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Validity and Reliability of the Turkish Version of the Postoperative Fatigue Scale

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ABSTRACT

Objective: Postoperative fatigue is an undesired and discouraging symptom that many patients experience after the surgery operation. Good assessment is essential to detect and manage this symptom. There is no specific Turkish validity and reliability measurement tool to assess postoperative fatigue. In this study, it was conducted to adapt the Postoperative Fatigue Scale (PO-FS) to Turkish in order to evaluate postoperative fatigue.

Methods: Methodological study method was applied. This study was conducted with a total of 276 patients. The data of the study were collected using the personal information form, PO-FS and Visual Analog Scale-Fatigue in April-July 2019.

Results: PO-FS sub-scales fatigue, vigor, and daily life activities have Cronbach's α coefficient of 0.873, 0.898, and 0.815, respectively. The factorial analysis revealed that three factors explain 76.344% of the total variance. These findings suggest that Turkish version of PO-FS is a valid and reliable scale.

Conclusion: PO-FS's Turkish translation is valid and can be reliably used for determining the postoperative fatigue of patients.

Keywords: Postoperative fatigue, reliability, validity

1. INTRODUCTION

Fatigue is a subjective sense of discomfort but it objectively causes the loss of ability to participate in daily life activities or normal activities (1). The term "postoperative fatigue" is defined as a discouraging symptom that may have an unpleasant effect on the patient's quality of life and it may last days after the surgery (2). After the surgery, the patients tend to experience postoperative fatigue (POF) that may last 2-4 weeks (3). POF generally affects the healthy individuals having a low level of or no fatigue in the beginning but it is directly related to surgical procedures and perioperative interventions (4,5). Delaying the mobilization, fatigue distorts the muscular function, delays healing, and increases the risk of severe complications such as pneumonia and deep vein thrombosis (6). Furthermore, fatigue may cause an individual to have various severe psychological problems such as anxiety, fear, sensuality, discomfort, sleeplessness, depression, and self-depreciation (3). It rarely threatens life and is thought to be an inevitable result of the surgery but the cumulative effect of fatigue and relevant shekels may significantly decrease the quality of life of patients and it may delay return to normal activities including working (6).

Professional healthcare team, especially the recommendations and evaluations of nurses play a significant role in patients' effective struggle with fatigue. Besides determining the time of fatigue, it is very important to determine the factors that might affect the fatigue such as surgical procedure, medications, rest, nutrition, culture, environment, psychological status, and hunger in assessing the fatigue (7). Multidimensional assessment instruments are used in POF evaluations (4).

Although there is no globally accepted standard measurement method for fatigue, various measurement instruments have been developed for assessing the fatigue. Ideally, the assessment should be performed making use of patient's own statements (8). In the literature, it is stated that analog

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or digital scales (Brief Fatigue Inventory) as well as more complex multidimensional scales (Piper Fatigue Self-Report Scale, Visual Analog Scale for Fatigue) are used to evaluate fatigue (9). However, POF assessment is made using the fatigue scale or the Quality of Life (QoL) scales that assess fatigue in the sub-dimension (4). Fatigue assessment tools are also discussed in studies evaluating fatigue in various diseases (10). According to a recent POF (4) review, there are two scales that can assess POF and they are; Fatigue Questionnaire (FQ) by Chalder et al. (11) and Identity Consequence Fatigue Scale (ICFS) by Paddison et al. (12). Nøstdahl et al. (2016) developed the 10-item postoperative fatigue scale of the ICFS to be practical in clinical use and to minimize patient burden (5). Although there are fatigue scales, which assess the severity of patients' fatigue and reliability and validity of which have been tested in Turkish population (13,14), there is no specific assessment tool to assess the postoperative fatigue of individual. For this purpose, a practical postoperative fatigue scale was developed by Nøstdahl et al. (2016) to evaluate the postoperative fatigue status of patients (5).

This study, it was aimed to test the validity and reliability of "Identity-Consequence Fatigue Scale" (ICFS), which has been developed by Nøstdahl et al. (5), in Turkish population.

