

Original scientific article/Izvirni znanstveni članek

Self-assessment of the characteristics of nurses' work environment and psychometric analysis of the Slovene-language version of the Practice Environment Scale of the Nursing Work Index (PES-NWI)

Samooocena značilnosti delovnega okolja medicinskih sester in psihometrična analiza lestvice Indeks delovnega okolja v zdravstveni negi v slovenskem jeziku

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ABSTRACT

Key words: career; professional status; leaders; job satisfaction; interprofessional collaboration; nursing care

Ključne besede: kariera; poklicni status; vodje; zadovoljstvo pri delu; medpoklicno sodelovanje; zdravstvena nega

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Introduction: Measures to improve nurses' work environments include ensuring adequate staffing levels, recognising the importance of nursing work, involving nurses in decision-making processes, and improving interprofessional communication. The aim of this study was to analyse the job characteristics reported by nurses and their association with the dimensions of clinical practice environments in hospitals.

Methods: A cross-sectional explorative research design was employed. The Slovene-language version of the Practice Environment Scale of the Nursing Work Index (PES-NWI(SI)) and data on nurses' job characteristics were used. A total of 1,010 nurses (403 general care nurses and 605 healthcare assistants) from ten Slovenian general hospitals participated in the study. Permission to conduct the research was granted by the Commission of the Republic of Slovenia for Medical Ethics.

Results: The mean score of the PES-NWI(SI) was low (2.64), and the scale reliability was 0.937. The original theoretical five-factor structure was confirmed. The regression model explained the five factors in 26–47% of cases. The explanatory variables included opportunities for advancement, educational opportunities, professional status, satisfaction with current job and work environment, independence at work, and study leave.

Discussion and conclusion: The study revealed managers' inadequate ability to ensure sufficient staffing, insufficient involvement of both respondents and managers in hospital affairs, and the lack of promotion opportunities. Creating an optimal work environment for nurses is an important task for managers and leaders. National healthcare policy must consider nurses as equal healthcare professionals and nursing as both a professional and scientific discipline.

IZVLEČEK

Uvod: Intervencije za izboljšanje delovnega okolja medicinskih sester vključujejo ustrezno kadrovske zasedbo, vrednotenje dela medicinskih sester, njihovo vključevanje v procese odločanja in dobro medpoklicno komunikacijo. Cilj raziskave je bil raziskati značilnosti dela, o katerih poročajo medicinske sestre v izbranih slovenskih bolnišnicah in njihovo povezavo z dimenzijami delovnih okolij v bolnišnicah.

Metode: Izvedena je bila presečna raziskava. Uporabljena je bila slovenska različica lestvice Indeks delovnega okolja v zdravstveni negi (PES-NWI(SI)), zbrani so bili podatki o značilnostih delovnih mest. Sodelovalo je 1010 medicinskih sester (403 diplomirane medicinske sestre in 605 tehnikov zdravstvene nege) iz desetih slovenskih splošnih bolnišnic. Dovoljenje za izvedbo raziskave je dala Komisija Republike Slovenije za medicinsko etiko.

Rezultati: Povprečna ocena PES-NWI(SI) je bila nizka (2,64); zanesljivost lestvice je bila 0,937. Prvotna pet-faktorska teoretična struktura lestvice je bila potrjena. Regresijski model je pojasnil pet notranjih dimenzij lestvice s 26–47 % uspešnostjo. Pojasnjevalne spremenljivke so bile priložnosti za napredovanje in izobraževanje, poklicni status, zadovoljstvo s trenutno službo in delovnim okoljem, neodvisnost pri delu in študijski dopust.

Diskusija in zaključek: Raziskava je pokazala slabo sposobnost menedžerjev v zdravstveni negi za zagotavljanje ustrezne kadrovske zasedenosti, slabo vključenost anketirancev in vodij v bolnišnične zadeve ter slabe možnosti kariernega napredovanja. Ustvarjanje optimalnega delovnega okolja za medicinske sestre je pomembna naloga menedžerjev in vodij. Nacionalna zdravstvena politika mora na medicinske sestre gledati kot na enakovredne zdravstvene delavce, na zdravstveno nego pa kot na stroko in znanost.



Received/Prejeto: 26. 10. 2022
Accepted/Sprejeto: 29. 12. 2023

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Introduction

Over the past two decades, there has been a growing body of research showing that nurses' work environment plays an important role in their ability to provide quality care (Ogata et al., 2021). French et al. (2022) summarised the empirical evidence from hospitals and nursing homes and demonstrated that, in settings where registered nurses (RNs) (a) care for greater numbers of patients simultaneously, (b) lack clinical autonomy in practice, (c) have unsupportive leadership that is unresponsive to RNs' concerns, and (d) have poor collegial relationships with physicians, patients are more likely to experience poor health outcomes, while RNs are more likely to report burnout, job dissatisfaction, and intent to leave.

The nursing practice environment has been defined as the organisational characteristics of the work setting that facilitate or constrain professional nursing practice (Lake et al., 2019). It has been acknowledged as a key predictor of work-related outcomes such as higher quality of care and lower turnover intention (Huang et al., 2021). Hegazy et al. (2021) and Rodriguez-Garcia et al. (2021) identify autonomy, environmental control, the doctor-nurse relationship, and organisational support as the identifying factors influencing a positive work environment. These factors are instrumental in diminishing turnover intentions and bolstering nurses' work engagement.

