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Validation of the *Practice Environment Scale of the Nursing Work Index* (PES-NWI) for the Portuguese nurse population

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Abstract

Background: The need to obtain efficiency gains and to focus practice on obtaining value has influenced research in the area of nursing environment and nursing outcomes. The conclusions reached in those studies highlight the need for better nurse/patient ratios, better qualified nurses, and greater involvement of nurses in decision-making and in clinical management, which will lead to increased levels of productivity and satisfaction and, consequently, better patient outcomes and better organization. The study and creation of favourable practice environments may play a fundamental role on that. Practice environments have been studied since the 1980s (Lake, 2002) with the aim of better understanding their effect on nursing professionals and on patient outcomes. More recently, focus has also been put on their connection to patient safety.
Aim: To translate and validate the *Practice Environment Scale of the Nursing Work Index* (PES-NWI) for producing a Portuguese version of the scale ready to be used for the assessment of nursing practice environments in Portugal.
Methodology: Translation, cultural validation and back-translation were achieved with the collaboration of a group of nurses and nursing teachers. The psychometric validation of the Portuguese version was reached by extracting the principal components using a varimax rotation (construct validity). The analysis of the criterion validity was carried out through correlation using Barton's Job Satisfaction Scale and scale reliability was assessed through the analysis of internal consistency using Cronbach's Alpha. An electronic version of the instrument was created and given to a sample of nurses who were members of the National Board for Nursing and who were invited to fill out the scale via email. A total of 418 responses were received.
Results: The analysis identified an eight-factor solution which, following a deeper semantic analysis resulted in seven subscales. The scale's global internal consistency was 0.892, with the subscales' alpha varying from 0.693 to 0.822
Conclusions: The results obtained shows that the Portuguese version of the PES-NWI is useful in assessing nursing practice environments. Implementing this scale, it is possible to identify the environments in an organization which are more favourable to the quality of the service provided and of nursing care, as well as their correlations with patient outcomes. By using its subscales it is possible to identify the areas where improvements can be initiated.

Key Words: Practice environment, nursing outcomes, validation

Introduction

In cases where there is a great need to use differentiated labour, namely in what concerns its training and skills such as nursing, the use of appropriate production techniques may help organizations to maximize outcomes and minimize costs. However, it is important to note that bad decisions, which influence the environments where practice is carried out, can hinder outcomes and increase costs (Newbold, 2008).

There is an increasing amount of evidence which shows that favourable practice environments lead to greater satisfaction among workers, lower levels of burnout and a lower number of professionals who wish to change workplace or abandon the profession (Aiken et al., 2002, 2008; Hayes et al, 2006). Regarding healthcare, more favourable nursing practice environments obtain better patient outcomes (Aiken et al., 2002; Estabrooks et al., 2005), namely in terms of safety, with fewer falls, fewer medication errors, fewer pressure ulcers, and fewer healthcare related infections (Upenieks 2002, 2003). Therefore, it is possible to state that the optimization of practice environments and the development of information systems help to ensure the quality of care and comparatively lower average delays, with clear repercussions in terms of the benefits for the organization that is providing care (Aiken et al, 2002, 2008; Doran, 2003; ICN 2007; Milisen et al., 2006; Pereira, 2009; Silva, 2006; Sousa, 2006; Stordeur et al., 2007; Upenieks 2002, 2003). More recently, lower mortality in surgical patients has also been attributed to more favourable practice environments (Aiken et al, 2008; Friese et al. 2008).

Nonetheless, the favourable nursing practice environment construct is difficult to define and operationalize. Hoffart and Woods (1996) describe it as a system which makes it possible to control the provision of healthcare and the environment in which care is provided by nurses. In addition, Zelauskas and Howes (1992) conceptualise it as an environment which empowers nurses and increases their ability to exert their autonomy, responsibility and control in the context where care is provided. Furthermore, it is believed that the physician-nurse relationship/collaboration is essential to sustain that environment (Grindel et al., 1996).

Another definition, apparently accepted by different authors, presents the practice environment as a set of organizational characteristics which facilitate or constrain the professional practice of nursing (Aiken et al. 2002; Lake 2002; Upenieks, 2003).

The theoretical principles for this construct are correlated with organizational sociology and the study of professions and work. It is assumed that when making decisions in complex organizations, such as hospitals, managers are confronted with numerous dilemmas such as how to organize workers so as to perform activities on a large scale (Weber, 1952); how to organize professionals, considering each one's own level of autonomy (Gummer, 1996), and how to organize a task which is inherently complex and unpredictable (Lake, 2002).