Research questions;

Is PO-FS a valid measurement tool in Turkish society?

Is PO-FS a reliable measurement tool in Turkish society?

2. METHODS

2.1. Design

The present study employs descriptive and methodological design. Before the study, an e-mail was sent to Torkjell Nøstdahl, one of the developers of scale, for obtaining the written approval and a briefing on and assessments about the scale were obtained. Before the study, the approval was obtained from Aksaray University Human Research Ethics Committee (date 26.09.2018; protocol no:2018/183) and from the institution. Participation in the study was the verbal consents of patients were obtained after informing them about the study.

2.2. Participants

The present study was carried out on the patients, who have undergone surgery between April and July 2019 in surgical departments of a training and research hospital (orthopedics, neurosurgery, general surgery, plastic surgery, otolaryngology, cardiovascular surgeon, and urology). The inclusion criteria for this study; (1) age of ≥18 years, (2) being on minimum 3rd postoperative day, (3) being able to communicate in Turkish language, (4) having no psychiatric or cognitive disorder, (5) having no history of severe auditory deficiency reported in clinical records, (6) operation under general anesthesia and being classified in Group 1 or Group 2 according to American Society of Anesthesiologists (ASA) classification. The study was completed with a total of 276 patients.

2.3. Data Collection Tools

"14-Item Introductory Information Form" containing items about age, gender, marital status, previous surgeries, hospital experience, type and duration of surgery, and "Postoperative Fatigue Scale (PO-FS)" and "Visual Analog Scale (VAS)" were used.

Postoperative Fatigue Scale (PO-FS): Postoperative fatigue scale was developed by Nøstdahl et al. in 2016 (5) as the 10-item short form of perioperative fatigue scale developed by Paddison et al. (2006) (12). PO-FS was divided into 10 items and 3 subscales measuring three dimensions of postoperative fatigue. The subscales are fatigue (Items 2, 4, 5, and 6), vigor (Items 1, 3, 7), and daily life activities (Items 8, 9, and 10). Each item is scored between 0 and 5 points. Cronbach's α coefficients were found to be 0.90 for fatigue, 0.84 for vigor, and 0.73 for daily activity (5).

Visual Analog Scale (VAS): Visual Analog Scale is a scale developed by Price et al. (15). VAS was used in many studies for subjectively assessing the severity of pain and it was proven to be valid and reliable. The VAS was used to assess fatigue. The scale is with evaluates fatigue on a 10-cm ruler between "0 = not fatigue" and "10 = higher the fatigue." (16).

2.4. Data Collection

The data collection was performed with patients by the researcher in surgical clinics 72 hours after the surgery. Patients answered the items of Postoperative Fatigue Scale in approx. 12 minutes. The application of all the questionnaire forms took approx. 15 minutes.

2.5. Data Analysis

The adaptation steps of the scale into Turkish were carried out in accordance with the literature on this subject (17-20). The coding and statistical analyzes of the data were performed using Statistical Package for the Social Sciences for Windows (SPSS) and Analysis of Moment Structures (Amos) statistical package programs. Exploratory factor analysis and confirmatory factor analysis were used for the validity and reliability of the scale, Pearson correlation technique was used to determine the item-total score correlation, and Cronbach's reliability coefficient analysis was used to determine the internal consistency of the scale. Before the factor analysis, Kaiser–Meyer–Olkin (KMO) and Barlet tests were used for determining the sample sufficiency and suitability for factor analysis.

2.5.1. Content validity: Content validity is an indicator of how well the items of a survey reflect the intended concept. In the literature, it is stated that the indicating consensus among experts is 0.80 of content validity value (18).

