formed by 8 items, was called teamwork, and had a Cronbach's α coefficient of .92. Component 3, formed by 5 items explaining 6.5% of variance, was labeled communication about patients, with a Cronbach's α of .90. Component 4, called cultural sensitivity, consisted of 7 items with a Cronbach's α of .82, accounting for 6.4% of variance. Component 5, describing handling disagreement and conflicts, was formed by 7 items and explained 5.1% of variance. Component 6, consisting of 4 items explaining 5.8% of variance, was called sufficient staff, time, and resources for quality patient care and had a Cronbach's α of .93. Component 7, explaining 5.8% of variance, was formed by 6 items with a Cronbach's α of .90 and called work motivation. Component 8, called staff relationships with physicians, staff, and

Table 2. PCA Loadings and Cronbach's α for Varimax-Rotated Factor Matrix for the Professional Practice Work Environment Inventory (PPWEI) N = 874

	Component		
Total explained variance, 64.5%	1	2	
Component 1: SL, ^a AC ^b ; 19.0% variance (Cronbach's α = .92)			
SL: Leaders in my unit/department encourage staff to contribute to decisions about our unit/department.	.85		
SL: Leaders in my unit/department value my opinion about unit/department-related issues.	.85		
SL: I feel valued by the leader in my unit/department.	.84		
SL: Leadership in this unit/department is supportive of unit/department staff.	.83		
SL: Unit/department leadership values my opinion about unit/department-related issues.	.83		
SL: Supportive leadership in my unit/department influences my decision-making.	.81		
SL: I am encouraged by staff leaders to voice my opinion on patient issues.	.81		
SL: My unit/department head is a good manager and leader.	.81		
AC: I have the capability to make changes in my unit/department.	.76		
SL: My unit/department head supports staff even if the conflict is with a doctor.	.76		
AC: I participate in making changes in my unit/department.	.70		
AC: I have freedom to make important patient care and work decisions.	.63		
AC: I am given the opportunity to implement organizational goals.	.62		
SL: The leader in my unit/department inspires staff members to participate in change.	.62		
AC: In my unit/department, I have access to all of the resources necessary to implement the changes.	.56		
AC: I am motivated to do well because I am empowered by my work environment.	.55		
AC: I receive information about what happens in my unit/department.	.53		
AC: I am able to implement changes at the bedside to provide safe patient care.	.52		
Component 2: teamwork; 9.2% variance (Cronbach's α = .92)			
Staff works well together in my unit/department.		.78	
There is effective teamwork in my unit/department.		.78	
Other staff members support me in the work that I do.		.73	
I get help from other staff without asking for it.		.72	
When I ask for help from other staff members, I get the help that I need.		.69	
Teamwork is valued in my unit/department.		.67	
I am a valued member of my team.		.67	
I know I am an important person on my team.		.59	
		Component	
	3	4	5
Component 3: communication about patients; 6.5% variance (Cronbach's α = .90)			
Information regarding patient care is relayed without delays.	.81		
Information on the status of patients is available when I need it.	.80		
I receive information quickly when a patient's status changes.	.78		
Staff communicates clearly about patient care.	.68		
Staff provides clear directions about caring for patients.	.51		
Component 4: cultural sensitivity; 6.4% variance (Cronbach's α = .82)			
Staff members are respectful to all members of the team regardless of race, ethnicity, and sexual preference.	.79		
Staff members respect the diversity of their healthcare team.	.78		
Staff members are sensitive to diverse patient populations for whom they serve.	.75		
Staff members are respectful to family members and integrate them into the care of their patients.	.74		
Staff members provide the same high quality care to all patients.	.73		
Staff members use interpreter services or technology to communicate with non-English-speaking patients.	.63		
Staff members have access to the necessary resources to provide culturally competent care.	.54		
Component 5: handling disagreement and conflict; 6.1% variance (Cronbach's α = .91)			
Staff members withdraw from conflict.		.72	
When staff members disagree, they ignore the issue, pretending it will go away.		.71	
All staff work hard to arrive at the best possible solution.		.70	
Staff members involved do not settle a dispute until all are satisfied with the decision.		.68	
All contribute from their experience and expertise to create a high quality solution.		.56	
All points of view are considered in finding the best solution to a problem.		.55	
Staff involved settle disputes by consensus.		.54	
		Component	
	6	7	8
Component 6: sufficient staff, time, and resources for quality patient care; 5.8% variance (Cronbach's α = .93)			
There are enough staff members to provide quality patient care.	.86		
We have enough staff to get the work done.	.86		
I have adequate support services to allow me to spend time with patients.	.77		
I have enough time and opportunity to discuss patient care problems with other staff.	.76		