According to Flood (1994), the nursing practice environment will reflect the approach adapted by managers adopt to resolve these dilemmas. Thus, when the aim is to organize an activity on a large scale with multiple workers, it is essential to consider not only the control of the decision-making process regarding this activity, but also the coordination of efforts among the workers to carry out each of the necessary actions.

Theoretically, this approach may correspond to a task-oriented organization, favouring a hierarchical control and the use of formal rules (bureaucratic model) or, on the other hand, a view focusing more on achieving objectives, recognizing skills and individual qualifications and the existence of self-regulating systems in each of the professions (professional model) (Alexander, 1982; Flood and Scott, 1987). The complexity and unpredictability associated to the care provided to patients deserve competent and professional attention in order to prevent, monitor, control and change the different actions (Strauss et al., 1985). Therefore, the professional model, giving importance to the presence of highly qualified professionals to care for patients, encourages decision-making and gives authority to make the necessary changes so that actions are more effective, may be considered the preferred model, instead of the bureaucratic model, which

focuses more on the task (Lake 2002, Lake and Friese, 2006).

The environment construct proposed by Lake (2002), based on favourable nursing practice, guarantees that there is professional autonomy, an adequate number of nurses according to patients' needs, shared management with involvement in decision-making, a good relationship between the different groups of professionals (e.g. between physicians and nurses), continuous training programmes, the necessary leadership, efficient management and acknowledgement of the nurses' status in the hospital's hierarchy.

The Aim of the Study:

The aim of the present study is the translation and validation of the *Practice Environment Scale of the Nursing Work Index* (PES-NWI) (Lake, 2002) in order to have a Portuguese version of the scale for the assessment of the nursing practice environments in Portugal.

METHODS

The instrument proposed by Lake (2002) called *Practice Environment Scale of the Nursing Work Index* (PES – NWI) is the one most commonly used worldwide to assess nursing practice environments. Its use is recommended by a number of international organizations linked to quality assessment, such as: the *National Quality Forum* (2004), which recommends it as a structural measure for the assessment of nursing care outcomes, and the *Joint Commission For Accreditation of Hospitals*, which accepts this instrument as an indicator of nurses' effectiveness in its accreditation standards (The Joint Commission, 2009).

In a systematic literature review organized from a search carried out on electronic databases by Havens and Warshawsky (2011) about papers published between 2002 and 2010, it was possible to note an increased use of the scale over time, having been implemented to assess various nursing practice environments in different locations, among others, United States, Australia, Canada, Iceland and Taiwan.

The PES-NWI is composed of 31 items which describe characteristics of practice environments and are grouped into five subscales. This instrument's items derive from an index composed of 65 questions which characterizes practice environments in Magnet hospitals. Its psychometric properties were assessed in relation to the construct's homogeneity (internal consistency) and validity (factorial analysis) (Lake, 2002; Lake and Friese, 2006). The reliability of each subscale, in relation to the original instrument, was measured using Cronbach's alpha and ranged from 0.71 to 0.83.

The five subscales were named and are composed according to the information presented in Table 1.

Table 1 - Components of the PES-NWI subscales

Subscale	Components
Nurse Participation in Hospital Affairs	**5, 6, 11, 15, 17, 21, 23, 27, 28**
Nursing foundations for quality of care	**4, 14, 18, 19, 22, 25, 26, 29, 30, 31**
Nurse Manager Ability, Leadership, and Support of Nurses	**3, 7, 10, 13, 20**
Staffing and resource adequacy	**1, 8, 9, 12**
Collegial Nurse-Physician Relations	**2, 16, 24**

Response to the instrument is given by nurses, marking their level of agreement with each item on a scale of four points, from 1 ('strongly agree') to 4 ('strongly disagree'). After being collected, the scores for each item are reverse-coded so that the highest scores correspond to the greatest agreement. Lake (2002) proposes that the data be analysed using the mean obtained in each answer. In this way, 2.5 will correspond to the midpoint on the scale of 1 to 4. The author justifies this option by stating that since the number of items per scale is not equal, making comparisons would become more complex if sums were used rather than means.