2.5.2. Construct validity: Construct validity the Spearman coefficient was used to measure the strength and direction

of the monotonic relationship between two variables. Correlation coefficients > 0.5 indicate strong correlation, 0.3–0.5 moderate, and <0.3 weak correlation (19). Construct validity can be measured by hypothesis testing and structural validity (17). Construct validity was assessed by performing hypothesis testing against VAS-fatigue scores in the questionnaire using a Spearman's rank correlation. The hypothesis in this study was that there would be a strong correlation between PO-FS sub-dimensions and VAS-fatigue, as the two scales measure similar constructs. Structural validity was evaluated by exploratory factor analysis in the postoperative period 276 patients.

2.5.3. Internal consistency: Internal consistency was calculated Cronbach's alpha to determine internal consistency. Cronbach's α values 0.70 or more were regarded as acceptable (21).

2.5.4. Test-retest measurement: Test-retest measurement is a method used to examine the temporal stability and result consistency of a measurement tool in different time intervals (22). In the literature, it is stated that the minimum score of acceptable test-retest reliability is 0.70 (23).

3. RESULTS

The mean age of 276 patients (157 [% 56.9] female, 119 [% 43.1] male) participating in the study was found to be 53.59 ± 17.52 years. The demographic characteristics and the types of operations are presented in Table 1.

In Table 1, it is stated that the mean score of PO-FS's vigor subscale was 58.40±19.91, that of fatigue subscale was 42.68±20.47, and that of daily activity subscale was 27.19±27.52.

3.1. Content Validity

An important stage of the study process is language validation. Translating a scale into another language may change the nature of the scale due to differences in expression. Careful evaluation of the scale items is important in adapting the scale to a new culture (20,24). The three methods used to translate the original scale into the target language are one-way, group and reverse translation. The most widely used method to ensure intercultural equality among these methods is the "reverse translation" method (24). In this study, the reverse translation method was used. It was translated from English to Turkish by the researchers to test the validity of the adaptation of the PO-FS to Turkish culture. After reviewing the translated forms, the final form of questionnaire was obtained. Then, the translated form was translated to English by 2 linguists having command of both languages. It was also translated by another linguist from English to Turkish. It was determined that the meanings of the items did not change between the original scale and its Turkish translation. Finally, the Turkish grammar control of the scale was performed by a Turkish language specialist.

Table 1. *Socio-demographic characteristics of participants (N=276)*

Characteristics		
Age (Mean±SD) (Min-Max)	53.59±17.52 (18-96)	
Duration surgery;hour (Min-Max)	1.58±0.88 (0.30-5.0)	
Subscales of the Questionnaire		
Vigor	58.40±19.91 (0-100)	
Fatigue	42.68±20.47 (0-100)	
Daily activities	27.19±27.52 (0-100)	
	N	**(%)**
Gender		
Female	157	56.9
Male	119	43.1
Marital status		
Married	222	80.4
Single	54	19.6
Education status		
Not literate	72	26.1
Literate	34	12.3
Primary education	95	34.4
High school	26	9.4
University	49	17.8
Occupation		
Not working	185	67.0
Worker	50	18.1
Officer	12	4.3
Self-Employment	11	4.0
Retired	18	6.6
Chronic disease		
Yes	124	44.9
No	152	55.1
Use drugs		
Yes	135	48.9
No	141	51.1
Previous surgery		
Yes	143	51.8
No	133	48.2
Surgery performend		
Nose Surgery	10	3.6
Tonsillectomy	5	1.8
Prosthetic Surgery	67	24.3
Other Oprtopedic Surgeries	16	5.8
Plastic Surgery Operations	10	3.6
Breast Surgery Mastectomy	1	0.4
Obesity Surgery	12	4.3
Other General Surgery Operations	40	14.5
Coronary Artery Bypass Graft Surgery	4	1.4
Other Cardiovascular Surgery Operations	9	3.3
Brain Surgery Medium Group Surgeries	67	24.3
Urology Medium Group Operations	20	7.2
Urology Minor Operations	15	5.5
The ASA score		
Group 1	176	63.8
Group 2	100	36.2
Total	**276**	**100.0**

ASA. American Society of Anesthesiolgist; SD. standard deviation

The content validity index was used for validating the linguistic and cultural equivalency of the items and content values by making use of quantitative values, as well as accurately assessing the opinions of experts. The opinions of 7 experts were obtained in total. In parallel with the expert opinions, no items were removed from the questionnaire. The understandability was tested by applying the questionnaire to 15 patients that were not involved in the present study. It was determined in the preliminary application group that the statements in the questionnaire were understandable.

