Original Article

Quality of Nursing Work Life Scale: The Psychometric Evaluation of the Turkish Version

Meltem Sirin, MSc
Researcher Assistant, Ataturk University Health Sciences Faculty, Department of Fundamental Nursing, Erzurum, TURKEY

Serap Mankaliye Sokmen, PhD
Assistant Professor, Erzincan University School of Health, Erzincan, TURKEY

Corresponding Author: Mankaliye Sokmen Serap, Erzincan University School of Health, Erzincan, Turkey E-mail: sokmenserap@hotmail.com

Abstract

Background: Quality of work life in nurses is difficult to measure due to variability in personal characteristics and social, organizational and environmental components. The health care organizations are facing employee intent to leave and dissatisfaction to work environment. So the nurses quality of work life has been determined by standardized a scale. As there is no scale developed to determine work life quality of Turkish nurses, a measurement tool is needed.
Objective: This study aim is evaluate psychometric properties the Turkish Quality of Nursing Work Life Scale.
Methodology: This methodological study was conducted on 518 nurses. The data was collected with the Turkish version of the Quality of Nursing Work Life Scale. The translate-retranslate method was used to determine language and content validity of the scale and expert opinion was sought. Explanatory and confirmatory factor analyses were performed to determine the structural validity of scale. Reliability of the scale was determined with the test-retest reliability and, Cronbach's alpha coefficients and discriminant validity of scale was also investigated.
Results: Correlations of total-item scores of the scale ranged from 0.123 to 0.663; furthermore, α=0.89 for total scale and ranged from 0.62 and 0.81 for sub dimensions. The test–retest correlation coefficient was r=0.75 (p<0.001) and the difference between the mean scores of two measurements was statistically insignificant (t=0.52; p>0.05). Factor analysis results of the Turkish version of the Quality of Nursing Work Life Scale demonstrated that it has a five-factor structure and that factor loads are appropriate. Confirmatory factor analysis results revealed that the five-factor structure is valid.
Conclusion: The Turkish version of quality of nursing work life scale is to be considered valid and reliable. The quality of nursing work life scale is a suitable measurement tool that can be used to determine work life quality of Turkish nurses and to learn about needed precautions to improve work life quality.

Key words: nurses, quality of work life, psychometric properties

Introduction

Quality of Work Life (QWL) can be defined as an extent to which an employee is satisfied with personal and working needs through participating in the workplace while achieving the goals of the organization (Swamy, Nanjundeswaraswamy & Rashmi 2015). It is well known that work life affects individuals and vice versa (Lu et al. 2007). Analysis of work life quality is intended for use to improve work conditions taking into consideration the physical, mental, psychological and social needs of individuals ((Cole et al. 2005, Lu et al. 2007). Components quality of work life include: social

environment, management style, organizational productivity, labor content or discontent, work conditions, interaction between work and social lives (Lewis et al. 2001). The underlying aim of studies about quality of work life is to provide employees with conditions under which they work productively (Danford & Tailby 2008).

Focusing on improving QWL to increase the contentment and satisfaction of employees can result in various advantages for both employees and organization (Swamy, Nanjundeswaraswamy & Rashmi 2015). The need for qualified labor force has increased due to the expanding scope of health services. Furthermore, it has become a priority to keep and attract qualified nurses due to a nursing shortage (International Council of Nurses 2007). Therefore, health care organizations should comprehend 'what it takes' to recruit and retain qualified nurses and to create and maintain suitable working conditions that support excellent performance of nursing care (Brooks *et al.* 2007). Therefore, determination of and improvement in work life quality of nurses is critically important to ensure quality patient care. Nurses need a positive work environment to work effectively (Gurses *et al.* 2009). Nursing work life quality is a comprehensive structure to describe characteristics of a positive environment to ensure high job satisfaction nurses and improved sense of well-being for nurses as well as improved results for both patients and health care personnel (Brooks & Anderson 2005, Brooks *et al.* 2007).

Donald (Donald 1999) defined a good quality work environment as a place "where nurses' needs and expectations are satisfied and patients acquire their health targets". Nurses should focus on jobs that use all their knowledge, ability and strength and they should be motivated ((International Council of Nurses 2007). In health care institutions, a positive atmosphere should be created and maintained to ensure an environment in which they can administer good quality care. This atmosphere is important to create a good quality work environments equipped with economic, psychosocial, organizational and managerial motivational tools to foster a desire to render nursing care (Burtson & Stichler 2010).