Inadequate working conditions can result from underdeveloped workplace infrastructure, poor work organisation, inadequate education, and inappropriate staffing norms (Aiken et al., 2017, 2018; Barrientos-Trigo et al., 2018). The negative consequences of poor work environments in the nursing profession include exhaustion, turnover, and job dissatisfaction (Ambani et al., 2020). Moreover, as demonstrated by Schlak et al. (2021), work environment has a statistically significant effect on patient outcomes, as in their study, improving work environment conditions from poor to mixed or from mixed to good was associated with a 14% decrease in the odds of 30-day in-hospital mortality. Cumulative evidence suggests that interventions aimed at improving hospital work environments and patient-to-nurse staffing ratios can play a critical role in addressing the problems associated with quality, safety, and staffing (French et al., 2022). Similarly, Barrientos-Trigo et al. (2018) mention ensuring adequate staffing levels, recognising the importance of nurses' work, involving nurses in decision-making processes, improving interprofessional communication, providing clear definitions for work structures and procedures, and developing an understanding of both work processes and the work environment among the possible interventions to improve nurses' work environment. Poor nurse-physician collaboration appears to be a key factor responsible for nurse distress and poorer

patient outcomes (Sabone et al., 2020). Furthermore, job satisfaction also depends on nursing leadership, response/teamwork, and resources, as these help to ensure high-quality care in the nursing environment (Kowalski et al., 2020). Nursing leaders should therefore be trained in participative leadership (Skela-Savič et al., 2020).

Research shows that nurses in Slovenia continue to face unsafe working conditions, understaffing, inadequate nursing staff structure in terms of educational background, as well as low decision-making authority and high professional demands (Dobnik et al., 2018; Skela Savič et al., 2020). Based on a sample of nurses in Slovene hospitals, Skela-Savič et al. (2020) identified three key dimensions of nurses' work environment: work demands, decision-making authority, and discretion. High levels of work demands, minimal decision-making authority, and a lack of autonomy in the application of nursing skills are likely to lead to out-migration. Therefore, creating an optimal work environment requires assessments at both ward and hospital level to identify the strengths and areas in need of improvement (Pintero et al., 2019).

Aims and objectives

The aim of this study is to investigate the relationship between nurse-reported job characteristics and their work environment in hospitals, and to validate the cross-cultural adaptation of the Slovene-language Practice Environment Scale of the Nursing Work Index (PES-NWI(SI)) used in the RN4CAST study.

Method

A cross-sectional explorative research design with a pilot study was employed. The pilot testing of the PES-NWI(SI) scale comprised four phases: (1) content validation of the translated items of the survey instrument by a panel of experts, (2) pilot testing of the instrument, (3) subsequent post-test editing of the instrument, and (4) repeat content validation.

Description of the research instrument

The revised PES-NWI comprises 32 items (Lake 2002) measuring elements of nurses' work environments. The PES-NWI has already been adapted and validated in several countries, but not yet in Slovenia. The scale has four response options (1–Strongly Disagree, 2–Somewhat Disagree, 3–Somewhat Agree, 4–Strongly Agree) and five subscales (Table 1). In addition to the standard demographic data, we collected data on satisfaction with the current job, different job aspects and nursing as a career (1–Very Dissatisfied, 2–Somewhat Dissatisfied, 3–Moderately Satisfied, 4–Very Satisfied), and on the conditions pertaining to the work environment (1–Poor, 2–Fair, 3–Good,

4–Excellent), as was the case in the RN4CAST instrument (Sermeus et al., 2011). The same translation methodology was used as that developed by Squires et al. (2013) and applied for the RN4CAST study. The process began with a forward translation of the PES-NWI from English into Slovene (PES-NWI(SI)), which was carried out by two translators specialising in healthcare terminology. The forward translator was provided with a translation guide for English to help with potentially problematic phrases or terms. To avoid bias, the backward translator had no contact with the original questionnaire. Expert review was performed by a team consisting of one expert from the RN4CAST consortium, two experts from the Slovene research group, both translators, and eight expert bilingual nurses with a bachelor's degree in nursing from the pilot-testing hospital. The team held three sessions to check the understanding and terminological suitability of the questions and statements, and the content validity of the questionnaires. Each question and statement was thoroughly checked for comprehensibility and substantive meaning in Slovene. The items were reviewed for relevance and clarity. The back translation into English was checked to ensure that the meaning had not been lost in translation. Based on the input from the nursing experts, revisions were made to the Slovene version of the questionnaire and the content was fine-tuned.

The content validity indexing practices call for expert raters to evaluate the relevance of the survey items to the local context and also to check the quality and accuracy of the translation. A four-point rating scale was used to assess the relevance of the items (1–Not relevant, 2–Somewhat Relevant, 3–Relevant, 4–Highly Relevant). The scores indicate the degree of agreement between the experts (Polit & Beck 2010). The scale-level content validation score was 0.98, with only three items not receiving an I-CVI score of 1. Modified kappa calculations indicated that the majority of translated items were rated as 'Excellent' ($k > 0.74$) or 'Good' ($k = 0.60-0.73$). Of the items that received poor I-CVI ratings, two items (1, 20) required conceptual clarification related to the translation. The pilot study of PES-NWI(SI) was conducted in a general hospital in December 2019. 51 nurses (60.7%) from medical and surgical wards returned the questionnaire. The Cronbach's alpha value was 0.918. The final version of the survey was then edited and reviewed by a panel of experts.

