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Turkish translation of the Prolapse and Incontinence Knowledge Questionnaire: validity and reliability

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Abstract

Introduction and hypothesis To translate the Prolapse and Incontinence Knowledge Questionnaire (PIKQ) into Turkish and test its validity and reliability.

Methods The study included 341 women. The translation of the PIKQ, which comprised of the urinary incontinence (PIKQ-UI) and pelvic organ prolapse (PIKQ-POP) sections, was performed in accordance with international recommendations. The Incontinence Quiz (IQ) and the Visual Analog Scale (VAS) were applied to assess the level of knowledge about POP and UI. Psychometric analyses consisted of assessing the following: (1) construct validity by confirmatory factor analysis, (2) criterion and known group validity, (3) internal consistency reliability by the KR-20 coefficient, and (4) test-retest reliability over 1 week with the intraclass correlation coefficient (ICC).

Results All fit indices except the Standardized Root Mean Square Residual indicated acceptable fit for the final models. Criterion validity was supported by moderate correlations between the PIKQ-UI and the IQ (rho = 0.679, $p < 0.001$). There were positive and weak linear correlations between the PIKQ-UI and PIKQ-POP scores and their corresponding perceived knowledge scores (rho = 0.351, $p = 0.013$ and rho = 0.345, $p = 0.014$, respectively). The known group validity did not show differences indicating that participants did not have enough knowledge about UI and/or POP even when they had the condition or acquaintance with them ($p = 0.852$ and $p = 0.185$, respectively). Reliability was excellent as indicated by the ICCs of 0.91–0.90, and KR-20 of 0.67–0.75 indicated good internal consistency for the PIKQ-UI and PIKQ-POP, respectively.

Conclusions The Turkish version of the PIKQ is a valid and reliable instrument to assess the knowledge of UI and POP.

Keywords Pelvic floor dysfunction · Prolapse and incontinence knowledge questionnaire · Validity · Reliability

Introduction

The female pelvic floor plays a central role in providing the physical support for pelvic organs, controlling urinary-fecal continence, sexual function, lymphatic flow, and lumbopelvic stability [1]. It also contributes to both postural and respiratory systems [1, 2]. Dysfunction of these structures represents a major health burden with a high prevalence [3]. Although pregnancy, obstetric trauma, and multiparty are considered the main predisposing factors, the pathogenesis of pelvic floor dysfunction (PFD) is multifactorial and highly complex [4]. The main types of female PFD are urinary incontinence (UI) and the pelvic organ prolapse (POP) [5].

PFD affects women in all ages and presents with a wide variety of clinical problems, such as urinary-fecal incontinence and constipation, which usually occur together [5]. While there are effective treatment options available, both

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conservative treatment and surgery, only a relatively limited number of individuals are likely to seek treatment, perceiving that PFD is an inevitable part of aging and there is little that can be improved by treatment [6, 7]. Patients' medically inaccurate knowledge, beliefs, and prejudices about the incidence, causes, and treatments of PFD and their role in the management stand in the way of effective care and prevention. It also has serious negative impacts on patients' quality of live with social, physical, and psychosocial consequences. Regardless of the reasons behind the patients' preferences, if the symptoms are left untreated, they cause restrictions of social and leisure activities, low self-esteem, depression, lack of employment, and sexual dysfunctions [4].

There are several questionnaires designed to examine different aspects of PFD, such as knowledge or symptoms of PFD, or its impacts on the quality of life. Among the most common questionnaires shown to be valid and reliable for assessing condition-specific symptoms and impact of health-related quality are the Pelvic Floor Distress Inventory-20 and the Pelvic Floor Impact Questionnaire-7, respectively [8]. Assessing knowledge about PFD is also especially important since a lack of knowledge is the major contributing factor for PFD. For this purpose, the 14-item Incontinence Quiz (IQ) was designed by Branch et al. to assess patients' knowledge about UI [9]. However, this quiz does not have specific items to assess knowledge about POP. Therefore, the Prolapse and Incontinence Knowledge Quiz (PIKQ), comprised of 2 sections with 12 items in each, was designed to assess knowledge about the etiology, diagnosis, and treatment of UI and pelvic prolapse [10].

An education plan for increased awareness of PFD, which will lead to prevention strategies, effective treatment, and management, first requires the assessment of the existing information level. The PIKQ is an effective evaluation tool to identify the knowledge gap [10]. Therefore, this study aims to translate the PIKQ and test the validity and reliability of the Turkish version of the PIKQ.

Materials methods

Translation

The PIKQ, which is a self-administered knowledge scale about pelvic floor disorders, was translated into Turkish by two Turkish physiotherapists specialized in PFD and a professional translator in consultation with a Turkish gynecologist. The back translations into English were performed by two other professional translators who were not familiar with the PIKQ. One was a Turkish/English language editor, and the other was a native English speaker who also speaks Turkish. In a meeting held by the entire translation team, the source and backward versions were compared, and the first draft of the Turkish version was produced. A pretest was performed with 31 women presenting to the urogynecology clinics to define the degree of their understanding of the items. Each item was rated on a 5-point Likert scale: "not understandable at all," "not understandable," "a little understandable," "understandable," and "completely understandable." All participants reported that all the items and the format were understandable, there were no ambiguities, and there was no need for a change.

