Turkish Validity and Reliability of Pediatric Sleep Practices Questionnaire

Arzu SARIALIOĞLU[1] , **Eda GÜLBETEKIN**[2] , **Semra KÖSE**[3]

[1]Department of Child Health and Diseases Nursing, Atatürk University, Erzurum, Turkey
[2]Department of Child Health and Diseases Nursing, Iğdır University, Iğdır, Turkey
[3]Department of Child Health and Diseases Nursing, Necmettin Erbakan University, Konya, Turkey

ABSTRACT

Objective: The study was conducted to test the validity and reliability of the Turkish version of the "Pediatric Sleep Practices Questionnaire," which was developed to evaluate the presence of factors that encourage or interfere with sleep.

Methods: The sample of the study consisted of 320 children aged 8-17 years who had a physical disease for at least 7 days in the hospital and were treated. "Sociodemographic Characteristics Form" and "Pediatric Sleep Practices Questionnaire" were used to collect the research data.

Results: The factor load values of the scale items range from 0.579 to 0.915. Fix index values were found as X^2/SD 1.63, goodness of fit index 0.97, adjusted goodness of fit index 0.95, comparative fit index 0.91, root mean square error of approximation 0.061, root mean square residual 0.054, parsimony goodness fit index 0.52, and parsimony normed fit index 0.52. The scale consists of 9 items and 3 factors. Total Cronbach's α coefficient of the scale was found as 0.694.

Conclusions: "Pediatric Sleep Practices Questionnaire" is a valid and reliable scale. This scale can be used in both clinical and research settings to evaluate the presence of factors that encourage or interfere with sleep.

Keywords: Pediatric, sleep practices, questionnaire

Introduction

Just as health is not the absence of an illness, healthy sleep is not simply the absence of a sleep disorder.[1,2] Healthy sleep, including sufficient sleep duration and optimal sleep quality, is critical for overall health and well-being in children and adolescents. Studies have showed that inadequate and/or poor quality sleep result in impairments to cognitive and academic functioning,[3,4] increased negative mood and difficulties with emotion regulation,[4,5] and poorer physical health outcomes.[6] Healthy sleep has an active role on children's mental development, development of attention and adaptation abilities, physical growth, metabolism, body mass indexes, emotional status, and academic success.[7,8]

Healthy sleep practices, also referred to as sleep hygiene, are a group of external, modifiable factors that significantly affect the amount and quality of sleep.[9-11] The most commonly recommended healthy sleep practices are (i) maintain a consistent bedtime and wake time 7 nights a week; (ii) establish a consistent bedtime routine; (iii) limit light exposure and technology use at least 30-60 minutes prior to bedtime; (iv) create a suitable room or sleep environment (e.g., cool, dark, and comfortable); and (v) avoid caffeine 4-6 hours prior to sleep onset.[11]

Providing sleep hygiene in childhood is important in terms of healthy sleep, which is one of the basic needs of life.[12] It has been reported in the literature that sleep deficiencies or disorders can cause behavioral changes such as irritability, anxiety, depression, and difficulty concentrating in children, as well as various problems such as loss of appetite and weakening of the immune system.[8,13] It is significant to enquire children and adolescents directly about their own sleep; as children get older parents become less included with sleep routines.[14]

Invasive procedures with hospitalization, painful procedures, separation anxiety, unfamiliar physicians and nurses, and unfamiliar environment may affect children's sleep habits.[13] In addition, all practices should be arranged in accordance with the sleeping environment that the child is used to, since the monitoring and treatments performed at bedtime in the clinic may disrupt the child's sleep habits and cause insufficient sleep.[15]

In the literature review conducted, no specific measurement instrument measuring the presence of factors that encourage or interfere with sleep in the hospital setting of children which is suitable for Turkish culture was found. For this reason, this study was conducted to find out the validity and reliability of "Pediatric Sleep Practices Questionnaire" developed by Meltzer et al[16] to identify the presence of factors that encourage or interfere with sleep in the hospital setting of children and to introduce it to Turkish literature.

Methods

Design
This methodological research aimed to test a valid and reliable Turkish form of Pediatric Sleep Practices Questionnaire (PSPQ).

Population and Sample
Population of the study comprised of children aged 8-17 years who had a physical disease and were treated at the university hospital in Erzurum. As stated in literature, the study should reach nearly 300 to 500 individuals, or 5 to 10 times the number of items on the scale.[17,18] First, the research sample involved 9 items and 120 children for exploratory factor analysis. After that, for confirmatory factor analysis, the different research sample involved 9 items and 200 children. The sample of the study consisted of 320 children aged 8-17 years.