After due authorization had been given by the author, the pertinence of the construct to which the instrument refers was discussed among a group of senior nurses, and conclusions were reached in light of its usefulness regarding the assessment of how much the environments where nursing care is provided limit or facilitate professionals' autonomy and the quality of care in Portugal.

In accordance with international scientific agreement (Acquadro et al., 2004; Streiner and Norman, 2003), two professionals did independent translations of the English original version, which were then combined into one consensual version based on an analysis of each individual item carried out by a group of nurses and nursing teachers. During the discussion, this consensus group assessed not only the understanding of each item, but also its cultural adaptation and pertinence. Some cultural adaptations were made such as, for example, changing the expression 'Chief Nursing Officer' to 'Nursing Director' because, although this role is recognized, it does not exist among the service providing organizations, but rather at a higher level of organization, in the Directorate General of Health. After that cultural validation, a back translation of the result of this analysis was carried out by an English professional translator.

After obtain a back translation we carry out a comparative analysis of the original English version and version resulted from the back translation. After, the back translation was sent to the authors who agree with the result. Based on the instrument, an electronic version was created as well as an application to organize the answers by attributing a code to each address so as to avoid multiple answers. In order to do this, the Board of Nursing was contacted and agreed to send the instrument to its members via email. Thus, the instrument was sent to 3,050 nurses. The aforementioned document was hosted on the Nursing School of Coimbra's server and nurses were able to fill it out by accessing a hyperlink. In order to avoid missing responses, the instrument could not be sent without being completely filled out.

Table 2 – Distribution by gender and by age group

		Sample (n=418)		Population (n=64,535)	
		Freq.	%	Freq.	%
Gender	**Male**	**69**	**16.5**	**12,064**	**18.7**
	Female	**349**	**83.5**	**52,471**	**81.3**
Age group	**21 - 25**	**73**	**17.5**	**6,154**	**9.5**
	26 - 30	**119**	**28.5**	**15,205**	**23.6**
	31 - 35	**73**	**17.5**	**10,348**	**16.0**
	36 - 40	**45**	**10.8**	**7,886**	**12.2**
	41 - 45	**49**	**11.7**	**6,892**	**10.7**
	46 - 50	**40**	**9.6**	**6,323**	**9.8**
	51 - 55	**13**	**3.1**	**4,511**	**7.0**
	56 - 60	**5**	**1.2**	**3,179**	**4.9**
	Over 60	**1**	**0.2**	**4,037**	**6.3**

Data was collected between October 11th and 30th, 2011. 418 responses were obtained, mainly from women (83.5%), whose ages varied between 22 and 68 years, with a mean of 33.9 years and a standard deviation of 8.9 (the modal age group was 26-30), as presented in Table 2. Analysis of the Board of Nursing's information regarding the global population of nurses registered in 2011 shows that 81.31% are female, with a mean age of 38.75 years and a standard deviation of 12.18 years. The modal age group corresponds also to the 26-30 interval.

In order to verify whether the present sample was representative from the population of nurses in Portugal, a chi-square test was used. This analysis showed that the differences are not significant in terms of gender (χ^2=1.3; p>0.05) but, they are significant in terms of the age groups (χ^2=69.8; p<0.005), since the mean sample is slightly younger than in the population.

Regarding the assessment of the PES-NWI's reliability, and given the impossibility of carrying out a test-retest due to the electronic and anonymous means used, it was assessed by Cronbach's alpha coefficient.

The construct's validity was established based on an exploratory factor analysis, with estimators obtained through principal component analysis followed by a varimax rotation, although the existence of some necessary conditions for its use was assessed beforehand.

Hence, the *Kaiser-Meyer-Olkin* (KMO) criteria was used, making it possible to assess the connection between the simple correlations and the partial correlations between the variables. According to Kaiser and Rice (1974), values which exceed 0.6 are considered reasonable and those which exceed 0.8 are considered good.

Bartlett's test of sphericity was performed, which made it possible to reject the hypothesis that the correlation matrix was an identity matrix. Having applied these tests, the KMO value reached was 0.859 and p<0.001 for the test of sphericity. This showed that the factor analysis could be carried out on this data set.

So as to support the decision made regarding the number of factors that should be extracted, a scree plot was used and eigenvalues exceeding 1 as well as coefficient values higher than 0.35 were considered. In the factor analysis, the concepts involved in each item were also analysed so that the organization of the factors made sense since, as mentioned by Maroco (2007), the use of only one criterion can lead to the retention of a number of factors which do not correspond to the ideal and are irrelevant.