Work life quality is not only limited to organizational boundaries, as personal life of employees should also

be considered (Bakal *et al.* 2003). Nurses may experience job-family role conflicts due to long working hours, frequent overtime, effects of shift work and inflexible and/or disordered working programs. Obligations to work nights or weekends can especially interfere with family needs and cause nurses to experience feelings of inadequacy in performance of their dual roles (work and family) (Bilazer *et al.* 2008). This can negatively affects nurses' job satisfaction and organizational devotion as well as work performance and attendance (Demir *et al.* 2003). Interaction between work and family life directly affects the general quality of life for nurses (Cimete *et al.* 2003). Organizations should endeavor to provide a supportive work environment for nurses to ensure appropriate balance of work-family roles (Demir *et al.* 2003).

Standards to ensure good quality work life in nursing include provision of: positive communication; feedback about performance; recognition of contributions; autonomy; effective problem solving; participatory decision making; team work philosophy; effective communication with employees including management-worker communications; adequate and fair salary; safe and healthy work environment; career opportunities; and balance between work and house/private life (Vagharseyyedin *et al.* 2011). Some studies in the literature report that nurses with a good quality of work life have high job satisfaction and motivation levels, are more attached to their organizations and experience less burnout (Demir *et al.* 2003).

An integrative review of the literature showed that the main determinants of nursing work life quality were leadership, management style, recognition of contributions to institution, decision-making freedom, use of shift work, salary level, fringe benefits, relations with work friends, demographic characteristics, work load and tension (Vagharseyyedin *et al.* 2011).

Organizational culture is an important factor in determination of individual perception of nurses about work life quality. In a study about organizational culture and work quality, the best organizational culture model to improve quality of work life for nurses is a human-centered model; indeed, there was a positive correlation between this model and organizational commitment,

empowerment, and job satisfaction, while a negative relation was detected between quality of work life and nurse's intentions of quitting their job (Gifford *et al.* 2002).

Indications of work life quality include work absenteeism, work turnover rate, employer-employee conflict, number of work accidents and overtime (Cole *et al.* 2005). Previous studies indicated that nurses complain about excessive workload, long working hours, dissatisfaction with management, poor work conditions, high work-related stress, shift work, inadequate educational and professional development opportunities and tasks other than nursing; in addition, they have feeling of quitting job and inclined to quit their current jobs (Ugur & Abaan 2008).

There are a limited number of studies about nursing quality of work life in Turkey and improvements in same are therefore inadequate to date. Thus, a scale is needed for evaluation of nurses' quality of work life in Turkish. The aims of this study were to adapt the Quality of Nursing Work Life Survey for Turkish nurses and to evaluate its psychometric properties.

This methodological study was performed in hospitals in Turkey. The study phases were as follows: first, translation of the Quality of Nursing Work Life Survey into the Turkish language from the English version and back-translation into English; second, content analysis by a panel of specialists; and third, pretesting and psychometric testing (factor analysis, a reliability coefficient and interitem correlations)

Sample

The sample comprised of 518 nurses who were worked in inpatient units of hospitals. Some participants (n=96) were asked to complete the scale for test–retest after two weeks. The adaptation of a scale into a different culture requires reaching a group at least 5–10 times greater than the number of scale items (Gozum & Aksayan 2002). The desired minimum sample size required was determined to be 210 participants based on 42 items. Without selecting a sample group for the study, the data were collected from a total of 518 nurses who agreed to participate

in the study. Table 1, introduces the demographic characteristics of the respondents.

Instruments

Quality of Nursing Work Life Survey (QNWL)

The QNWL was developed by Beth A. Brooks in USA in 2001 to determine nurses' work life quality. The scale consists of 42 items and it has four subscales (Home/Work Life, Work Organization/Design, Work Conditions/Contention and Work World). Each item in the original scale is scored in 6-point likert scale ranging from "completely disagree (1 point)" and "completely agree (6 point)". Only the 20. item is reverse coded in the scale. The minimum total score is 42 and the maximum is 252. Higher total scores indicate better work life quality.