Table 2. *Total item correlations and cronbach's a coefficients of the questionnaire*

Items	Average of scale if item is removed	Variance of scale if the item is removed	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha If Item Deleted
1.	17.86	62.00	0.740	0.654	0.903
2.	18.83	59.52	0.753	0.613	0.902
3.	17.88	61.81	0.733	0.675	0.904
4.	18.43	60.89	0.748	0.677	0.903
5.	18.49	61.85	0.706	0.575	0.905
6.	18.74	60.04	0.690	0.510	0.906
7.	17.79	60.64	0.752	0.709	0.902
8.	19.57	63.50	0.577	0.441	0.912
9.	19.53	63.98	0.566	0.492	0.913
10.	19.45	61.34	0.616	0.571	0.911

3.2. Internal consistency

Scale's total correlation scores, and Alpha values are presented in Table 2. PO-FS Turkish Form's total item correlation scores ranged from 0.566 to 0.753 points. Cronbach's coefficient was found to be 0.862 for the whole scale, 0.873 for the fatigue, 0.898 for the vigor and 0.815 for the daily activity subscale (Table 3).

Table 3. *Factor structure and explotary variance values of the scale*

Factors	Items	Cronbach alpha	Factors Loading
Factor 1	4. I have been feeling fatigued	0.873	0.791
	5. Physically. I have felt tired		0.766
	6. I have had to restrict how much I try and do in a day		0.701
	2. I have been feeling worn out		0.699
Factor 2	3. I have been feeling vigorous	0.898	0.806
	7. I have been feeling lively		0.805
	1. I have been feeling energetic		0.798
Factor 3	8. Read a newspaper/book or watch TV	0.815	0.748
	9. Dress		0.826
	10.Visit or socialize with family and friends		0.842
Total Cronbach alpha		0.862	
Total Variance	**%** 76.344		

3.3. Exploratory factor analysis

Analysis, KMO and Bartlett tests were applied before factor analysis to evaluate sampling adequacy and factor suitability. The KMO value was found to be 0.908. This value shows its suitability for the analysis of the principal components. Thus, the result of Barlett's sphericity test was found to be statistically significant. The result of the test shows that the data are interrelated and suitable for factor analysis.

As a result of exploratory factor analysis (EFA), the three-dimensional structure of the scale was obtained. The factor loads were found to range between 0.798 and 0.806 for vigor subscale, 0.699 and 0.791 for fatigue dimension, and 0.748 and 0.842 for daily activity dimension. Moreover, it was determined that the scale was explaining 76.344% of the total variance (Table 3).

The three-dimensional structure of the scale was confirmed using the Confirmatory Factor Analysis (CFA). The factor loads were found to range between 0.84 and 0.88 for vigor dimension, 0.73 and 0.86 for fatigue dimension, and 0.70 and 0.86 daily life dimension. As a result of CFA, the result of the goodness of fit of scale; index values X^2 / standard deviation = 2.117, Goodness of Fit Index (GFI) = 0.955, Adjusted Goodness of Fit Index (AGFI) = 0.923, Comparative Fit Index (CFI) = 0.979, Root Mean Square Error of Approximation (RMSEA) = 0.064.

Figure 1 shows that the factor loadings of PO-FS vary between 0.70 and 0.88. As a result of the scale's test-retest analysis, it was determined that there was a positive correlation between the first and second applications of the scale (r = 0.973, p = 0.01).