Description of the research sample

In accordance with the RN4CAST protocol, all general hospitals ($N = 10$) and clinical centres ($N = 2$) were invited to participate. Of these, eight general hospitals and two clinical centres ($n = 10$) confirmed their participation. All adult surgical and medical units were included in the study. We invited all nurses

employed in these units ($N = 2,813$) who provided direct patient care. The response rate was 35.91% ($n = 1,010$), with respondents comprising 848 (83.96%) females and 160 (15.84%) males. The sample included 403 registered nurses (RNs) (40.00%) and 605 (60.00%) healthcare assistants (HCAs). RNs are nurses who meet the European Union criteria for trained and licensed nurses according to Directive 2005/36/EC. HCAs have an educational background of four years of secondary school for health technicians, which corresponds to level four of the EQF. The average length of employment of the respondents was 21.42 years ($s = 3.40$), with 15.34 years in nursing ($s = 11.12$), and their average age was 37.02 years ($s = 10.65$). Almost all (96.2%) were full-time employees.

Description of the research procedure and data analysis

Each hospital was given two weeks for data collection, which began in February 2020. The majority of the data was collected between 10 February and 7 March 2020, i.e., before the first major wave of the COVID-19 pandemic in Slovenia. Due to the pandemic, one hospital collected the data between 8 and 20 June 2020. Participants were provided with written details about the various aspects of the study, informed about their rights, including voluntary participation and possibility of withdrawing from the study at any time, and given the assurance of privacy and confidentiality. At the beginning of the survey, the participants gave their consent to participate in the study and allow their data to be collected and used for professional and scientific purposes at the national level. The data were analysed using the SPSS ver. 22 statistical software (SPSS Inc., Chicago, IL, USA). Univariate and bivariate statistical analyses and multivariate analyses were performed. Content validity indexing calculations were performed using Polit & Beck (2010) formulas. Cronbach's alpha was used to assess the reliability of the measured scale. Principal component analysis (PCA) was performed to analyse the psychometric properties and dimensions. Varimax rotation, Bartlett's sphericity test ($p < 0.05$), KMO test (> 0.6), and communalities (below 0.300) were used in the analysis. Confirmatory Factor Analysis (CFA) was used to assess the empirical data using the five-factor structure proposed by Lake (2002). The threshold for statistical significance was set at $p < 0.05$.

Results

The descriptive data and reliability scores for the PES-NWI(SI) subscales are shown in Table 1. The reliability of the entire PES-NWI(SI) scale proved to be very good ($n = 1,008$, Cronbach $\alpha = 0.937$). Only the 'Staffing and Resource Adequacy' subscale resulted in a Cronbach's alpha below 0.7 (0.636). The overall

Table 1: Scale translation and descriptive results, reliability and share of variance in the existing CFA five-factor structure of five PES-NWI(SI) subscales**Tabela 1:** Prevod lestvice in opisni rezultati petih dimenzij lestvice PES-NWI(SI); zanesljivost in delež variance v obstoječi pet-faktorski strukturi z uporabo metode CFA