The Cronbach Alpha coefficient of the original scale is 0.83. Factor analysis revealed structural validity. The scale consists of 4 subscales with Cronbach alpha coefficients for subscales ranging from 0.45 to 0.60, while the total score correlation coefficient ranges from r= 0.24 to r= 0.68 and correlation coefficients for each sub-dimension were between r= 0.50 and 0.90; consequently, Brooks reported that the QNWL is a valid and reliable scale (Brooks 2001).

Translation

The translation-back translation method was used to test language validity of the QNWL. The scale was translated from English to Turkish by four linguistic experts. The translated Turkish items were then examined by researchers and then the back translation was performed on items by another linguistic expert. The initial translation into Turkish was subsequently back-translated into English by two different bilingual independent translators who were Turkish. Neither of these participated in the previous phase of the study. The purpose of the translation phase was to check for discrepancies between content and meaning of the original version and the translated instrument. All the versions were analyzed and compared by the author and a final version resulted. Following the translation process, the scale was applied on a group of 20 nurses as a pilot test (these 20 nurses were not included in the later study). Following the pilot test, any required changes

were made according to the opinions of the participants.

Content Validity

To test item clarity and content validity, the translated version was submitted to 11 nursing specialists who were informed of the measures and concepts involved. Experts were asked to evaluate each item on a four-point scale where 4 = 'very relevant', 3 = 'relevant with some adjustment to phrasing', 2 = 'only relevant if phrasing is profoundly adjusted' and 1='not relevant'. The experts suggested minor changes in wording, and the translated scale was revised accordingly. Following the content validity analysis, the scale was applied on a group of 15 nurses as a second pilot application (these 30 nurses were not included in the final study). The scale was finalized after this application.

Internal Consistency

Internal consistency of the scale was assessed with Cronbach's alpha coefficient and item total score correlations. A Cronbach's alpha coefficient of at least 0.60 is required and item total score correlations of at least 0.20 in each item (Simsek 2007).

Stability

The stability of the scale was established by measuring the test–retest reliability. In this study the 96 respondents were sent the same instrument after approximately 2 weeks with the request to complete it again. Based on a code each respondent received, the data relating to the first and second measurement could be detected and matched. Then, by means of the intra-class correlation coefficient (ICC), the test–retest reliability could be calculated. Difference between both measurements was analyzed with t test in dependent groups.

Construct Validity

Explanatory and confirmative factor analyses were used for the construct validity of scale. Before conducting the factor analysis, the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy and Bartlett's test were conducted to evaluate whether the sample was large enough to perform a satisfactory factor analysis. A KMO value > 0.5 indicates that the sample size is adequate for factor. Moreover, the fact that the Bartlett test was found to be significant

signified that the dataset was convenient for the factor analysis (Ozdamar 2010).

During exploratory factor analysis (EFA), the principal components analysis was used and the data were examined by using the direct oblimin rotation method. The lowest factor load of 0.40 was considered as a criterion (Ozdamar 2010).

The factor structure of the instrument was tested with explanatory factor analysis (EFA) and confirmatory factor analysis (CFA). EFA can identify the factor structure for a set of variables based on data instead of theory. In contrast, CFA is generally based on a strong theoretical and empirical foundation that allows the investigator to specify a hypothesized factor structure in advance and then test it. Thus, CFA can determine how well the proposed model fits the data (Hair, Anderson, Tapham 1998; Tabachnick, Fidell 2007).

Asymptotic variance matrix was examined by using the Diaganally Weighted Least Squares (DWLS) estimation method that is suggested in categorical data for the confirmatory factor analysis (CFA) (Scientific-Software-International). The CFA results were evaluated according to various fit index results (p, $\chi2$/SD, Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Root Mean Square Error of Approximation (RMSA), Standardized Root Mean Square Residial (SRMR).

Data Collection and analysis

The data collection tool was distributed to nurses who consented participate in this study on both day and night shifts after necessary information was supplied by the researcher; participants were asked to fill out the form on the same day as soon as distribution if possible. The scale was administered to 518 hospital nurses and the second round of data collection was administered to 96 participants 15 days later for test-retest analysis.

SPSS (version 16, SPSS Inc.) and Lisrel 8.0 software programs were used to analyse the data. In order to conduct the statistical analysis, number, percentages, mean, standard deviation, validity and reliability analyses were used.