Bearing in mind the conclusions reached by some authors (Aiken et al. ,2002, 2008; Upenieks 2002, 2003), showing that there is a connection between workplace environments and satisfaction. Barton's General Job Satisfaction Scale, which was translated and adapted to the Portuguese population by Silva et al. (1995) was used as criterion to validate the PES-NWI, even knowing that it is not specific to nursing.

Results

Construct validity

Using the Portuguese version of the PES-NWI, the first factor analysis extraction produced eight latent factors, based on the scree plot and on the Kaiser criterion regarding eigenvalues exceeding 1. This model explained 60.0% of the variance, as presented in Table 3.

Table 3 –Factor analysis of the PES-NWI

Factor	Eigenvalue	Rotated version Weight	Rotated version % of the accumulated variance
1	7.601	3.270	10.5
2	2.359	2.647	19.1
3	2.050	2.453	27.0
4	1.730	2.411	34.8
5	1.532	2.195	41.9
6	1.264	1.952	48.2
7	1.054	1.894	54.3
8	1.015	1.784	60.0

Based on the analysis of each factor's components, it became clear that factors 2 and 4 were composed by the same items as in the original scale, which made it possible to name

them in the same way (F2: 'Staffing and resource adequacy'; F3: 'Collegial relations between nurses and physicians'). In what concerns the other factors, we realized that some of them were subdivided and there were items which should be grouped together, but in an inadequate way from a conceptual perspective.

Therefore, a detailed analysis of each factor and each item was carried out, resulting in a model which includes subdomains in some subscales.

Table 4 – Domains and subdomains of the Portuguese version of the PES-NWI

Domain/ Subdomain	Items	Cronbach's apha
Participation in hospital issues	**11,15,21,23,**	**0.777**
Participation in hospital affairs	**27,28,**	**0.720**
Opportunities for professional development	**5,6,17**	**0.691**
Nursing foundations for quality of care	**4,14,18,19,**	**0.763**
Philosophy of quality	**22, 25,26**	**0.693**
Continuity of care	**29,30,31**	**0.756**
Nurse Manager ability, leadership and support	**3,7,10,13,20**	**0.766**
Staffing and resource adequacy	**1,8,9,12**	**0.788**
Collegial relations between nurses and physicians	**2,16,24**	**0.822**

In the original version, the subscale 'Participation in hospital affairs', not only includes participation in management activities, but also opportunities for individual development and involvement in governance. In our model, some of the items, which from a semantic perspective are connected to these situations, are spread among other factors. For example, item 27 ('Nurses have the opportunity to serve on hospital and nursing committees') appears in factor 6, which is mainly composed of items associated to quality. For this reason, item 27 was retained in factor 1, in the subdomain 'Opportunities'. On the other hand, the weight of item 23 is higher than 0.30 in factors 1 and 6, being more so in the latter, but since its semantic construction is connected to factor 1, this is where it was retained. In the reached model, items 3 and 7 belong to factor 1 ('Participation in hospital affairs') even though their semantic construction is connected to the way in which supervisors carry out leadership, which could be considered one of its subdomains. However, as stated by Waltz et al. (2005), a factor which only has two items is not stable, so we decided to join them together in one subscale. The result, with seven factors, is presented in Table 4.

Table 5 – Comparison between the original version and the Portuguese version of the PES-NWI

Domain	No. items	Original version (n=1,610)	Portuguese version (n=418)
Nurse participation in hospital affairs	**9**	**0.83**	**0.78**
Nursing foundations for the quality of care	**10**	**0.80**	**0.76**
Nurse Manager ability, leadership and support	**5**	**0.84**	**0.77**
Staffing and resource adequacy	**4**	**0.80**	**0.79**
Collegial relations between nurses and	**3**	**0.71**	**0.82**

physicians

Comparison of the final structure with the factorial structure of the PES-NWI revealed that the factors 'Staffing and resource adequacy' and 'Collegial relations between nurses and physicians' coincide. Following the semantic adjustments, the factor 'Nurse Manager's Ability', leadership and support' also coincides. On the other hand, in the structure of the Portuguese version, the factor associated to nurses' participation in hospital issues is subdivided into a subdomain linked to participation in hospital affairs, with six items, and another which reveals perception of opportunities for professional development, with three items. The same situation occurs in the subscale 'Nursing foundations for quality of care' where a set of seven items linked to philosophy of quality and a set of three items linked to continuity of care were grouped together.