To what extent are the following features present in your current job?/ V kolikšni meri so naslednje značilnosti prisotne v vaši sedanjih službi?				
Items:	n	\bar{x}	s	FI
F1: Staffing and resource adequacy/Kadrovska zasedba in ustreznost virov (Share of CFA variance = 33.12%) (\bar{x} = 2.27; s = 0.625; α = 0.636)				
1. Adequate support services allow me to spend time with my patients./Zaradi ustreznih podpornih oskrbovalnih služb lahko posvetim čas pacientom.	1005	2.55	0.892	0.372
8. Enough time and opportunity to discuss patient care problems with other nurses./Imam dovolj časa in priložnosti za razpravo z drugimi medicinskimi sestrami o problemih pri obravnavi pacientov.	1008	2.56	0.831	0.472
9. Enough registered nurses on staff to provide quality patient care./Imamo dovolj zaposlenih diplomiranih medicinskih sester za zagotavljanje kakovostne obravnave pacientov.	994	2.08	0.980	0.615
12. Enough staff to get the work done./Imamo dovolj osebja, da se delo lahko opravi.	994	1.90	0.924	0.765
F2: Collegial nurse-physician relationships/Kolegialni odnosi med medicinsko sestro in zdravnikom (Share of CFA variance = 54.89%) (\bar{x} = 2.59; s = 0.650 α = 0.894)				
2. Physicians and nurses have good working relationships./Delovni odnosi med zdravniki in medicinskimi sestrami so dobri.	1003	2.85	0.751	0.701
7. Physicians value nurses' observations and judgments. / Zdravniki cenijo opažanja in presoje medicinskih sester.	1007	2.59	0.833	0.764
13. Physicians recognise nurses' contributions to patient care./Zdravniki prepoznajo prispevek medicinskih sester k obravnavi pacientov.	1003	2.44	0.841	0.755
17. A lot of team work between nurses and physicians./Med medicinskimi sestrami in zdravniki je veliko timskega dela.	1006	2.74	0.866	0.739
21. Physicians respect nurses as professionals./Zdravniki spoštujejo medicinske sestre kot strokovnjakinje.	1003	2.45	0.877	0.752
26. Collaboration between nurses and physicians./Medicinske sestre in zdravniki sodelujejo.	999	2.91	0.783	0.745
30. Physicians hold nurses in high esteem./Zdravniki zelo cenijo medicinske sestre.	996	2.15	0.863	0.728
F3: Nurse manager ability, leadership and support of nurses/Sposobnost vodje v zdravstveni negi za vodenje in podporo medicinskim sestram (Share of CFA variance = 42.64%) (\bar{x} = 2.98; s = 0.611; α = 0.727)				
3. A supervisory staff that is supportive of nurses./Nadrejeno osebje je podporno do medicinskih sester.	999	2.96	0.765	0.686
10. A nurse manager who is a good manager and leader./Vodja zdravstvene nege, ki je dober menedžer in vodja.	985	3.34	0.774	0.742
14. Praise and recognition for a job well done./Pohvala in priznanje za dobro opravljeno delo.	1004	2.41	0.889	0.436
22. A nurse manager who backs up the nursing staff in decision making, even if the conflict is with a physician./Vodja zdravstvene nege podpre zaposlene v zdravstveni negi v odločitvah, tudi v primerih konflikta z zdravnikom.	997	3.17	0.862	0.703
F4: Nursing foundations for quality of care/Temelji zdravstvene nege za kakovost obravnave (Share of CFA variance = 34.88%) (\bar{x} = 2.71; s = 0.536; α = 0.818)				
4. Active staff development or continuing education programs for nurses./Imamo aktivni razvoj kadrov ali stalni izobraževalni programi za medicinske sestre.	993	2.77	0.829	0.541
15. High standards of nursing care are expected by the management./Vodstvo pričakuje visoke standarde zdravstvene nege.	998	2.88	0.838	0.556
19. A clear philosophy of nursing that pervades the patient care environment./Okolje obravnave pacientov temelji na jasni filozofiji zdravstvene nege.	996	2.63	0.795	0.752
20. Working with nurses who are clinically competent./Delam z medicinskimi sestrami, ki so klinično kompetentne.	995	3.21	0.746	0.479
24. An active quality assurance program./Imamo delujoč sistem zagotavljanja kakovosti.	994	2.59	0.821	0.726
27. A preceptor program for newly hired nurses./Imamo program uvajanja za novo zaposlene medicinske sestre.	994	2.76	0.934	0.612

Continues/Se nadaljuje

To what extent are the following features present in your current job?/ V kolikšni meri so naslednje značilnosti prisotne v vaši sedanji službi?				
Items:	n	\bar{x}	s	F1
28. Nursing care is based on a nursing rather than a medical model./ Zdravstvena nega temelji na modelu zdravstvene nege in ne na modelu medicinske obravnave.	978	2.68	0.759	0.583
31. Written, up-to-date care plans for all patients./Imamo pisne, dnevno posodobljene načrte obravnave za vse paciente.	990	2.76	0.903	0.534
F5: Nurse participation in hospital affairs/Sodelovanje medicinskih sester v bolnišničnih zadevah (Share of CFA variance = 40.43%) (\bar{x} = 2.62; s = 0.601; α = 0.843)				
5. Career development/clinical ladder opportunity./Imam priložnosti za karierni razvoj/strokovno napredovanje.	1004	2.60	0.889	0.611
6. Opportunity for registered nurses to participate in policy decisions./ Diplomirane medicinske sestre imajo možnost sodelovati pri pomembnih odločitvah.	967	2.64	0.877	0.654
11. A chief nursing officer who is highly visible and accessible to staff./Glavna medicinska sestra bolnišnice je vidna in dostopna zaposlenim.	997	2.77	0.926	0.564
16. A chief nursing officer is equal in power and authority to other top- level hospital executives./Glavna medicinska sestra bolnišnice je po moči in pristojnostih enakovredna drugim vodstvenim kadrom bolnišnice.	989	2.62	0.885	0.674
18. Opportunities for advancement./Imam priložnosti za napredovanje.	1003	2.33	0.860	0.644
23. Management that listens and responds to employee concerns./Vodstveni delavci prisluhnejo težavam zaposlenih in se nanje odzovejo.	1000	2.58	0.866	0.619
25. Registered nurses are involved in the internal governance of the hospital (e.g., practice and policy committees)./Diplomirane medicinske sestre sodelujejo pri notranjem upravljanju bolnišnice (npr. v komisijah za klinično delo in upravljanje).	976	2.72	0.846	0.671
29. Registered nurses have the opportunity to serve on hospital and nursing committees./Diplomirane medicinske sestre imajo priložnost sodelovati v bolnišničnih komisijah in komisijah zdravstvene nege.	963	2.69	0.844	0.644