(continues)

Table 2. PCA Loadings and Cronbach's α for Varimax-Rotated Factor Matrix for the Professional Practice Work Environment Inventory (PPWEI) N = 874, Continued

	Component
Component 7: work motivation; 5.8% variance (Cronbach's α = .90)	
I feel a great sense of personal satisfaction when I do this job well.	.73
I have challenging work that motivates me to do the best job I can.	.72
Working in this environment increases my sense of professional growth.	.67
Working in this unit/department gives me the opportunity to gain new knowledge and skills.	.67
I feel a high degree of personal responsibility for the work that I do.	.67
My opinion of myself goes up when I work in this unit/department.	.51
Component 8: staff relationships with physicians, staff, and hospital groups; 5.7% variance (Cronbach's α = .82)	
My unit/department does not get the cooperation that it needs from other hospital units/departments.	.77
There is effective teamwork between our unit/department and other hospital units/departments.	.68
Inadequate working relationships with other hospital groups limit the effectiveness of work in this unit/department.	.66
Other hospital units/departments seem to have a low opinion of my unit/department.	.65
My unit/department has constructive relationships with other groups in this hospital.	.65
The staff members in my unit/department have positive relationships with other disciplines in the hospital.	.61

Abbreviations: AC, autonomy and control over practice; SL, supportive leadership.

^aCronbach's α (10 items) = .88.

^bCronbach's α (8 items) = .90.

hospital groups, contained 6 items with a Cronbach's α of .82 and explained 5.7% of variance. Thus, the now 61-item PPWEI demonstrated 8 components of the PPE and was judged as sufficiently reliable for use as independent measures in subsequent research. It does not only provide similar information to the PPE and RPPE scales but also contains added information about supportive leadership, relationships with groups other than physicians, and the components that contribute to delivering quality patient care.

Administration of the Instrument

The PPWEI is self-administered. Test takers are sent work-based e-mails with an embedded URL that they are instructed to mouse click to direct them to a specific agency-based, secure Web site wherein the PPWEI resides. It takes approximately 15 minutes to provide answers on the PPWEI. The inventory is scored so that high scores represent high amounts of the construct being measured with mean scores being used. Because there are unequal numbers of items defining each PPWEI subscale, average scores should be used so that all subscale scores have equal weight. All mean subscale scores are formed by adding the subscale items together and then dividing that sum by the number of items in the subscale.

Discussion

Results from this psychometric evaluation of the now 61-item MGH PPWEI indicated that all subscales are reliable and construct valid for use as independent dimensions of the PPE in today's acute care setting. Moreover, component 1, which contains both sup-

portive leadership and autonomy and control over practice items, can be separated into these 2 subscales and used independently to provide for a more focused understanding of the close relationship between these constructs. The PPWEI provides a comprehensive picture of today's PPE. In addition to the professional characteristics springing from the Magnet® hospital studies, the PPWEI also measures professional staffs' ability to handle disagreement and conflict using a problem-solving approach, supportive leadership, and the staff, time, and resources needed to provide quality patient care.

Implications for Nursing Leaders

The PPWEI serves as an effective report card of the health of the PPE linked to a model of practice that aspires to achieve these outcomes. At the MGH, PPWEI data are used to assist nursing leadership design, enhance change of the various components of an individual unit or department practice setting, and specify evaluative feedback about whether such enhancements/changes have made a difference in practice. Massachusetts General Hospital nursing management and staff have used PPE-, RPPE-, and now PPWEI-item data in this way for more than 15 years. They report that the subscale and item scores are valuable information describing effective PPEs in today's acute care settings. The MGH embeds unit names in respondents' identifying information so that unit PPWEI scores can be formed and used to provide needed information at the unit or specialty group levels. However, researchers should be cognizant that moving from the individual to the unit or specialty group level changes the unit of analysis,

making it much smaller, depending on the number of units/specialty groups in the study sample.