The inclusion criteria were (i) being between the ages of 8 to 17 years, and (ii) were treated at the hospital for at least 7 days. The exclusion criteria were (i) visual, audio, or speech impairments, and (ii) mental disorders.

Data Collection
The study data were collected between September 2021 and January 2022 at university hospital in Erzurum. The "Sociodemographic Characteristics Form" and the "Pediatric Sleep Practices Questionnaire" were used to collect data through face-to-face interview technique. It took 10-15 minutes on average to fill in the forms while collecting the research data.

Measurement
Sociodemographic Characteristics Form: This form, which was prepared by the researchers based on the literature,[7,13,16] consists of 11 questions covering questions about the age, gender, place of residence of the children, family type, parental education level, parents' job status, income status, and sleep problems.

Pediatric Sleep Practices Questionnaire (PSPQ)
The scale was developed by Meltzer et al[16] in 2021. It is a Likert type scale that investigates the sleeping habits of children aged 8-17 years in the hospital environment in the last week. The scale included 9 items that were used to identify 3 sleep practices: sleep timing (two items), routines/consistency (3 items), and sleep environment (4 items). In the adaptation of the scale to Turkish, PSPQ was formed with 9 items and 3 subdimension.

Data Analysis
The data were analyzed with SPSS for Windows 22 package program and AMOS 20. Content validity, construct validity, and reliability analyses were used for data assessment. Content validity index (CVI) was conducted for content validity and exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were conducted for construct validity. Kaiser–Meyer–Olkin (KMO) and Bartlett tests were used for EFA, while "X^2/SD < 5, root mean square error of approximation (RMSEA) < 0.08, standardized root mean square residual (SRMR) < 0.08, goodness of fit index (GFI) > 0.90, adjusted goodness of fit index (AGFI) > 0.90, comparative fit index (CFI) > 0.90, parsimony goodness fit index (PGFI) >0.50, parsimony normed fit index (PNFI) >0.50[19]" fit tests and PATH diagram were used for CFA. For reliability analysis, item-total correlation tests and Cronbach's alpha internal consistency coefficient were used. Scales with a coefficient of 1.00-0.80 have high reliability, scales with a coefficient of 0.60-0.79 are very reliable, and scales with a coefficient of 0.40-0.59 have low reliability.[17] Demographic features of the children were analyzed by using descriptive statistics.

Ethical Considerations
Permission was taken through e-mail from the authors who developed PSPQ to adapt the scale to Turkish society. After obtaining ethical approval (April 14, 2021 dated and 2021-1/16 numbered), written permission was taken from the hospital where the study would be conducted. Aim of the study was explained to children who met the research group criteria, questions were answered and written, and oral approval of children and parents were taken. Ethical principles were followed in the study.

Results

The Demographic Characteristics of the Children
The average age of the children participating in the research was 12.00 ± 2.43 years, 54.1% were male, 90.3% were living in a nuclear family, 70.9% were living in the city, 95% had social security, 80.3% had income equal to expenditure, 53.4% of the mothers had high school degree and 67.8% of them were unemployed, 45.9% of the fathers had high school degree and 51.6% of them were self-employed, and 60.3% had sleep problems (Table 1).

Language Validity: For Turkish validity and reliability of PSPQ, first of all permission was taken from Meltzer et al[16] who developed the study to use the scale. The scales were independently translated into Turkish by 3 researchers who had doctorate degree in nursing and a professional translator, and the translations were checked by the researchers and turned into a single form. Later, it was translated into the original language by using the back translation technique by a different language expert who knew about both languages and cultures and sent to the author to assess conformity in terms of original language. Revisions were made, and the items were finalized. Then the scales were sent to experts for content validity.

Content Validity: Turkish form of the prepared scale was sent to 10 experts in pediatrics via e-mail and their opinions were received. These experts were academicians experienced in pediatric nursing and scale development. The experts were asked to evaluate the cultural relevance of PSPQ and whether the items covered the concepts that were intended to measure. Davis Technique was used in the study for the content validity of the scale. The scale was revised and finalized in line with the suggestions of the experts. Content validity index value of the scale was found as 0.98. Therefore, no items were deleted from the scale in terms of content validity.