Legend/Legenda: n – number/številico; \bar{x} – average/povprečje; s – standard deviation/standardni odklon; α – Cronbach's alpha coefficient/Cronbach alfa koeficient; CFA – Confirmatory Factor Analysis factoring/Konfirmatorna faktoriska analiza; F – factor/faktor

Table 2: Correlations between PES-NWI(SI) subscale factors and nurse-reported job characteristics

Tabela 2: Korelacije med dejavniki podlestvice PES-NWI(SI) in značilnostmi delovnega mesta, kot o njih poročajo medicinske sestre

Variables (Scale: 1–4)	\bar{x} (s)	F1	F2	F3	F4	F5
Satisfaction – current job (1–4)	2.96 (0.733)	0.406**	0.409**	0.465**	0.452**	0.454**
Satisfaction – career (1–4)	2.89 (0.791)	0.209**	0.182**	0.289**	0.271**	0.285**
Work environment rate (1–4)	2.70 (0.750)	0.397**	0.400**	0.483**	0.492**	0.471**
Aspects of job (scale: 1–4)						
1-Work schedule flexibility	2.83 (0.910)	0.336**	0.266**	0.427**	0.399**	0.392**
2-Opportunities for advancement	2.55 (0.958)	0.367**	0.373**	0.408**	0.499**	0.575**
3-Independence at work	2.98 (0.792)	0.293**	0.328**	0.412**	0.483**	0.441**
4-Professional status	2.79 (0.947)	0.404**	0.423**	0.404**	0.493**	0.476**
5-Wages	2.18 (0.952)	0.332**	0.294**	0.263**	0.348**	0.374**
6-Educational opportunities	2.69 (0.898)	0.322**	0.348**	0.405**	0.527**	0.532**
7-Annual leave	2.89 (0.889)	0.313**	0.266**	0.351**	0.378**	0.398**
8-Sick leave	2.99 (0.896)	0.273**	0.286**	0.364**	0.372**	0.357**
9-Study leave	2.75 (1.031)	0.312**	0.319**	0.347**	0.415**	0.426**
Demographic data						
Age	37.02 (10.65)	0.071*	0.067*	-0.028	0.012	0.024

Legend/Legenda: **correlation is significant at the 0.01 level (2-tailed)/korelacija je statistično značilno pomembna na ravni 0,01; \bar{x} – average (four-point scale)/povprečje (4 stopenjska lestvica); s – standard deviation/standardni odklon; F1 – Staffing and Resource Adequacy/Zadostnost kadrov in virov; F2 – Collegial Nurse-Physician Relationship/Kolegijski odnos med medicinskimi sestrami in zdravniki; F3 – Nurse Manager Ability, Leadership and Support of Nurses/Sposobnost managerja v zdravstveni negi za vodenje in podporo medicinskim sestram; F4 – Nursing Foundations for Quality of Care/Temelji zdravstvene nege za kakovostno oskrbo; F5 – Nurse Participation in Hospital Affairs/Sodelovanje medicinskih sester v bolnišničnih zadevah

Table 3: Linear regression model with nurse-reported job characteristics data in relation to the PES-NWI(SI) subscale factors**Tabela 3:** Linearni regresijski model s podatki o značilnostih delovnega mesta, kot o njih poročajo medicinske sestre, v povezavi s faktorji podlestvice PES-NWI(SI)

Factors/Faktorji	F1		F2		F3		F4		F5	
Adjusted R-Squared	$(R^2 = 0.273)$		$(R^2 = 0.260)$		$(R^2 = 0.347)$		$(R^2 = 0.447)$		$(R^2 = 0.472)$	
Variables	β	<i>p</i>	β	<i>p</i>	β	<i>p</i>	β	<i>p</i>	β	<i>p</i>
Satisfaction – current job	0.155	0.001	0.138	0.004	0.126	0.005	0.073	0.073	0.078	0.049
Satisfaction – career	-0.041	0.244	-0.041	0.256	0.055	0.105	-0.005	0.868	-0.015	0.620
Work environment rate	0.142	0.001	0.143	0.001	0.159	<0.001	0.147	<0.001	0.144	<0.001
Aspects of job										
Work schedule flexibility	0.074	0.067	-0.061	0.139	0.120	0.002	-0.008	0.829	-0.009	0.794
Opportunities for advancement	0.083	0.072	0.083	0.076	0.034	0.446	0.088	0.030	0.266	<0.000
Independence at work	-0.079	0.077	0.022	0.621	0.100	0.019	0.141	<0.001	0.015	0.691
Professional status	0.155	0.001	0.196	<0.000	0.050	0.245	0.125	<0.001	0.092	<0.001
Wages	0.089	0.022	0.058	0.137	-0.078	0.036	-0.009	0.792	-0.037	0.274
Educational opportunities	-0.016	0.709	0.047	0.285	0.112	0.008	0.214	<0.001	0.213	<0.001
Annual leave	0.011	0.799	-0.065	0.142	-0.001	0.990	-0.020	0.609	0.013	0.733
Sick leave	0.006	0.901	0.067	0.149	0.100	0.023	0.051	0.218	-0.003	0.941
Study leave	0.122	0.004	0.073	0.096	0.028	0.494	0.103	0.007	0.136	<0.001