Table 1. Characteristics of Participating Nurses (n = 424)

Characteristics	Mean	SD
Age	29.04	5.94
Years of work	7.41	6.29
	N	**%**
Marital status		
Married	227	53.5
Alone	197	46.5
Children		
None	242	57.1
1 child	81	19.1
2 children and over	101	23.8
Education	**n**	**%**
Health vocational school	138	32,5
Pre-license	122	28,8
Bachelor's degree	145	34,2
Master's and doctoral	19	4,5
Institution		
State hospital	204	48.1
University hospital	220	51.9
Position		
Clinic nurse	365	86.1
Charge nurse	59	13.9
Clinical		
Internal services	142	33.5
Surgical services	131	30.9
Special services	151	35.6
Roster status		
Regular	207	48,8
Contractual	217	51,2
Shift type		
Continuous daytime	168	39,6
Continuous night	134	31,6
Rotational shifts	122	28,8
Economic status		
Income less than expenses	114	26.9
Equivalent income and expenses	269	63.4
Income over expenses	41	9.7

Table 2. Cronbach's Alpha Values QNWL

Scale and subscale	Item Number	Range	Mean±Sd	Cronbach's α
QNWL	**35**	**35-175**	107.29±17.85	**0.89**
Work Environment	**9**	**9-45**	25.61±6.28	0.78
Relations with managers	**5**	**5-25**	17.37±4.27	0.81
Work conditions	**10**	**10-50**	24.89±6.26	0.71
Job perception	**7**	**7-35**	26.21±3.88	0.67
Support Services	**4**	**4-20**	13.21±3.13	0.62

Table 4. Distribution QNWL Items by Factors and Factor Loads

Factor	Quality of Nursing Work Life Scale	Factor load	Explained variance %	Explained total variance %
Factor 1 Work Environment	Society has positive opinion about nurses.	.365	9.929	9.929
	Institution gives professional opportunities	.507		
	I communicate with other team members like Physiotherapist and respiration therapist	.305		
	I receive support for in-service training and constant education	.359		
	Nursing policies and procedures facilitates my job	.609		
	Safety provides a safe environment	.673		
	I feel safe protected against damage (physical, moral, verbal)	.638		
	I believe my job is safe.	.625		
	Managers respect nursing			
Factor 2 Relations with managers	I have good communication with my manager/supervisor nurse.	.578	8.904	18.833
	Manager/supervisor provides adequate supervision/ inspection.	.634		
	Manager/supervisor provides feedback about performance	.763		
	Manager/supervisor ask our opinions	.749		
	My achievements are recognized by manager/supervisor.	.668		
Factor 3 Work conditions	I am overworked	.511	8.475	27.308
	I can manage a good balance between work and family	.366		
	I do a lot of work irrelevant to nursing	.427		
	I have energy outside of work	.509		
	My daily affairs are frequently disrupted.	.558		
	I have enough time for work	.477		
	The number of nurses is adequate in my unit.	.490		
	Shift work negatively affects my life	.356		
	My salary is adequate for my job.	.562		
	Institutional policy is suitable for saving time for family.	.467		
Factor 4 Job perception	I am content with my work	.447	7.990	35.299
	I have autonomy in deciding patient care	.552		
	Team work is present in my unit	.405		
	I feel attached to work	.423		
	I feel approved by doctors at work	.610		
	I can communicate with doctors at the work environment	.595		
	My job is effective for patients and their family life.	.367		
Factor 5 Support Services	I receive adequate support from support service staff (meal, cleaning and care staff).	.752	7.041	**42.339**
	I have adequate materials and equipment for patient care.	.493		
	I can give good quality patient care.	.364		
	I receive qualified support from support services staff (meal, cleaning and care staff)	.652		

Table 3. Intercorrelations of subscale and QNWL

	1	2	3	4	5	6
1 Work Environment	-					
2. Relations with managers	.451*	-				
3. Work conditions	.545*	.334*	-			
4 Job perception	.468*	.472*	.348*	-		
5. Support Services	.494*	.399*	.398*	.458*	-	
6. QNWL	.839*	.687*	.768*	.697*	.684*	-
Ranj	35	20	32	27	16	119

* $p<0.001$

Table 5. CFA results fit index

Fit Index	Results
χ^2/Sd	2.54
CFI	0.91
GFI	0.84
AGFI	0.81
RMSEA	0.06
SRMR	0.08

Ethical considerations

Permission to use the QNWL in this study was obtained from the developer (Brooks 2001) before commencement. The study received approval from the Clinical Studies Ethical Committee and written permissions were obtained from hospitals administration in order to conduct the study. Moreover, verbal consent was obtained from the nurses who agreed to participate in the study. All study participants gave verbal informed consent to participate in the study. Data collected was kept confidential.