Pilot Application: In order to test whether the scale items were understood by the children, 30 children were selected from the target population, and a pilot application was conducted. The children in

Table 1. Demographic Characteristics of the Children (n=320)

	12.00 ± 2.43	
Average Age (average ± SD)	**n**	**%**
Gender		
Female	173	54.1
Male	147	45.9
Family type		
Nucleus family	289	90.3
Extended family	31	9.7
Living place		
City	227	70.9
Country	75	23.4
Village	18	5.7
Social security status		
Yes	304	95.0
No	16	5.0
Level of income		
Income lower than expenditure	39	12.2
Income equal to expenditure	257	80.3
Income higher than expenditure	24	7.5
Level of mothers' education		
İlliterate	10	3.1
Primary school	55	17.2
High school	171	53.4
University	84	26.3
Level of fathers' education		
İlliterate	4	1.3
Primary school	27	8.4
High school	147	45.9
University	142	44.4
Mother's employment status		
Unemployed	217	67.8
Employed	103	32.2
Father's occupation		
Unemployed	8	2.5
Civil servant/worker	147	45.9
Self-employment	165	51.6
Sleep problem status		
Yes	193	60.3
No	127	39.7

the pilot application were not included in the sample. The children were asked to fill in the scale and then to evaluate each item in terms of comprehensibility. No changes were made to the items during the pilot application.

Construct Validity
Exploratory and confirmatory factor analyses were used for construct validity.

Exploratory Factor Analysis
Factor analysis was conducted to find out the construct validity of PSPQ. Prior to factor analysis, KMO and Barlett's test were used to determine sample adequacy and whether the data were suitable for factor analysis. KMO value of the 9-item scale was found as 0. 674. Similarly, Barlett's test results (χ^2=325.547, P=.001) showed that the data were correlated and suitable for factor analysis.

Principal component analysis was used in EFA. As a result of Promax analysis, it was found that the scale items gathered under 3 factors. The fact that there were 3 components with an eigenvalue above 1 indicated that the scale had a 3-factor structure. The factor load values of the items were found to be between 0.578 and 0.915 (Table 2). Also, the scale explained 63.960% of the total variance. Consequently, PSPQ comprised 3 sub-dimension and 9 items.

Confirmatory Factor Analysis
Confirmatory factor analysis was employed to define whether the items indicated the subdimension and whether the subdimension explained for the scale structure. "χ^2/SD, SRMR, RMSEA, CFI, AGFI, GFI, PGFI, PNFI" fit indices were used, and "χ^2/SD was 1.63, GFI=0.97, AGFI=0.95, CFI=0.91, RMSEA=0.061, RMR=0.054, PGFI=0.52, and PNFI=0.52" (Table 3). The fit indices showed that the model was acceptable.

According to the PATH diagram, the factor loads of the model were found to be between 0.20 and 1.40, and all items had t values greater than 1.96 (Figure 1).

Reliability
In order to define the reliability of the PSPQ, Cronbach's alpha, and item-total correlation tests were conducted. It was determined that 0.693 for the "routines/consistency" sub-dimension, 0.702 for the "room environment" sub-dimension, 0.689 for the "timing" sub-dimension, and 0.694 for the total of the scale (Table 4). The item-total correlation scores were found to be between 0.22 and 0.57.

Table 2. Items and Factor Loads of PSPQ (9 Items)

	Factors		
Pattern Matrix[a]	**1**	**2**	**3**
i7: I woke up at about the same time every morning.	.856		
i4: I tried to fall asleep at about the same time every night.	.830		
i1: I followed a bedtime routine before falling asleep.	.578		
i5: I needed someone with me to fall asleep.	.492		
iHOT-COLD: I had problems sleeping because my room was too hot. I had problems sleeping because my room was too cold		.915	
i9: I had problems sleeping because there was too much light in my room.		.739	
i8: I had problems sleeping because my room was too noisy.		.579	
weekdaysleep3category			.840
weekendsleep3category			.836
Core values	2.577	2.200	1.540
Explained variance	33.025	16.446	14.489
Total eigenvalue	10.281		
Total variance	63.960		

PSPQ, Pediatric Sleep Practices Questionnaire.
[a]Rotation converged in 5 iterations.

Table 3. Compliance Index Values

Index	Normal Value	Acceptable Value	Found Value
X^2/SD	<2	<5	1.63
GFI	>0.95	>0.90	0.97
AGFI	>0.95	>0.90	0.95
CFI	>0.95	>0.90	0.91
RMSEA	<0.05	<0.08	0.061
RMR	<0.05	<0.08	0.054
PGFI	>0.89	>0.50	0.52
PNFI	>0.89	>0.50	0.52

AGFI, adjusted goodness of fit index; CFI, comparative fit index; GFI, goodness of fit index; PGFI, parsimony goodness fit index; PNFI, parsimony normed fit index; RMR, root mean square residual; RMSEA, root mean square error of approximation.

