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Psychometric Testing of the Persian Version of the Conditions of Work Effectiveness Questionnaire-II (CWEQ-II-PV)

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Abstract:

BACKGROUND: Structural empowerment (SE) is an effective method of advancing work environments and has previously been widely discussed in Western countries. Due to the lack of culturally and academically accepted scales in Iran for measuring SE, localization of a foreign scale in this field is necessary.

OBJECTIVES: This study aimed at investigating the validity and reliability of the Persian Version of the Conditions of Work Effectiveness Questionnaire-II (CWEQ-II-PV) among Iranian nurses.

METHODS: The present cross-sectional methodological research was conducted during 2017–2018. Participants were 230 nurses working in four teaching hospitals affiliated to Kashan University of Medical Sciences in Kashan, Iran, who were selected using quota sampling. A standard forward–backward translation procedure according to Wild *et al.* (2005) was used to translate the English Version of the CWEQ-II to Persian. The psychometric evaluation processes were achieved by face, content, and construct validity (confirmatory factor analysis [CFA]). Reliability was examined using test–retest and Cronbach's alpha for internal consistency reliability.

RESULTS: The CWEQ-II-PV showed good content validity (the mean content validity scores for relevancy, clarity, and simplicity were 94%, 96%, and 94%, respectively). In the CFA, the original six-factor version with 19 items was confirmed. The original model was presented and incorporated in the CFA, indicating an acceptable fit for the model (root mean square error of approximation = 0.06, comparative fit index = 0.92, goodness of fit index (GFI) = 0.94, and adjusted GFI = 0.91). Cronbach's alpha coefficient for the total scale was 0.84 and for each component ranged from 0.71 to 0.87, indicating good internal consistency, and the test–retest Spearman and intraclass correlation coefficients were 0.93 and 0.87, respectively, showing good test–retest reliability.

CONCLUSIONS: Evidence was found to support the reliability and validity of the CWEQ-II-PV scale that measures the quality of the work environment for nurses from a SE perspective.

Keywords:

Conditions of Work Effectiveness Questionnaire-II, empowerment, nurses, psychometrics, questionnaire

Introduction

Iranian nurses find themselves in dramatically changed working conditions after a decade of health-care restructuring and policy reform.^[1] Increased job insecurity, job stress, and job dissatisfaction resulting

from heavy workloads and increased overtime hours have had negative effects on nurses' health.^[2] In a recent qualitative study in Iran, a strong desire to leave the bedside is an important and considerable challenge among nurses.^[3] Currently, nursing managers are facing increasing demands for jobs that have reduced their

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visibility and availability to support and mentors.^[4] This has led to further frustration for nurses. Every effort must be made to improve working conditions that fulfill the needs of nurses.^[2] It is crucial to ensure that work environments are attractive to recruit new nurses. Empowerment is an effective method of advancing work environments and has previously been widely discussed in Western countries.^[5]

Structural empowerment (SE) is a complex context-bound multidimensional concept.^[6] It is a broad concept with different definitions.^[6-8] Hagbaghery *et al.* defined nurse empowerment as the use of knowledge and skill in care based on one's own discretion and in response to clients' needs.^[6]

SE improves nurses' cognitive and functional skills in professional environments, helps them make wise clinical decisions based on professional judgment, and benefits patients and organizations.^[9] Moreover, nurses' SE improves care quality, ensures patient safety, and reduces mortality rate.^[10,11] When nurses are empowered through assuming authority, they independently do critical thinking about the processes which facilitate effective care planning and provision.^[12] In addition, SE, particularly in interdisciplinary collaboration, helps create a healthy work environment for nurses; reduces their workload, depression, and burnout;^[13] and, thereby, improves their job satisfaction and their retention in the profession.^[14]

Given these extensive outcomes, it is evident that the measurement of SE is an important way of determining the effectiveness of clinical education programs and potentially of identifying the factors that impact on these experiences. On the other hand, there has been very little research on this issue in Iran. Adib Hajbaghery and Salsali^[1] designated a model for empowerment of nursing in Iran. However, they did not focus on psychometric testing of the instrument used to measure empowerment.