Results

Research Population

Questionnaire and QNWL data were collected from 518 nurses, however and accordingly, 94 questionnaires contained incomplete responses were excluded from study; as a result, 424 questionnaires/scales/data were tested for validity and reliability. The characteristics of the sample (N = 424) are summarized in Table 1. Nurses in this study had an average age of 26.04 ± 5.94 and their average work experience was 7.41 ± 6.29 years. There were 34.2% of nurses who were bachelor's degree graduates, 86.1% were clinic nurse and 51.9% worked in university hospital.

Content Validity

The scale was tested for content validity of the Turkish adaptation taking into consideration expert opinion. The translated scale, consisting of 42 items, was reviewed by the expert panel for its relevance and the phrasing of the items. For each item, the experts could suggest possible improvements in phrasing. Subsequent revisions of the Turkish version were made and discussed again by the panel members until agreement on content was reached. The scale took its final form after such consideration of expert opinions and pretest which translated scale was applied to a small pilot group consisting of 25 nurses.

Stability

Ninety six of the research population complied with the request to complete the scale for the second time after 2 weeks. The final 35-item version of the Turkish QNWL examined the test–retest reliability for the total scale. The test–retest correlations for the total scale was $r= 0.75$, $p< 0.001$. There was not a significant difference between test administration sessions given two weeks apart (t=0.524, p>0.05).

Internal Consistency

Internal consistency findings of the scale were examined using Cronbach's alpha coefficient. Item-total score correlations of items 10., 29., 30., 36. and 37. were negative, and very low in 13. and 27. items and these items were removed from the scale. Item-total score correlation ranged from r=0.21 to r=0.66, a statistically significant difference. Consequently, the Cronbach's Alpha coefficient of the 35-item *QNWL* Turkish scale was determined 0.89. The Cronbach Alpha coefficients of sub-factors were: α= 0.78 for sub-dimension of "work/working conditions", α=0.81 for "relations with managers", α= 0.71 for perceived "work conditions", α= 0.67 for "work perception", and α= 0.62 for "support services" (Table 2). Table 3 illustrates Cronbach's alpha coefficients of the overall scale and the subscales. Investigation of *QNWL* factor group correlations (with each other and with the whole scale) revealed that all were significant (p<0.001).

Construct validity

Explanatory factor analysis

Gozum and Aksayan (Gozum & Aksayan 2003) suggested that the number of participants should be at least 5 to 10 times the number of items in the scale in order for factor analysis to be generalizable. Based on the total number of items of the QNWL, we therefore projected the need to collect data from 518 participants. Factor analysis was carried out with 424 data. Before the principal components analysis was carried out to provide more precise findings the KMO and Bartlett's tests were conducted for the purpose of determining the sample adequacy and suitability of the data for the factor analysis. As a result of the analysis, the KMO value was determined as 0.86 and this value shows the suitability for the principal components analysis (Ozdamar 2010). Likewise, the results of the Bartlett's test were determined as χ2=4326.357, df=595 and p=0.000 and it was specified that the data were interrelated and acceptable for a factor analytic approach (Ozdamar 2010). The data were examined by using the principal component method in the analysis. As in the original scale, four different factor analyses were performed to determine factor structure of QNWL. Consequently, a structure was determined, which explains 38% of total variance

with > 1.50 eigenvalue. However, the percentage of factor loads explaining total variance should be at least 0.40 or higher in factor analysis (Oner 1997). Therefore, instead of four-factor structure as used in the original scale, a five-factor structure was chosen by scree plot test used to determine factor structure of the scale. In 5-factor factor analysis, the post-rotational variances of the factors were 9.93%, 8.90%; 8.48%; 7.99%; 7.04% respectively. The 5 factors all together explained 42.33% of total the variance with > 1.50 eigenvalue . (Table 4). Factor loads of items varied between 0.30 and 0.76 and factor loads of all items were above 0.30. After the factor analysis, five factors identified as conceptual:

Factor 1: Work Environment

Factor 2: Relations with managers

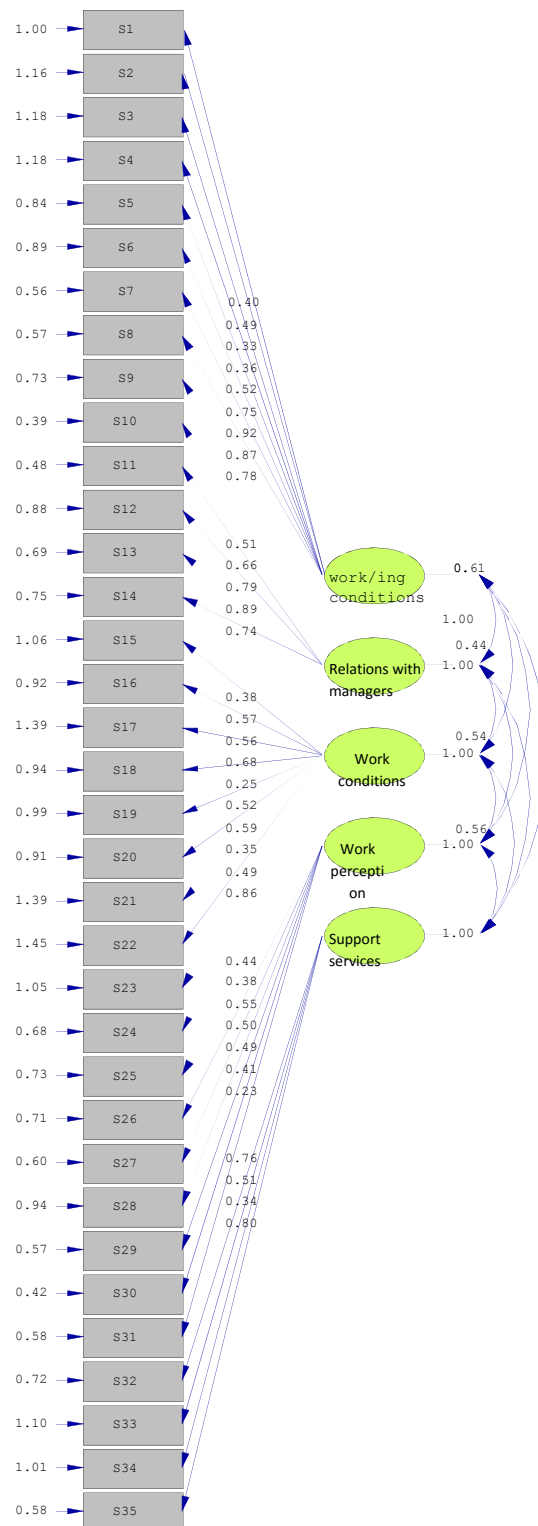Factor 3: Work conditions

Factor 4: Job perception

Factor 5: Support Services (Table 4)

Confirmatory Factor Analysis

Subsequently, the fitness of 5-factor structure determined in explanatory factor analysis was tested by confirmatory factor analysis (CFA). In the CFA, a five-subscale structure was involved in the model. In the CFA, a five-subscale structure was involved in the model. All fits indicated that the five-factor model had a satisfactory goodness of fit; $\chi2 = 1399.65$, degree of freedom 550, p=0.000, $\chi2/SD= 2.54$, CFI 0.91, and RMSEA 0.06. Other fit index results, item factor loads and PATH diagram of the scale are presented in Table 5, and Figure 1). Fit indices were found to be acceptable in this study. According to the findings of the explaratory and confirmatory factor analyses, the Turkish form of the QNWL with 35 items was determined as five-factor.

Discriminant Validity

Analysis of discriminant validity of the QNWL revealed the following. Total scores obtained from the scale were ordered from low to high, and 27% of slices were taken from low and high groups; t-testing was used to analyze whether each item discriminated the high and low groups. All t values for each factor group and the total score for each item in the Quality of Nursing Work Life Scale were significant (p<0.001).