Discussion

The aim of this study is to determine the Turkish validity and reliability of the "Pediatric Sleep Practices Questionnaire." This scale can be used in both clinical and research settings to evaluate the presence of factors that encourage or interfere with sleep.

All measurement instruments used in scientific studies should be valid and reliable so that they can be used in future studies.[19-21] In the content validity performed with Davis Technique, CVI should be 0.80 and higher.[22] In this research, the CVI of PSPQ was 0.98. As a result, it was found that PSPQ is a scale reflecting the presence of factors that encourage or interfere with sleep adequately.
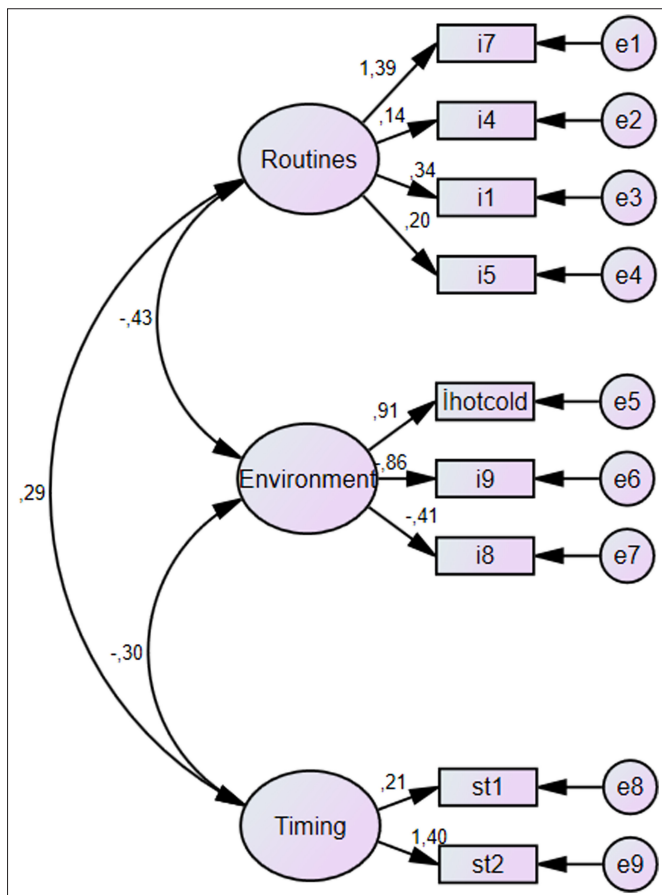

Figure 1. PSPQ confirmatory factor analysis PATH diagram. PSPQ, PSPQ, Pediatric Sleep Practices Questionnaire.

Table 4. PSPQ Item—Total Correlations and Cronbach's α Coefficients

	Mean	Corrected Item Total Correlations	Cronbach's α if Item Deleted
i1	10.33	.461	.623
i4	10.31	.294	.659
i5	10.24	.413	.633
i7	10.24	.564	.605
i8	11.04	.485	.629
i9	11.07	.534	.613
iHOT-COLD	11.06	.229	.670
weekdaysleep3category	11.30	.215	.720
weekendsleep3category	10.41	.261	.668

PSPQ, Pediatric Sleep Practices Questionnaire.

A KMO value higher than 0.5 is essential for factor analysis.[23] KMO values are considered as perfect between 0.90 and 1.00, as very good between 0.80 and 0.89, as good between 0.70 and 0.79, as moderate between 0.60 and 0.69, as weak between 0.50 and 0.59, and as unacceptable below 0.50. Barlett test result should be significant at $P <$ .05.[24] KMO value of PSPQ was higher than 0.67 in this research shows that the adequacy of the sample was moderate for factor analysis. In addition, Barlett test was found to be very significant and thus a correlation was found between the variables/factors of PSPQ.

Factor loads are expected to be above 0.40.[25,26] In this study, factor load values of PSPQ were found to vary between 0.578 and 0.915. Variance values explained were 63.960% for the total PSPQ. An exploratory variance of 40%-60% has been reported to be acceptable.[26,27] The values acquired indicated that the scale was adequate to explain pediatric sleep practices.