The Conditions of Work Effectiveness Questionnaire-II (CWEQ-II) scale captures staff nurses' views of current work conditions from an empowerment perspective. The scale has been widely used in Western countries and in many areas of nursing including acute care, nursing home care, and other settings.^[15,16] Empowering work environments are vital not only for retaining nurses but also for improving nursing care quality.^[1] The CWEQ-II is a valid and reliable instrument to assess SE of nurses. Given the importance of the concept of empowerment for clinical care, cultural and linguistic differences between countries and the lack of a valid and reliable Persian empowerment tool, it is recommended that studies be carried out in Iran to accommodate any cultural

specificity. Therefore, this study aimed to translate the CWEQ-II scale into Persian and evaluate psychometric properties of the new version of the scale in Iranian nurses' culture and language.

Description, administration, and scoring of the instrument

CWEQ-II has been translated into several languages, and the validity and reliability of different versions have been studied.^[2,17] This instrument contains 19 items with a five-point rating scale. Five alternative answers are given as follows: 1= "none," 2= "a little," 3= "some," 4= "many," and 5= "a lot." The instrument has six subscales: opportunities (three items), information (three items), supports (three items), resources (three items), formal power (three items), and informal power (four items).^[5] Laschinger *et al.* have validated the factor structure of the CWEQ-II and recommended creating a total score by summing the six subscale means. The total scores of the instrument range from 6 to 30.^[18] The original version has demonstrated good validity and reliability. Cronbach's alpha coefficients across previous studies have ranged from 0.79 to 0.82. Reported subscale reliability coefficients have ranged from 0.79 to 0.93 with an overall reliability of 0.88.^[19] A two-item global empowerment scale correlated positively with the CWEQ-II ($r = 0.56$), supporting the overall construct validity.^[5]

Methods

This cross-sectional study was carried out in four teaching hospitals, affiliated to medical universities of Kashan (Kashan University of Medical Sciences, Kashan) in Iran, 2017–2018. In this study, the translation and psychometric testing of the instrument was conducted in four phases, including translation, face and content validity, confirmatory factor analysis (CFA), and reliability.^[20] For using an instrument in different cohorts, assessing psychometric properties and cultural adaptation of the instrument is fundamental for rigor of interpretation of the results.^[21]

Procedures

Phase 1: Translation

Cultural adaptation addresses compatibility between the original and new versions of a scale in accordance with face and content validity.^[22] The most common strategy for cross-cultural adaptation of an instrument is translation.^[23] Severinsson stated that there is no single technique for translation of instruments.^[24] In the translation process of CWEQ-II, we used protocol of Wild *et al.*, including forward translation, reconciliation, back translation, back translation review, harmonization, cognitive debriefing, results and finalization, and final report.^[25]

Phase 2: Face and content validity

In this phase, the primary Persian version of the instrument was given to ten experts who are expert in the domain of nursing management and development of instrument at Kashan University of Medical Sciences and used their constructive opinions to assess the instrument's content validity. The experts were asked to comment on reasonability, suitability, attractiveness, and the logical sequence of items, as well as the conciseness and comprehensiveness of the tool. Then, the content validity index (CVI) of the tool was assessed. This indicator is the most commonly used quantitative method to determine the content validity of multiple-choice instruments. The CVI indicates relevance, simplicity, and clarity of items according to experts' judgment.^[26,27]

To estimate the CVI for each item, different attributes, such as being simple and clear, were scored using a four-choice Likert scale ranging from not clear to very clear and from not simple to very simple.^[26,27] According to Waltz and *et al.* index, interpretation of the scores for CVI includes <0.70 = unacceptable, $0.7-0.78$ = revision and correction, and ≥ 0.79 = acceptable.^[28] After evaluating content validity, the new version of the tool was given to ten nurses to determine face validity. Items without meeting the criteria of simplicity, readability, and clarity were simplified and/or modified.