The PPWEI is an effective tool to measure baseline and ongoing perceptions of clinicians' impressions of their PPE, which are aligned with the 5 model elements of Magnet® recognition, namely transformational leadership; structural empowerment; exemplary professional practice; new knowledge, innovations, and improvements; and empirical outcomes.¹² Through annual administration of the RPPE, a greater understanding of organizational concepts that enhance clinical practice can be achieved. Such data help illustrate which support structures are needed to hardwire the Institute of Medicine's 6 aims (patient-centeredness, safety, effectiveness, efficiency, timeliness, and equity of care) into practice.¹³

Summary

These findings indicate that the multidimensional PPWEI is a psychometrically sound measure of 8 or 9 components of the PPE in an acute care setting, namely handling disagreement and conflict, leadership and autonomy in clinical practice, internal work motivation, control over practice, teamwork, communication about patients, cultural sensitivity, and staff relationships with physicians. As well as being

psychometrically sound, the RPPE demonstrates substantive coherence and application at both the individual and one or more organizational levels of analysis. Pursuing Magnet® recognition, the RPPE scale is an effective tool to measure baseline and ongoing perceptions of clinicians' impressions of their professional practice model, which are aligned with the 5 model elements of Magnet® recognition, namely transformational leadership; structural empowerment; exemplary professional practice; new knowledge, innovations, and improvements; and empirical outcomes.¹² Through annual administration of the PPWEI, a greater understanding of organizational concepts that enhance clinical practice can be achieved.

Such data help illustrate what support structures are needed to hardwire the Institute of Medicine's 6 aims into practice.¹³ The findings cited in this report indicate that the multidimensional PPWEI is a psychometrically sound measure of 8 or 9 components of the PPE in both acute and general practice settings. As Ives Erickson¹⁴ stated, "Dysfunctional work environments have been demonstrated to be a significant contributor to dissatisfaction and turnover. Any issue that contributes to nurse dissatisfaction is particularly problematic at a time when a shortage in the supply of nurses makes retention so important."^{14p24}

References

1. McClure M, Poulin M, Sovie M, Wandelt M. *Magnet Hospitals: Attraction and Retention of Professional Nurses*. Kansas City, MO: American Nurses Association; 1983.
2. Kramer M, Hafner L. Shared values: impact on staff nurse job satisfaction and perceived productivity. *Nurs Res*. 1989;38:172-177.
3. Ives Erickson J, Duffy ME, Gibbons MP, Fitzmaurice J, Ditomassi M, Jones D. Development and psychometric evaluation of the Professional Practice Environment (PPE) Scale. *J Nurs Scholarsh*. 2004;36(3):279-285.
4. Ives Erickson J, Jones D, Ditomassi M. *Fostering Nurse-Led Care*. Indianapolis, IN: Sigma Theta Tau; 2013.
5. Aiken L, Patrician P. Measuring organizational traits of hospitals: the revised nursing work index. *Nurs Res*. 2000;49(3):146-153.
6. Lake E. Development of the practice environment scale of the nursing work index. *Res Nurs Health*. 2002;25:176-188.
7. Erickson JI, Duffy ME, Ditomassi M, Jones D. Psychometric evaluation of the revised professional practice environment (RPPE) scale. *J Nurs Adm*. 2009;39(5):236-243.
8. Estabrooke C, Tourangeau A, Humphrey C, et al. Measuring the hospital practice environment: a Canadian context. *Res Nurs Health*. 2002;25:256-268.
9. Duffy ME. Evaluating nursing practice in nursing research. In Ives Erickson J, Ditomassi M, Jones D. *Fostering a Research-Intensive Organization*. Indianapolis, IN: Sigma Theta Tau; 2015:159-190.
10. Rafferty AI, Griffin MA. Dimensions of transformational leadership: conceptual and empirical extensions. *Leadersh Q*. 2004;15:329-354.
11. Tabachnick B, Fidell L. *Using Multivariate Statistics*. 5th ed. New York, NY: Harper Collins College Publishers; 2007.
12. Comrey AL. Factor-analytic methods of scale development in personality and clinical psychology. *J Consult Clin Psychol*. 1988;56:754-761.
13. American Nurses Credentialing Center. Announcing a new model for ANCC's Magnet Recognition Program. 2008. <http://cms.nursecredentialing.org/Magnet/NewMagnetModel.aspx>. Accessed April 6, 2017.
14. Ives-Erickson J. *Nurses' Perception of the Professional Practice Environment Across Health Care Settings*. Boston, MA: MGH Institute of the Health Care Professionals. DNP Capstone Project; 2010.