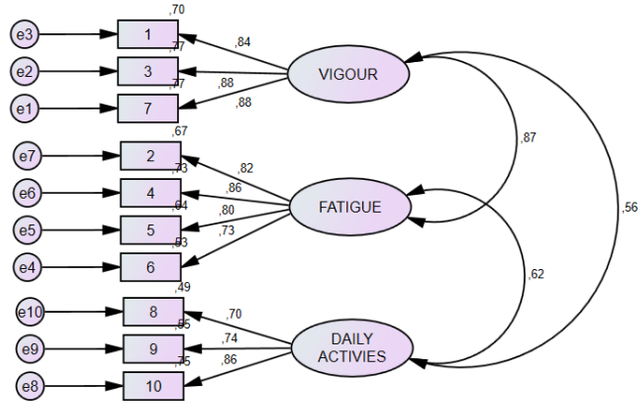

Figure 1. *The path diagram for Postoperative Fatigue Scale Turkish version.*

3.4. Correlation between PO-FS and VAS-Fatigue

To test concurrent validity, the scale is applied concurrently with another previously validated scale that examines the same or related construct. This shows how useful it is to predict a measure such as predictive validity. As post-operative fatigue status may differ between patients,

the VAS-Fatigue was used as a second scale to assess the reliability of the PO-FS. As a result of the analysis, a positive correlation was found between the mean scores of VAS-Fatigue and the mean scores of all PO-FS subscales (Table 4).

Table 4. *Parallel forms equivalence results*

Subscales of the Questionnaire		VAS Fatigue
Vigor	r	0.573
	p	0.01
Fatigue	r	0.772
	p	0.01
Daily activities	r	0.362
	p	0.01

PO-FS Postoperative Fatigue Scale; VAS Visual Analog Scale

4. DISCUSSION

Postoperative fatigue is one of the negative events after major and minor surgical operations[6]. Although there are scales measuring the fatigue severity of the patients in Turkish population (13,14), there is no specific assessment tool to assess the postoperative fatigue level of an individual. Therefore, this study was conducted to test the validity and reliability of the Turkish version of the PO-FS.

In order for an assessment tool to be considered sufficient, Cronbach's coefficient should be as close to 1 as possible (19,25,26) or the values equal to or higher than 0.7 were accepted to indicate a good reliability (27). In the present study, Cronbach's coefficient was found to be 0.86 for PO-FS in total, 0.89 for vigor subscale, 0.87 for fatigue subscale, and 0.81 for daily activity subscale (Table 3). As a result of the reliability analysis, the alpha coefficients were found to be higher than 0.80 for each of the subscales. It suggests that the scale is reliable (27). Nøstdahl et al. tested PO-FS by applying to the patients before and after the surgery (5). For the postoperative application of PO-FS, the Cronbach's coefficients were found to be 0.84 for vigor subscale, 0.90 for fatigue subscale, and 0.73 for daily activity subscale.

In this study, factor loads of all items ranged from 0.69 to 0.84 (Table 3) and between 0.54 and 0.96 in the study carried out by Nøstdahl et al. (5). These results show that the items of PO-FS have a high level of factor loads.

In the present study carried out on the adaptation of PO-FS to Turkish, 76.34% of the total variation was explained. The same value was 74.7% in the study of Nøstdahl et al. (2016) (5). In addition, the results of the explained variance ratio show that the PO-FS consists of 3 subscales and the factor load is sufficient as in the original form of the scale. Index values X^2 / standard deviation = 2.117, GFI = 0.955, AGFI = 0.923, CFI = 0.979, RMSEA = 0.064. When the goodness of fit indices of the model are examined, it is seen that the value of X2 /df is 2.117. Models where this value is <2 for the normal value and <5 for the acceptable value are considered good models (28). On the other hand, the GFI value, which is an important indicator of model fit and expected to show a value of .90 for an acceptable model (29), was found to be .95 in this study. In validity and reliability studies, RMSEA values between 0.050 and 0.080 are acceptable. Currently, the values obtained in our study include acceptable goodness-of-fit values (28,29). It was determined as a result of EFA that the goodness of fit was achieved. The relevant fit index values show that the form is acceptable (30).