Legend/Legenda: R^2 – Adjusted R-Squared/prilagojen R kvadrat; β – Standard regression coefficient/Standardni regresijski koeficient; *p* – statistical significance/statistična značilnost; F1 – Staffing and resource adequacy/Zadostnost kadrov in virov; F2 – Collegial nurse-physician relationships/Kolegialni odnos med medicinskimi sestrami in zdravniki; F3 – Nurse manager ability, leadership and support of nurses/Sposobnost managerja v zdravstveni negi za vodenje in podporo medicinskim sestram; F4 – Nursing foundations for quality of care/Temeljni zdravstvene nege za kakovostno oskrbo; F5 – Nurse participation in hospital affairs/Sodelovanje medicinskih sester v bolnišničnih zadevah

composite score of PES-NWI(SI) shows that the overall environment is favourable ($\bar{x} = 2.64$; $s = 0.852$). A mean composite score for each subscale and an overall composite score were calculated. Lake (2002) considers 2.5 to be the neutral midpoint for a four-point response set, with values above 2.5 indicating agreement and a favourable environment and values below 2.5 indicating disagreement or an unfavourable environment. The subscales F3 (2.89), F4 (2.71), F5 (2.62) and F2 (2.59) indicated agreement, while the subscale F1 (2.27) indicated disagreement (Table 1).

The 32 items of the PES-NWI(SI) were subjected to a principal component analysis (PCA). All extraction coefficients were above 0.300, only statement 32 "Patient care assignments that foster continuity of care (i.e., the same nurse cares for the patient from one day to the next)." had a lower coefficient (0.286) and was therefore excluded. The Kaiser-Meyer-Olkin value was 0.947 and the Bartlett's Test of Sphericity was < 0.001 . The PCA with five fixed factors yielded a variance of 53.71. We decided to test the existing five-factor theoretical structure using confirmatory factor analysis (CFA) to see whether the conceptual structure was reflected in the empirical data for Slovenia (Table 1).

In line with previous studies that had already established construct validity for the PES-NWI scale

(Ferreira & Martins, 2014; Efstathiou et al., 2018), we used the minimum value of factor weight of 0.300. The most stable construct was 'Collegial Nurse-Physician Relationships', which also explained most of the variance, followed by 'Nurse Manager Ability, Leadership and Support of Nurses', 'Nurse Participation in Hospital Affairs', 'Nursing Foundations for Quality of Care', and finally the least stable construct 'Staffing and Resource Adequacy', which had the lowest reliability with an alpha coefficient below the desired lower bound of 0.700.

The descriptive results for job characteristics are shown in Table 2. Most of the variables have a positive orientation in relation to the average value, but a value of three, which was the highest score, means only partial satisfaction or agreement, so we cannot speak of favourable values in terms the nurse-reported job characteristics. Satisfaction with wages was found to be strongly negative, followed by opportunities for advancement and educational opportunities.

All correlations between job characteristics and PES-NWI(SI) factors have positive signs, mostly at a strong or medium level ($r = 0.300$ – 0.532), with the exception of the correlation with age. Gender and educational achievement did not impact the factors.

The regression model for each factor of the PES-NWI(SI) subscales explained the variance in 26–

Table 4: Ranking of significant variables influencing the PES-NWI(SI) subscale factors by size of standard regression coefficient (β)

Tabela 4: Razvrščanje pomembnih spremenljivk, ki vplivajo na dejavnike podlestvice PES-NWI(SI), glede na velikost standardnega regresijskega koeficienta (β)

<i>F1 – Staffing and Resource Adequacy/ Zadostnost kadrov in virov</i>	<i>F2 – Collegial Nurse-Physician Relationships/ Kolegialni odnos med medicinskimi sestrami in zdravniki</i>	<i>F3 – Nurse Manager Ability, Leadership and Support of Nurses/ Sposobnost managerja v zdravstveni negi za vodenje in podporo medicinskim sestram</i>	<i>F4 – Nursing Foundations for Quality of Care/ Temelji zdravstvene nege za kakovostno oskrbo</i>	<i>F5 – Nurse Participation in Hospital Affairs/ Sodelovanje medicinskih sester v bolnišničnih zadevah</i>
Professional status	Professional status	Work environment	Educational opportunities	Opportunities for advancement
Satisfaction – current job	Work environment rate	rate	opportunities	Educational opportunities
Work environment rate	Satisfaction – current job	Satisfaction – current job	Work environment rate	Work environment rate
Study leave		Work schedule flexibility	Independence at work	Study leave
Wages		Educational opportunities	Professional status	Study leave
		Independence at work	Study leave	Professional status
		Sick leave	Opportunities for advancement	Satisfaction – current job
		Wages (neg.)		

47% of all cases (Table 3). The strongest explanatory variables ($\beta > 0.190$; $p < 0.001$) were 'opportunities for advancement' (0.266), 'educational opportunities' (0.214), and 'professional status' (0.196), followed by 'satisfaction with current job', 'work environment', 'independence at work' and 'study leave' ($\beta > 0.130$; $p < 0.001$). Table 4 shows the powers of the explanatory variables for each factor according to the standard regression coefficient (β), ordered from the most to the least significant β coefficient.