Reliability

The scale's Cronbach's apha is 0.892 and it would not increase if any of the items were deleted from the scale. Cronbach's alpha coefficient for the five subscales is always higher than 0.70. Regarding the subscales' subdomains, only the one corresponding to the philosophy of quality shows a value which is slightly lower than 0.70, as can be seen in Table 4.

On the other hand, the correlation between the different domains, or subscales, and the scale as a whole varies between 0.509 and 0.768 (table 6). The correlation between the scales is low, which shows that the subscales, or domains, have some degree of independence among each other.

Criterion validity

Job satisfaction is an affective state which results from the evaluation of perceived characteristics of the job and of the organisation. On Barton's scale, the respondent nurses showed a mean level of satisfaction of 22.95±6.45, with a range of 5 to 35.

When the correlation was established between the results reached with the Portuguese version of the PES and general job satisfaction, a positive correlation, statistically significant, but moderate ($r= 0.449$; $p<0.05$), was obtained. It was, however, enough to validate the scale in relation to the criterion. Figure 1 presents this correlation.

Discussion

Although our sample presents differences in terms of age when compared to the nursing population, the results reached during the validation of the PES-NWI in Portuguese make it possible to guarantee the instrument's quality, validity and reliability. The larger number of factors found in the Portuguese version is intended to better specify some of the from Lake's original structure (2002). This happens namely in terms of the factor connected to foundations for quality where there are items which are grouped together and are not related to the continuity of care. When, based on the factors which have been subdivided, we tried to assess whether or not there was a reason to, in fact, divide them. We concluded that their separation was justified. Even from a semantic perspective, it is interesting to note that under the heading leadership and quality of management, for items related to the evaluation of direct managers and others are clearly separated. Regarding criterion validity it is possible to state that, although the working environment and general job satisfaction are not similar constructs, there is, in fact, a significant correlation between them.

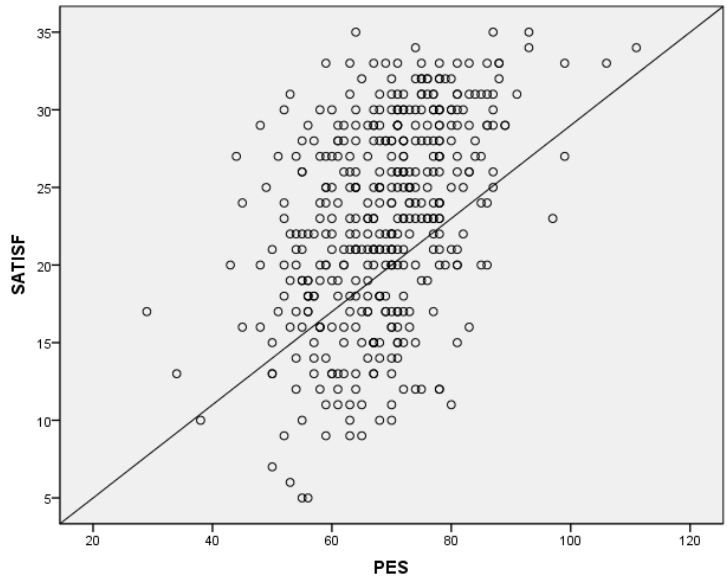
Thus, in conclusion, it is possible to state that the Portuguese version of the PES-NWI is a good instrument to measure favourable environments for the provision of care. It can be used not only to exclusively assess environments where nursing care is provided, but also as an independent variable in studies assessing the quality of care and outcomes.

Table 6 – Correlations between the domains and subscales of the Portuguese version of the PES-NWI

	PES	F1	F2	F3	F4	F5	F6	F7
PES								
Participation in hospital affairs	.767**							
Opportunities for professional development	.619**	.469**						
Philosophy of quality	.766**	.551**	.325**					
Continuity of care	.509**	.136**	.123*	.415**				
Nurse Manager Ability, leadership and support	.768**	.589**	.438**	.531**	.244**			
Staffing and resource adequacy	.638**	.374**	.356**	.376**	.238**	.340**		
Collegial relations between nurses and physicians	.554**	.289**	.342**	.358**	.262**	.292**	.298**	

*** p<0.05; ** p<0.01**

Figure 1 – Correlation between the Portuguese version of the PES and job satisfaction



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