1.00 →	S1	
1.16 →	S2	
1.18 →	S3	
1.18 →	S4	
0.84 →	S5	
0.89 →	S6	
0.56 →	S7	0.40
0.57 →	S8	0.49
0.73 →	S9	0.33
0.39 →	S10	0.36
0.48 →	S11	0.52
0.88 →	S12	0.75
0.69 →	S13	0.92
0.75 →	S14	0.87
1.06 →	S15	0.78
0.92 →	S16	
1.39 →	S17	
0.94 →	S18	
0.99 →	S19	
0.91 →	S20	
1.39 →	S21	
1.45 →	S22	
1.05 →	S23	
0.68 →	S24	
0.73 →	S25	
0.71 →	S26	
0.60 →	S27	
0.94 →	S28	
0.57 →	S29	
0.42 →	S30	
0.58 →	S31	
0.72 →	S32	
1.10 →	S33	
1.01 →	S34	
0.58 →	S35	

work/ing conditions — 0.61 — 1.00

0.51
0.66
0.79
0.89
0.74

Relations with managers — 0.44 — 1.00

0.38
0.57
0.56
0.68
0.25
0.52
0.59
0.35
0.49
0.86

Work conditions — 0.54 — 1.00

0.44
0.38
0.55
0.50
0.49
0.41
0.23

Work perception — 0.56 — 1.00

0.76
0.51
0.34
0.80

Support services — 1.00

Chi-Square=1399.65, df=550, P-value=0.00000, RMSEA=0.061

Figure 1. Factor Loads of QNWL by Confirmatory Factor Analysis

Discussion

This study was conducted in order to determine the validity and reliability of the QNWL and to integrate the scale into Turkish nurses. Validity study is an imperative process for any measurement tool, and language adaptation comprises the first step in scale validity study. For language adaptation of the QNWL, the translate-retranslate method, is used most commonly, and is used to minimize expression differences and conceptualization problems (Oner 1997). For this method, two independent interpreters should translate the original scale into the target language and two different and independent interpreters should translate the scale back into the original language. Subsequently, the investigator should compare the designed scale to the original scale; at that time, a pilot study should be implemented (Aksayan & Gozum 2002). A similar process was followed for language adaptation of the QNWL in the present study.

Scope validity involves analysis by an expert group as to whether items in the measurement tool adequately represent measures of the target behavior in terms of both quantity and quality (Erefe 2002). Studies show that the number of experts consulted should be between 3 and 20 in adaptation and development studies (Erefe 2002). In this study, opinions of 11 experts were asked in parallel with literature. The original form of the QNWL is scored using 6-point likert design; however, the Turkish form of QNWL was graded in 5-point likert style based on experts' suggestions. Fewer than 5 points in the likert style would result in information loss, while more than 5 grading items causes disappearance of difference between Likert grades (Tezbasaran 1997). Similar to the original version of the scale, answer tags were organized ranging from "completely agree" and "completely disagree". Subsequently, language and scope validities of scale were confirmed and a pilot study was implemented using 25 participants with similar characteristics to the larger study group.

Test-retest analysis involves re-administration of the scale to the same sample group 2-4 weeks after the first session and should include at least 30 individuals ((Gozum & Aksayan 2003). In this study, data were collected from 96 people at 15 days interval for test-retest analysis. Consistency of scale was determined in test-retest by the correlation between two measurements and the requirement that correlation is at least 0.70, positive and highly significant (Gozum & Aksayan 2003). Failure to achieve an adequate correlation level between the first and second administrations indicates inadequate consistency of scale over time. In this study, test-retest correlation of scale was suitable at r=0.75.

Statistically insignificant difference between test-retest scores indicates consistency of scale over time (Erefe 2002). In this study, difference between two measurements of scale was not statistically significant and test-retest reliability of Turkish form of *QNWL* was found consistent.

Item-total score correlations of a scale should not be negative and at least 0.20 for internal consistency analysis (Oner 1997). Item-total score correlation analysis of internal consistency for the Turkish form of the QNWL, item-total score correlation was negative for items 10, 29, 30, 36 and 37. As such, they were excluded from scale. In addition, correlations of the 13th (r=0.09) and 27th items (r=0.06) were found too low. The correlation level of 0.20 is a minimum degree of efficiency. Therefore, the 13th and 27th items were also excluded from the Turkish scale.