Phase 3: Factor analysis

To establish construct validity, CFA was conducted by LISREL (SSI - Scientific Software International, Inc, USA) and EQS (Multivariate Software Inc, USA) programs to ensure that the factor structure of the Persian Version of the Conditions of Work Effectiveness Questionnaire-II (CWEQ-II-PV) is comparable with the English version. The LISREL, AMOS (IBM-International Business Machines Corporation, USA), and EQS were used for CFA to release model fit indices.^[29] Severinsson reported that if fit indices do not fit the model, CFA will change to exploratory factor analysis.^[24] Acceptable scores of fit indices include Chi-squared goodness of fit test (χ^2/df) ≤ 3 , root mean square error of approximation (RMSEA) ≤ 0.08 (acceptable score), RMSEA ≤ 0.05 (good score),^[30,31] goodness of fit index (GFI) and comparative fit index (CFI) ≥ 0.70 (acceptable score), GFI and CFI ≥ 0.90 (good score), adjusted GFI (AGFI) ≥ 0.70 (acceptable score), and AGFI ≥ 0.90 (good score).^[32,33] One prerequisite of CFA is a proper sample size. Although there are no clear rules specifying the sample size required for factor analysis, the recommended size was 5–10/item in the tool being assessed.^[20] Given that the questionnaire used in this study had 19 items, the sample size was estimated as 190; yet to account for a 20% probability of returning

incomplete questionnaires and to ensure an acceptable sample size, a total of 230 questionnaires were ultimately distributed.

For factor analysis, participants were randomly selected by quota sampling. Participants were employees in four teaching hospitals affiliated to Kashan University of Medical Sciences, Kashan, Iran. Collecting data was performed from November to February 2017–2018. Inclusion criteria were holding at least a nursing bachelor of science degree, at least 1 years of work experience, employment at various wards and shifts, and were willing to participate. Using the Kolmogorov–Smirnov test, normality of data was determined. Convergent and discriminant validity were assessed by estimating average variance extracted (AVE), maximum shared squared variance (MSV), and average shared square variance (ASV). To establish convergent validity, the AVE of constructs should exceed 0.50. For discriminant validity, both MSV and ASV should be less than AVE.^[34]

Phase 4: Reliability

Internal consistency of the scale was assessed by Cronbach's alpha coefficient. A Cronbach's alpha of 0.70 or more was considered satisfactory.^[35] Moreover, the stability of the CWEQ-II-PV was assessed using the test–retest method. Accordingly, twenty participants were randomly recruited from the study sample and asked to complete the test twice with a 2-week interval in between. The test–retest Spearman and intraclass correlation coefficient (ICC) were then calculated. Data were analyzed using Statistical Package for the Social Sciences version 16 (Spss Inc, Chicago, IL, USA), and CFA was conducted using EQS version 6.1.

Ethical considerations

This study has been approved by the Ethical Committee of Kashan University of Medical Sciences with the code of IR.KAUMS.MEDNT.REC.1396.92. The study was explained to potential participants, and consent forms were completed. The confidentiality of data and the right to withdraw were explained to all participants. Permission for translation and cross-cultural modification of the CWEQ-II was obtained from the original instrument's author.

Results

Description of samples

From 230 participants, 205 nurses anonymously completed self-report questionnaires (response rate = 89.13%). Findings indicated that 65.9% of participants were female and 15.6% were single [Table 1].

Phase 2: Findings of face and content validity

For face validity, minor changes were made in some of the items of the questionnaire, according to

the comments of the surveyed nurses and experts; therefore, no items were removed in the content validity assessment stage and all the items were entered for construct validity assessment. Based on the results of CVI, all items were scored >0.90 and included in the new scale. The mean content validity scores for relevancy, clarity, and simplicity were 94%, 96%, and 94%, respectively.

Phase 3: Factor analysis Confirmatory factor analysis

The confirmatory factor analysis was used to confirm that all the 19 items fell into the six theoretically determined factors. The Chi-square index (χ^2) is affected by sample size and is increased in sample sizes above 200; as a result, many researchers measure the Chi-square to the degree of freedom, i.e., the relative Chi-square (χ^2/df). The ratio of this index minimizes the effect of sample size on Chi-square.^[36] The χ^2/df was calculated as 2/74 in this study, which indicates a good fit. An acceptable RMSEA is ≤ 0.08 , reported as 0.06 in this study indicating excellent fitness of the model,^[33] and GFI, AGFI, and CFI should be ≥ 0.90 , reported as 0.94, 0.91, and 0.92 in this study, respectively; the values obtained in this study revealed a good confirmatory factor analysis^[37] [Table 2]. The factor loading values ranged from 0.44 to 0.81 in this study, which are all >0.4 (the acceptable value) and therefore considered significant. The 19 items were, thus, confirmed within the six determined factors. Table 3 presents the details of all the items of the questionnaire. As shown in Table 4, the AVE, MSV, and ASV of constructs fulfill the requirements of convergent and discriminant validity.