According to literature, X^2/SD value should be below 5 for the tested model to show a good fit.[19,28,29] CFI value is 1.0, RMSEA value is 0.04 of original scale. In this study, X^2/SD value was found to be perfect with 1.63. GFI was 0.97, AGFI was 0.95, and CFI was 0.91. Indices equal to or higher than 0.90 are acceptable values.[30,31] RMSEA of PSPQ was found as 0.06, while RMR was found as 0.054. RMSEA value should be <0.08 for a good fit. The model shows a good fit in case of 0.05 < RMR < 0.10.[32] With these fit indices, it was concluded that this form of the model was acceptable.

Scales with a coefficient of 1.00-0.80 have high reliability, scales with a coefficient of 0.60-0.79 are very reliable, and scales with a coefficient of 0.40-0.59 have low reliability.[17,33] In this research, the Cronbach's alpha of PSPQ was 0.69. Cronbach's alpha values are higher than 0.60 shows that it is a scale with fair reliability.

It has been stated that items with an item total correlation of 0.20 and higher can be included in the scale and can discriminate between individuals in terms of the related feature.[24,34] In this research, item-total correlations of PSPQ were found to be above 0.22. This result showed that children understood the items correctly and answered objectively, while the item discrimination of the scale was found to be high.

The PSPQ sleep timing scale allows for an examination of both bedtime and sleep opportunity, 2 variables known to have an impact on sleep and daytime functioning. Having a bedtime routine and a consistent sleep schedule are also well known to impact sleep quantity and quality. While few studies have examined the common recommendation for a cool, dark, and comfortable bedroom, the PSPQ room environment scale showed that youth who reported more difficulties

123

with sleep because of noise, light, and/or uncomfortable temperatures also reported more sleep disturbances and greater sleep-related impairment.[16] Since there was no other adaptation study other than the original of the scale, the research result was found to be compatible only with the original.

Limitations

The fact that the data collection tools of the research were filled based on the self-reports of the children was considered as a limitation of the study. The research data are limited to the qualities measured by the measurement tool. Another limitation of the study is that the age range is wide and the sleep patterns of children aged 7-18 years may differ.

Conclusion

Pediatric Sleep Practices Questionnaire is a valid and reliable scale. The scale consists of 9 items and 3 factors. This scale can be used in both clinical and research settings to evaluate the presence of factors that encourage or interfere with sleep.