Discussion

In our study, the average score of the PES-NWI(SI) is among the lowest of all studies to date (Swiger et al., 2017; Ogata et al., 2021). A literature review by Swiger et al. (2017) reported the average score between 2.30 and 3.07. A survey conducted in Turkey by Sariköse & Göktepe (2021) reported an average of 2.9 and a lower response dispersion. It should be noted, however, that 68% of the respondents held a bachelor's degree. This puts Slovenia in the group of countries with the lowest scores, comparable to those reported in a study by Ogata et al. (2021). Overall, the results are not encouraging as they reveal problems, such as managers' inadequate capability to maintain sufficient staffing levels, the limited involvement of both respondents and managers in hospital affairs, and the lack of advancement opportunities.

The results for the individual subscales of the PES-NWI(SI) were not satisfactory, with Staffing and Resource Adequacy being the most notable. Insufficient resources and inadequate staffing in the work environment lead to poor work outcomes such as increased burnout, job dissatisfaction, exhaustion and turnover (Al Sabei et al., 2020; Ambani et al., 2020).

Relationships between doctors and nurses are also not encouraging, nor is the involvement of nurses in hospital affairs. Research shows that collegial relationships can foster a positive environment that increase nurses' job satisfaction (Gabriel et al., 2013). It is therefore necessary to improve the work environment in nursing, to support and promote continuing education, master's, and postgraduate education and professional development of nurses, and to create an atmosphere of collegial solidarity (Sariköse & Göktepe, 2022). The demographic data did not reach statistical significance. As indicated by Velasco-Ferrer & Conde (2015), a multigenerational workforce does not influence the nursing practice environment. The survey showed a moderate correlation between the PES-NWI(SI) subscales and the respondents' self-assessment related to 'job satisfaction', 'work environment', 'development opportunities', 'autonomy at work', 'professional status' and 'education opportunities'. All of these variables proved to be significant in the regression model.

The regression analysis emphasised a high significance of the variables related to nurse-reported job characteristics, in particular the following variables: 'opportunities for advancement', 'educational opportunities' and 'professional status', followed by 'satisfaction with current job', 'work environment', 'independence at work' and 'study leave'. The variables which were less important, but still significant, were: 'wages', 'independence at work', 'sick leave', and 'a flexible work schedule'. 'Satisfaction with one's career' and 'annual leave' proved to be irrelevant. In comparison, Rodriguez-Garcia et al. (2021) found that the variables of autonomy, environmental control, doctor-nurse relationships, and organisational were significant.

Our data are comparable to the variable 'autonomy' as it merges opportunities for advancement and

education, professional status and independence at work. We were surprised to find that the educational level of the study participants had no effect on performance on the PES-NWI(SI) subscale, as has been the case in other studies (Galletta et al., 2016; Tarhan et al., 2022). One possible explanation for this is the effectiveness of nursing education in producing graduates who have a high perception of professional identity, believe in professional values and wish to improve their profession, as reported by Tarhan et al. (2022). In the area of nursing professionalisation, Gunn et al. (2018) also found that structural factors outside nursing, such as education, health, labour market, and gender policies at the national level, can influence the process of professionalisation and can thus be used to strengthen nursing by increasing the level of professionalisation. This can be confirmed by a study conducted in Slovenia (Skela-Savič et al., 2017), which shows that RNs ascribe less importance to the values associated with activism and professionalism, and competencies associated with the development of professionalism. A study conducted in Italy reports that professional commitment has a significant positive impact on nurses' attitudes towards interprofessional collaboration (Galletta et al., 2016).

The Slovene-language version of the PES-NWI(SI) scale as a whole achieved very good reliability scores, which is consistent with the results of comparable studies (Lake, 2002; Ferreira & Martins, 2014; Brzyski et al. 2016; Efstathiou et al., 2018; Almeida et al. 2020; Lucas et al., 2021), albeit with differences in the subscales (Swiger et al., 2017).

The CFA model indicates that the five-factor model aligns well with the study sample in the Slovene health context and demonstrates good global internal consistency. We believe that an EFA analysis is necessary for the future use of the PES-NWI(SI) scale in Slovenia, as the existing scale by Lake (2002) does not provide a reliable measure for the 'Staffing and Resource Adequacy' subscale. It is therefore necessary to conduct an EFA analysis and actually identify a construct that explains the working environment of nurses in the context of the country's health system, education system and national understanding of nursing (Efstathiou et al., 2018; Almeida et al., 2020; Lucas et al., 2021). Also, with regard to the communalities limit, we believe that a limit over 0.400 should be considered. Similar variations in construct validity have been observed in previous studies (Fuentelsaz et al., 2013; Gasparino & Guirardello, 2017). This may be due to differences in sample size, culture, healthcare systems, cross-cultural differences reflected in the functioning of the healthcare system, and management among countries, which may influence nurses' responses (Brzyski et al., 2016; Almeida et al., 2020). Factorial weight choices may also have influenced our results. While we, like Almeida et al. (2020), used weight

values of over 0.300, some other studies used weight values of over 0.400 (Bogaert et al., 2009; Ferreira & Martins, 2014). This is further confirmation that the items measuring particular dimensions of the nursing work environment may vary from country to country (Brzyski et al., 2016; Squires et al., 2018).