Table 1: Demographic characteristics of nurses (n=205)

Variable	n	Percentage
Sex		
Female	135	65.9
Male	70	34.1
Educational level		
Bachelor	181	88.3
Master of science	24	11.7
Marital status		
Married	173	84.4
Single	32	15.6
Age (years) Mean±SD (range)	46/6±11/5 (23-53)	
Job experience (years) Mean±SD (range)	14/4±9 (1-30)	

SD=Standard deviation

Table 2: Results of fit index confirmatory factor analysis of the Persian Version of the Conditions of Work Effectiveness Questionnaire-II (n=205)^a

Model	χ^2	df	χ^2/df	RMSEA	GFI	AGFI	CFI
Value	1423.2	519	2.74	0.06	0.94	0.91	0.92

^aAll item scale relationships were statistically significant $P<0.001$.
GFI=Goodness of fit index, AGFI=Adjusted goodness of fit index, CFI=Comparative fit index, df=Degree of freedom, RMSEA=Root mean square error of approximation, χ^2/df =chi square to df ratio

Phase 4: Reliability

The findings revealed that the Cronbach's alpha coefficient for the Persian version of the instrument was 0.84 and for subscales ranged from 0.71 to 0.87. Moreover, the test-retest Spearman and ICCs were 0.93 ($P < 0.001$) and 0.87 ($P < 0.001$; 95% confidence interval: 0.804–0.912), respectively. ICC for subscales ranged from 0.76 to 0.86 [Table 3].

Discussion

This study was conducted to assess the psychometric properties of CWEQ-II-PV and proposes it as a valid tool to be used for nursing research in Iran. Various psychometric properties were, thus, examined in the Iranian community of staff nurses, including face validity, content validity, construct validity, and reliability. In this study, participants' response rate was 89.13%. Polit and Beck reported that a response rate of >50% is satisfactory.^[38]

The CVI was used to assess the content validity of the questionnaire, which was calculated as 94%, 96%, and 94% for relevancy, clarity, and simplicity, respectively. Polit and Beck^[39] proposed a CVI of 0.9 or above as the standard value for content validity; therefore, the questionnaire content is a valid measure of the trait for which it was developed to assess. This finding was consistent with the results obtained by Sun *et al.*^[2]

Construct validity was evaluated using CFA. The factor loading values were between 0.44 and 0.81 in this study, well above Waltz *et al.*'s recommendation of at least 0.4 for factor loadings,^[28] therefore, no items were removed. Our factor analysis results of the CWEQ-II-PV were consistent with the CWEQ-II original six-factor model.^[5] The order of the items in each factor was completely similar to the original structure of the questionnaire. This finding was similar to the one conducted by Sun *et al.*^[2]

The reliability of the questionnaire was calculated using the internal consistency method (Cronbach's alpha), which was obtained as 0.84 for the entire questionnaire and as 0.71–0.87 for the categories. These correlations showed that the questionnaire and its categories had coefficients above 0.70, which were similar to the ones obtained by Laschinger *et al.*^[13,40,41] and the ones observed in the Spanish version of the CWEQ-II^[42] and another reported in the Chinese version.^[2] Streiner *et al.* demonstrated that increasing homogeneity can lead to a higher internal consistency of scales.^[43] Houser noted that the minimum acceptable value for Cronbach's alpha is 0.7. Moreover, Cronbach's alpha values 0.7 and 0.9 and greater are considered as indicative of moderate and strong internal consistency, respectively.^[44]