A positive correlation was found between the two scales in comparison with the VAS-Fatigue scale to test the stability of the PO-FS (Table 4). Nøstdahl et al. (2016) (5) also used second form for reliability method with 31-item ICFS and, when compared to the original 31-item scale, they found that 98% of the change in total fatigue score between preoperative and postoperative periods was maintained. Thus, these results show that 10-item Short Form PO-FS is a valid and reliable instrument to use in researches.

This study had some limitations. In this study, sample included of a single research hospital in a city in Turkey. Further studies are needed with operation patients hospitalized in different hospitals in different geographic regions of Turkey.

5. CONCLUSION

PO-FS can be used for Turkish culture because it was translated to Turkish language using the content reliability and inter-observer reliability criteria and no difference was found between the experts' opinions on the items of PO-FS. PO-FS's Turkish form's total item correlation scores range between 0.566 and 0.753. From this aspect, the Turkish form's total item correlation values were found to be at the reliability level. The results of reliability analysis showed that the alpha coefficient of each dimension was higher than 0.80. In conclusion, PO-FS can be used for assessing the postoperative fatigue level of patients after a surgical intervention.

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REFERENCES

[1] Yu J, Zhuang CL, Shao SJ, Liu S, Chen WZ, Chen BC, Shen X, Yu Z. Risk factors for postoperative fatigue after gastrointestinal surgery. Journal of Surgical Research 2015;194:114-119. DOI: 10.1016/j.jss.2014.09.041

[2] McGuire J, Ross GL, Price H, Mortensen N, Evans J, Castell LM. Biochemical markers for post-operative fatigue after major surgery. Brain Research Bulletin 2003;60: 125-130. DOI: 10.1016/S0361-9230(03)00021-2

[3] Barnason S, Zimmernan L, Nieveen J, Schulz P, Miller C, Hertzog M, Rasmussen D. Relationships between fatigue and early postoperative recovery outcomes over time in elderly patients undergoing coronary artery bypass graft surgery. Heart & Lung 2008; 37(4):245-256. DOI: 10.1016/j.hrtlng.2007.09.003

[4] Zargar-Shoshtari K, Hill AG. Postoperative fatigue: A review, World J. Surg. 2009; 33: 738-745. DOI: 10.1007/s00268.008.9906-0

[5] Nøstdahl T, Bernklev T, Raede J, Sandvik L, Fredheim O. Postoperative fatigue; translation and validation of a revised 10-item short form of the Identity-Consequence Fatigue Scale (ICFS). Journal of Psychosomatic Research 2016;84:1-7. DOI: 10.1016/j.jpsychores.2016.03.002

[6] Abdelmalak BB, You J, Kurz A, Kot M, Bralliar T, Remzi FH, Sessler DI. The effects of dexamethasone, light anesthesia, and tight glucose control on postoperative fatigue and quality of life after major noncardiac surgery: A randomized trial. Journal of Clinical Anesthesia 2019;55:83-91. DOI: 10.1016/j.jclinane.2018.12.038

[7] Kaya S, Şenturan L. The investigation of fatigue of the patients undergoing coronary artery by-pass graft surgery. JAREN. 2016; 2(2):59-67. DOI: 10.5222/jaren.2016.059

[8] Argon A, Onat H. Cancer fatigue, approach to cancer patient. Ed: Onat H, Mandel NM. Istanbul: Nobel Printing 2002.

[9] Ahlberg K, Ekman T, Gaston-Johansson F, Mock V. Assessment and management of cancer-related fatigue in adults. Lancet 2003; 362(9384):640-50. DOI: 10.1016/S0140-6736(03)14186-4.

[10] Dittner AJ, Wessely SC, Brown RG. The assessment of fatigue: a practical guide for clinicians and researchers. J. Psychosom. Res. 2004;56:157-170. DOI: 10.1016/S0022-3999(03)00371-4.

[11] Chalder T, Berelowitz G, Pawlikowska T, Watts L, Wessely S, Wright D, Wallace EP. Development of a fatigue scale. J. Psychosom. Res. 1993;37(2):147-153. DOI: 10.1016/0022-3999(93)90081-p.