Correlation coefficients of remaining 35 items after internal consistency analysis were calculated again, and accordingly, correlation coefficients changed between r=0.16 and r=0.62. In literature, it is decided to exclude items with correlation coefficient lower than 0.20 from scale and changes in Cronbach Alpha coefficient should also considered (Oner 1997). Therefore, changes that would occur in Cronbach alpha coefficients if the 2nd, 16th and 20th items with correlation under 0.20 were excluded from scale were investigated and it was concluded not to exclude these items as no increase occurred in Cronbach alpha coefficient. Total score correlations of corrected items in original scale is between 0.24 and 0.68.

Item-total score correlation is an indicator whether an item measures target property and it should be at least 0.20. Accordingly, item-total score correlation of *QNWL* changed between r=0.213 and r=0.663, which were acceptable. These findings demonstrated that remaining 35 items after excluding 7 items from scale were compatible.

A Kaiser-Meyer Olkin (KMO) coefficient of scale higher than 0.7 indicates that the sample size is acceptable for factor analysis, while high significance of Bartlett test results indicates that items in the scale are suitable for factor analysis (Akgul 2003). The KMO coefficient of the QNWL was 0.863 and the Bartlett test result was highly significant (x^2=4326.357 p<0.001). Taken together, these findings demonstrate that the data have normal distribution and further, that results are not affected by sample size. Lastly, these results indicate that sample size is adequate and appropriate for factor analysis.

Factors with an eigenvalue higher than 1 should be investigated using a graphic method (i.e., Scree Plot test) to determine the appropriateness of the number of factors used in the scale (Akgul 2003). In the present study, the first abrupt change seen in scree plot test results was for the 5th factor; of note, 4-factor structure was analyzed first to try to adhere as closely as possible to the original scale. Although factor loads should explain 40 – 60% of total variance the 4-factor structure explained 38% of total variance (Akgul 2003). Therefore, 4-factor structure was assessed as not valid. We then conducted 5-factor analysis of the scale, and found an eigenvalue over 1.5 that explained 42.33% of total variance. Eigenvalue is the total variance explained by a single factor and is equal to the sum of factor loads. When the eigenvalue of each factor is divided by the number of questions, the result is the total variance. Factors with an eigenvalue over 1 are generally considered to be acceptable (Akgul 2003).

There is no exact limit for the minimum value for acceptable factor load for inclusion as a factor in a specific scale; however, recommendations range between 0.30 and 0.40 (Akgul 2003). In the present study, *factor loads* ranged from 0.35 to 0.76. Factor structure of the Turkish adaptation of the QNWL has appropriate structural validity.

The Cronbach Alpha coefficient of the Turkish adaptation of the QNWL was 0.89, with Cronbach alpha coefficients of sub-factors between 0.62 and 0.81. A Cronbach Alpha coefficient between 0.60 and 0.80 is considered to be quite reliable, while coefficients between 0.80-1.00 are highly reliable (Gozum & Aksayan 2003). This indicates that the current adaptation of the scale and sub-scales have high internal consistency.

Discriminant validity analysis of the QNWL adaptation shows that: mean values vary; difficulty level of questions are not equal; groups with the overall sample give different answers to questions; all items are important to the scale and the scale can distinguish between nurses with high work life quality versus low work life quality levels (Akgul 2003) .

In confirmatory factor analysis, the presence of offending estimates in the estimated parameters should be investigated first (Tabachnick & Fidell 2007). Undesired estimations like negative or insignificant error variances, excessively high standard errors and standard coefficients close to 1 or 1 were not observed in the present case. χ^2/sd, which tests model-data compatibility, was 2.54, which is lower than the reference value ≤5. Another indicator for model-data compatibility, the root mean square error of approximation (RMSEA) was 0.061 in the present study, also lower than the reference value 0.080 (Hair *et al.* 1998). In addition, the goodness of fit index (GFI) and the adjusted goodness of fit index (AGFI) were over 0.80, while the comparative fit index (CFI) and normed fit index (NFI)s were both over 0.90. All findings demonstrate acceptable model-data compatibility. In conclusion, factor load of Turkish form of Quality of Nursing Work Life Scale were found within suitable limits in confirmatory factor analysis (Figure 1).

Conclusion and recommendation

The present study results show that the Turkish Adaptation of the Quality of Nursing Work Life Scale is a valid and reliable measurement tool. Future studies are suggested to determine breakpoints and repeat the validity and reliability study with different sample groups to further evaluate this adapted scale.

The Turkish adaptation of the QNWL can be used to determine quality of nursing work life and suggest precautions to improve work life quality.

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