Table 3: The factor loading, internal consistency, intraclass correlation coefficients, and item content validity index in the Persian Version of Conditions of Work Effectiveness Questionnaire-IIa

Construct	Factor loading	Internal consistency	Intraclass correlation (ICC)	Item CVI (%)		
				Relevancy	Clarity	Simplicity
Opportunity						
Q1	0.61	0.71	0.76	100	100	90
Q2	0.57			90	90	100
Q3	0.43			100	100	100
Information						
Q4	0.79	0.84	0.83	100	100	100
Q5	0.44			90	90	90
Q6	0.80			90	90	90
Support						
Q7	0.81	0.85	0.79	90	100	100
Q8	0.42			100	100	90
Q9	0.66			100	100	100
Resources						
Q10	0.62	0.83	0.86	90	90	100
Q11	0.67			100	100	90
Q12	0.58			90	90	100
Formal power						
Q13	0.73	0.86	0.81	100	100	100
Q14	0.72			100	100	90
Q15	0.81			100	90	90
Informal power						
Q16	0.79	0.87	0.78	90	90	90
Q17	0.62			90	90	90
Q18	0.55			90	100	90
Q19	0.66			90	100	90
Total		0.84	0.87	94	96	94

*P<0.001. ICC=Intraclass correlation coefficient, CVI=Content validity index

Table 4: Convergent and divergent validity of the Persian Version of the Conditions of Work Effectiveness Questionnaire-II

Factor	AVE5	MSV	ASV
1	0.54	0.44	0.34
2	0.56	0.41	0.33
3	0.59	0.39	0.31
4	0.53	0.45	0.37
5	0.51	0.40	0.29
6	0.58	0.37	0.28

AVE=Average variance extracted, MSV=Maximum shared squared variance, ASV=Average shared square variance

The test-retest ICC of the CWEQ-II-PV was 0.87. None of the studies conducted on CWEQ-II questionnaire in the world reported the ICC of the tool.^[2,17] According to Houser, stability values of >0.7 are considered as satisfactory.^[44] Test-retest is one of the common reliability assessment methods that assess the stability and the repeatability of an instrument. Polit and Beck considered stability values of >0.7, 0.8, and 0.9 as satisfactory, very good, and ideal, respectively.^[38] Accordingly, the CWEQ-II-PV has very good stability, repeatability, and reliability.

According to the results of the present study, it can be argued that CWEQ-II-PV is a reliable, repeatable, and

adequately consistent tool that can be trusted. For this reason, the scale can be considered valid and reliable and ready to be used as a measurement of nurses' SE. Therefore, we believe that the CWEQ-II-PV will be an effective evaluation tool of SE in Iranian clinical nursing environments.

Conclusions

The results of this study showed that the CWEQ-II-PV has good validity and reliability, and its six categories were, thus, confirmed for use in the Iranian community of nurses. With its 19 items and 6 categories, this tool can be used in national health-care organizations, especially in nursing. The CWEQ-II-PV contributes to the study of SE in the Iranian health-care system. Nurses who view their work environments as empowering are more likely to provide high-quality care. Empowering work environments are vital not only for retaining nurses but also for improving nursing quality. The CWEQ-II-PV could be useful in designing organizational strategies, for which empowering employees may be advantageous to improve the quality of services as well as increasing employees' well-being. Therefore, the translated and validated version of the CWEQ-II-PV is useful for

nursing management. The scale has several advantages. It is relatively short and easy to administer, and it has adequate internal consistency. It may be used in a wide range of situations where SE among nurses is a matter of concern. As a result, the scale could facilitate the assessment of structural aspects of professional empowerment among nurses and contribute to the assessment of tendencies to behave autonomously among nurses in the various clinical settings. Because structural professional empowerment is an essential prerequisite for nursing practice, it might be useful as an independent or dependent variable for researchers investigating this concept.

Limitations

This study must be viewed in light of two potential limitations. First, the self-report feature of the CWEQ-II-PV instrument could bias the answers toward social desirability and popular norms. However, it was assumed that the anonymity of the responses could decrease the likelihood of this bias. Second, the data-gathering sites are located in one city in Iran.

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Conflicts of interest

There are no conflicts of interest.

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