References

1. Buysse DJ. Sleep health: can we define it? Does it matter? *Sleep*. 2014;37(1):9-17. [CrossRef]
2. Morgenthaler TI, Croft JB, Dort LC, Loeding LD, Mullington JM, Thomas SM. Development of the national healthy sleep awareness project sleep health surveillance questions. *J Clin Sleep Med*. 2015;11(9):1057-1062. [CrossRef]
3. Beebe DW. Cognitive, behavioral, and functional consequences of inadequate sleep in children and adolescents. *Pediatr Clin North Am*. 2011;58(3):649-665. [CrossRef]
4. Dewald JF, Meijer AM, Oort FJ, Kerkhof GA, Bögels SM. The influence of sleep quality, sleep duration and sleepiness on school performance in children and adolescents: a meta-analytic review. *Sleep Med Rev*. 2010; 14(3):179-189. [CrossRef]
5. Gregory AM, Sadeh A. Annual research review: sleep problems in childhood psychiatric disorders–A review of the latest science. *J Child Psychol Psychiatry*. 2016;57(3):296-317. [CrossRef]
6. Chaput JP, Gray CE, Poitras VJ, et al. Systematic review of the relationships between sleep duration and health indicators in school-aged children and youth. *Appl Physiol Nutr Metab*. 2016;41(6)(suppl 3):266-282.
7. Akgün KM, Kocaaslan EN, Bilsel A, Mutlu A. Determination of sleep habits in children aged 3-6 years. *Arch Health Sci Res*. 2016;3(2):123-132.
8. Gözün KÖ, Ceylan Ş. Determining the sleeping habits of toddlers aged 0-3. *J Hist Cult Art Res*. 2018;7(3):607-620.
9. Allen SL, Howlett MD, Coulombe JA, Corkum PV. ABCs of Sleepıng: a review of the evidence behind pediatric sleep practice recommendations. *Sleep Med Rev*. 2016;29:1-14. [CrossRef]
10. Irish LA, Kline CE, Gunn HE, Buysse DJ, Hall MH. The role of sleep hygiene in promoting public health: a review of empirical evidence. *Sleep Med Rev*. 2015;22:23-36. [CrossRef]
11. Loghmanee DA, Cvengros JA. Promoting health sleep practices. In: Sheldon SH, Ferber R, Kryger MH, Gozal D, eds. *Principles and Practice of Pediatric Sleep Medicine*. Philadelphia: Elsevier; 2014:63-66.
12. Sadeh A, Mindell JA, Luedtke K, Wiegand B. Sleep and sleep ecology in the first 3 years: a web-based study. *J Sleep Res*. 2009;18(1):60-73. [CrossRef]
13. Başbakkal Z, Sönmez S, Şen Celasin N, Esenay F. Determination of behavioral reactions of a child of 3-6 ages group to be hospitalized due to an acute illness. *Int J Hum Sci*. 2010;7(1):456-468.
14. Mindell JA, Meltzer LJ, Carskadon MA, Chervin RD. Developmental aspects of sleep hygiene: findings from the 2004 national sleep foundation sleep in America poll. *Sleep Med*. 2009;10(7):771-779. [CrossRef]
15. Ward TM, Rankin S, Lee KA. Caring for children with sleep problems. *J Pediatr Nurs*. 2007;22(4):283-296. [CrossRef]
16. Meltzer LJ, Forrest B, Motte A, Mindell J. A, Bevans KB. Development and validation of the pediatric sleep practices questionnaire: a self-report measure for youth ages 8-17 years. *Behav Sleep Med*. 2021;19(1):126-143.
17. Alpar R. *Applied Statistics and Validity-Reliability*. Ankara: Detay Publishing; 2020.
18. Seçer İ. *Practical Data Analysis with SPSS and Lisrel*. Ankara: Anı Publishing; 2017.
19. Esin MN. Data collection methods and tools-reliability and validity of data collection tools. In: Erdoğan S, Nahcivan N, Esin MN, eds. *Research, Process Practice and Critical in Nursing. İstanbul, Nobel Medical Bookstores*; 2021:193-235.
20. Gaskin CJ, Happell B. On exploratory factor analysis: a review of recent evidence, an assessment of current practice, and recommendations for future use. *Int J Nurs Stud*. 2014;51(3):511-521. [CrossRef]
21. Çapık C, Gözüm S, Aksayan S. Intercultural scale adaptation stages, language and culture adaptation: updated guideline. *FNJN Florence Nightingale J Nurs*. 2018;26(3):199-210. [CrossRef]
22. Karasar N. *Scientific Research Method Concepts Principles Techniques with Scientific Will Perception Framework*. Ankara: Nobel Academy; 2020.
23. Ho RC, Hou Hong A, Nourallah M. *Impact of Globalization and Advanced Technologies on Online Business Models*. IGI Global; 2021.
24. Büyüköztürk Ş. D*ata Analysis Handbook for Social Sciences Statistics, Research Pattern SPSS Applications and Interpretation*. Ankara: Pegem Academy; 2020.
25. Alavi M, Visentin DC, Thapa DK, Hunt GE, Watson R, Cleary M. Exploratory factor analysis and principal component analysis in clinical studies: which one should you use? *J Adv Nurs*. 2020;76:1886-1889. [CrossRef]
26. Samuels P. *Advice on Exploratory Factor Analysis*. Birmingham City University; 2016:1-8.
27. Shrestha N. Factor analysis as a tool for survey analysis. *Am J Appl Math Stat*. 2021;9(1):4-11. [CrossRef]
28. Çapık C. Use of confirmatory factor analysis in validity and reliability studies. *J Anatolia Nurs Health Sci*. 2014;17(3):196-205.
29. Alavi M, Visentin DC, Thapa DK, Hunt GE, Watson R, Cleary M. Chi-square for model fit in confirmatory factor analysis. *J Adv Nurs*. 2020;76(9):2209-2211. [CrossRef]
30. Kline RB. *Principles and Practice of Structural Equation Modeling*. New York: The Guilford Press; 2016.
31. Tabachnick BG, Fidell LS. *Using Multivariate Statistics*. London: Pearson; 2019.
32. Özdamar K. *Package Programs with Statistical Data Analysis*. Ankara: Nisan Bookstore; 2018.
33. Bujang MA, Omar ED, Baharum NA. A review on sample size determination for Cronbach's alpha test: a simple guide for researchers. *Malays J Med Sci*. 2018;25(6):85-99. [CrossRef]
34. Taber KS. The use of Cronbach's alpha when developing and reporting research instruments in science education. *Res Sci Educ*. 2018;48(6):1273-1296. [CrossRef]