[12] Paddison JS, Booth RJ, Hill AG, Cameron LD. Comprehensive assessment of perioperative fatigue: Development of the identity-consequence fatigue scale, J. Psychosom. Res. 2006;60:615-622. DOI: 10.1016/j.jpsychores.2005.08.008

[13] Arslan S, Öztunç G. Validity and reliability of chronic obstructive pulmonary disease and asthma fatigue scale. Journal of Research and Development in Nursing 2013; 15(1):48-60.

[14] Can AG, Can SS. Validation of the Turkish version of the fatigue severity scale in patients with fibromyalgia. Rheumatology International. 2012;32:27-31. DOI: 10.1007/s00296.010.1558-3

[15] Price DD, McGrath PA, Rafii A, Buckingham B. The validation of visual analogue scales as ratio scale measures for chronic and experimental pain. Pain 1983;17(1): 45-56. DOI: 10.1016/0304-3959(83)90126-4

[16] Tseng BY, Gajewski BJ, Kluding PM. Reliability, responsiveness, and validity of the visual analog fatigue scale to measure exertion fatigue in people with chronic stroke: A preliminary study. Stroke Research and Treatment 2010;2010:412964. DOI: 10.4061/2010/412964.

[17] Mokkink LB, Terwee CB, Patrick DL, Alonso J, Stratford PW, Knol DL, Bouter LM, Vet HCW. The COSMIN checklist for assessing the methodological quality of studies on measurement properties of health status measurement instruments: An international Delphi study. Qual Life Res. 2010;19:539–549. DOI 10.1007/s11136.010.9606-8.

[18] Yurdugul H. Ölçek geliştirme çalışmalarında kapsam geçerliliği için kapsam geçerlilik endekslerinin kullanılması. In: XIV Educational Sciences Congress; Denizli, Turkiye; 2005 (Turkish).

[19] Alpar R. Spor sağlik ve eğitim bilimlerinden örneklerle uygulamali istatistik ve geçerlik – güvenirlik. Ankara, Turkiye: Detay Yayıncılık, 2010. (Turkish)

[20] Gjersing L., Caplehom RM., Clausen T. Cross-cultural adaptation of research instruments: language, setting, time and statistical considerations. BMC Medical Research Methodology 2010,10:13.

[21] Polit DF, Beck C. In essentials of nursing research methods, appraisal, and utilization 6th ed. Philadelphia, PA: Lippincott; 2005, p. 597–607.

[22] Karasar N. Araştırma yöntemleri. Ankara, Türkiye: Nobel Akademik Yayıncılık; 2014. (Turkish)

[23] Koo TK, Li MY. A guideline of selecting and reporting Intraclass correlation coefficients for reliability research. J Chiropr Med. 2016; 15(2):155-163. DOI: 10.1016/j.jcm.2016.02.012.

[24] Aksayan S, Gözüm S. A guide for transcultural adaptation of the scale. J Nurs Res Dev 2002;4(1):9e14.

[25] Karagöz Y. SPSS and AMOS 23 Uygulamalı istatistiksel analiz. Nobel Yayıncılık Ankara. 2016. (Turkish)

[26] Akgül A, Çelik O. İstatistiksel analiz teknikleri. Emek Yayıncılık. Ankara 2005. (Turkish)

[27] Conway JM, Huffcutt AI. A review and evaluation of exploratory factor analysis practices in organizational research. Organizational Research Methods 2003;6(2):147-168. DOI: 10.1177/109.442.8103251541

[28] Çapık C. Use of confirmatory factor analysis in validity and reliability studies. Journal of Anatolia Nursing and Health Sciences 2014;17(3):196-205.

[29] Bardakçı S. The Validity and reliability study of the scale of the perceived sociability of online learning environments. Journal of Faculty of Educational Sciences 2010;43(1):17-39. DOI: 10.1501/Egifak_000.000.1189

[30] Kline RB. Practice of principles of structural equation modeling. (4th Edn.) New York: Guilford 2016.

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