There are some limitations to this study that need to be taken into account. A higher response rate would have been desirable. Moreover, we believe that a five-point scale in the original PES-NWI scale would also provide more reliable results in the translated version. In the Slovene-language version, adequate reliability was not reached for the 'Staffing and Resource Adequacy' subscale. Higher item loadings in the respective factors would have changed our research results as more items would have been excluded. The results of this study are limited to the responses provided by nurses working in selected specialised areas and cannot be generalised to all hospital units in Slovenia. It is possible that the respondents were overly positive or negative about their work environment, so caution should be applied when generalising the results. Caution should also be used when generalising and interpreting the results of the regression model, as perceptions of the studied variables can vary from person to person and as cross-sectional research does not allow for the determination of causal factors, but only the identification of predictors. Longitudinal and experimental research designs are better suited for the prediction of causal factors. Finally, the accuracy of self-report surveying techniques may be limited.

Despite its limitations, this study provides important insights into nurse-reported job attributes and their association with the dimensions of clinical practice environments. First, the findings emphasise the importance of career advancement opportunities, educational opportunities and professional status in explaining the nursing practice environment. Second, the findings suggest that nurse leaders lack the necessary competences to argue for the importance of skills and staff development in nursing. Finally, the study contributed to managers' and nurses' understanding of the process and activities required prior to using a foreign-language instrument.

Creating an optimal work environment for nurses is an important task for managers and leaders. National healthcare policy must recognise nurses as equal healthcare professionals and nursing as a professional and scientific discipline. Our study shows the importance of a well-organised work environment, a recognised professional status for all occupational groups, positive job satisfaction, and adequate development opportunities as well as the necessary support for development. The results of this study can provide hospital managers with very clear indications of factors that explain such poor performance. The significance of the study lies in its ability to place the work environment of nurses

from a specific country into a broader, international framework, while emphasising the critical need for adequate validation of the instruments used for data collection. It is important to enhance interprofessional collaboration and support the diversity of disciplines (Matthys et al., 2022). To drive this change, the role of managers in healthcare institutions and those involved in healthcare and welfare state policy is of paramount importance (Gunn et al., 2018).

Conclusion

This study has shown that managers lack the ability to ensure adequate staffing levels, that respondents and managers are insufficiently involved in hospital affairs, and that promotion opportunities have been insufficiently developed. These findings may therefore provide valuable insights that could assist nursing and healthcare leaders in further examining the nursing practice environment. This would enable nurses to perform at the highest level of clinical practice. Our finding on nurses' work environment, based on the validation of the PES-NWI(SI) scale instrument, can be described as reliable and valid in four domains or subscales, and thus contribute to the understanding and knowledge of nurses' work environment both in Slovenia and internationally. Given the acute shortage of nurses in Europe, this information is particularly important for healthcare managers and healthcare policy makers.

Acknowledgements/Zahvala

The authors would like to thank the nurses who participated in the study./Avtorji se zahvaljujejo medicinskim sestram, ki so sodelovale v raziskavi.

Conflict of interest/Nasprotje interesov

The authors declare that no conflicts of interest exist./Avtorji izjavljajo, da ni nasprotja interesov.

Funding/Financiranje

The research was financed by the ERASMUS +, Action KA2 (Project No. 601092-EPP-1-2018-1-SI-EPPKA2-KA) in the 2018-2021 period./Raziskava je bila financirana s strani ERASMUS+, Akcija KA2 (št. projekta 601092-EPP-1-2018-1-SI-EPPKA2-KA) v obdobju 2018-2021.

Ethical approval/Etika raziskovanja

Permission to conduct the study was obtained from the Commission of the Republic of Slovenia for Medical Ethics (No. 0120-488/2019/6, January 7, 2020). We have obtained permission from the RN4CAST Europe consortium to use the instruments in the study, with the commitment to use the already published

study protocol./Dovoljenje za izvedbo raziskave smo pridobili od Komisije RS za medicinsko etiko (št. 0120-488/2019/6, 7. januar 2020). Od konzorcija RN4CAST Europa smo pridobili dovoljenje za uporabo instrumentov v raziskavi, z zavezo, da bomo uporabili že objavljeni protokol raziskave.

Author contributions/Prispevek avtorjev

All authors were involved in preparing the article, they all gave final approval for the version to be published, and they all agree to be accountable for all aspects of the work by ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved./Vsi avtorji so sodelovali pri pripravi članka in vsi so odobrili verzijo, ki bo objavljena. Vsi se strinjajo, da so odgovorni za vse vidike dela in zagotavljajo, da so vprašanja v zvezi s točnostjo ali celovitostjo katerega koli dela članka ustrezno raziskana in razrešena.

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Cite as/Citirajte kot:

Skela-Savič, B., Squires, A., Sermeus, W., Lobe, B., Dello, S., & Bahun, M. (2024). Self-assessment of the characteristics of nurses' work environment and psychometric analysis of the Slovene-language version of the Practice Environment Scale of the Nursing Work Index (PES-NWI). *Obzornik zdravstvene nege*, 58(1), 7–17. <https://doi.org/10.14528/snr.2024.58.1.3212>