Participants

Patients visiting the general gynecology unit for an annual checkup and those visiting the urogynecology clinics for a follow-up between April 2018 and August 2018 were included in the study. Inclusion criteria were age > 18 years, female gender, ability to read and understand, and being a volunteer to participate in the study. Patients were excluded from the study for being unable to understand or complete the scale or cooperated insufficiently. The study was conducted in accordance with the Helsinki Declaration. This study protocol was approved by the ethics committee of Ankara Yildirim Beyazit University (approval number: 673/23). All participants were informed and gave their consent before participating in the study. Sample size was determined according to the study by Comrey et al., who indicated that a sample size of 300 was sufficient for knowledge tests [11]. The sample size was increased by 10–15% to minimize potential losses during data collection. As a result, the PIKQ was administered to 341 of 365 patients. Twenty-four women who did not consent to participate were excluded from study.

Assessment

Physical and demographic characteristics of the participants, namely age, weight, height, and marital, employment, and educational statuses, were recorded. Participants were asked whether they had complaints of urine leakage or had POP, constipation, chronic cough, or acquaintance with someone with urinary incontinence or POP, with dichotomous "yes" or "no" questions. Smoking status, menstrual status, and obstetric history were also obtained.

As far as we know, the IQ is the only valid and reliable instrument to measure UI knowledge, and there is no valid and reliable scale that measures the POP knowledge in our population. Thus, the IQ and Visual Analog Scale (VAS) were used for 50 participants to assess the level of participants' knowledge about UI and POP for the criterion validity. The Turkish version of the IQ, which was shown by Kara et al. to be a valid and reliable instrument to evaluate the knowledge of UI, consists of 14 statements about UI answered as "true," "false," or "do not know" [9, 12]. Answers were scored as 0 (do not know, incorrect) or 1 (correct). The total score ranged between

0 and 14. Higher scores indicate more knowledge and more positive attitudes toward UI.

The VAS is a psychometric response scale used in questionnaires where participants are asked to specify their response by indicating a position along a continuous line between defined end points [13]. The VAS is commonly used in studies of urogynecologic problems as well [14]. The participants were asked to mark their perceived knowledge level about UI and POP separately on a 10-cm VAS, where 0 indicated "no knowledge" and 10 indicated possession of "a lot of knowledge about it."

The PIKQ is a self-administered knowledge scale consisting of 24 items divided into two subscales: PIKQ-UI and PIKQ-POP. Items presented in a statement format required participants to indicate their level of agreement on a 3-point Likert scale (agree, disagree, do not know). Each scale item is given a score of 1 for "a correct response." "Do not know" and "incorrect" answers or missing responses are given a score of 0. Total UI and POP scale scores are calculated by summing the number of correct responses, which range between 0 and 12, where a higher score indicates a higher level of knowledge about UI and POP [10]. A physical therapist explained the PIKQ to the participants and asked them to complete the Turkish version of the PIKQ. It was re-administered to 59 participants 1 week later to assess the test-retest reliability.

Statistical analyses

The distribution of continuous variables was examined by Shapiro-Wilk test and normality plots. Median (min–max) was reported for all numeric variables. Categorical variables were presented by *n* (%).

Validity

Construct validity

Construct validity of the PIKQ was examined separately for PIKQ-UI and PIKQ-POP by confirmatory factor analysis (CFA) with the diagonally weighted least squares estimator (DWLS). Modification indices (MI) > 5 were checked to improve model fit, and covariance parameters were added to the model considering the concepts (namely diagnosis, etiology, and treatment) to which items were related. Each scale had a final model with one factor. Both standardized and unstandardized factor loadings (SFL and FL) were reported. SFLs were considered based on the rule of thumb (SFL > 0.30). Furthermore, χ^2 and degree of freedom (df), comparative fit index (CFI), Tucker-Lewis index, root mean square error of approximation (RMSEA), and standardized root mean square residual (SRMR) were used as recommended by Kline [15] to assess model fit. χ^2 was considered with other fit indices since it is sensitive to large sample sizes and strong correlations between items. The following criteria for good (or acceptable, at least) fit were used: CFI ≥ 0.95, TLI ≥ 0.95, WRMR ≤ 1.00, RMSEA < 0.06 or < 0.08 at most [16], SRMR < 0.08, and χ^2/df < 3 [17]. The consistency of the fit indices was investigated by nonparametric bootstrap with 1000 replications, and 95% confidence intervals (CI) of bootstrap results were given.

Criterion validity

Criterion validity was evaluated by the Spearman correlation coefficients between the total scale scores of the PIKQ-UI and PIKQ-POP and perceived knowledge scores for UI-POP measured by the VAS, respectively, and between the total scale score of the PIKQ-UI and IQ scores.

Known-group validity

Mann-Whitney U test was administered to compare the total scale scores of the PIKQ-UI and PIKQ-POP across some participant characteristics related to UI and POP.

Reliability

Internal consistency reliability of the PIKQ-UI and PIKQ-POP was assessed by the KR-20 coefficient. Test-retest reliability was established by comparing the scale scores using the Wilcoxon test, and the agreement between test-retest scores was investigated by the interclass correlation coefficient (ICC) based on a single-measurement, absolute-agreement, two-way mixed-effects model.

$p < 0.05$ was regarded as statistically significant. IBM SPSS Statistics 21.0 (IBM Corp., released 2012; IBM SPSS Statistics for Windows, version 21.0; Armonk, NY: IBM Corp.) was used for descriptive statistics and reliability analyses. CFA and bootstrapping were performed in RStudio 1.1.456 with the "lavaan" package, while path diagrams were drawn with the "semPlot" package.

Results

Physical and demographic characteristics of the participants are shown in Table 1. The median age and BMI (body mass index) of the participants were 42 years (min–max: 19–80 years) and 27.34 kg/m^2 (min–max: 16.94–46.88 kg/m^2), respectively. Of the participants, 23.5% ($n = 80$) were employed in the medical field. It was found that 127 participants (37.2%) had UI, while 44 participants (12.9%) had POP. All of the participants completed PIKQ-UI and PIKQ-POP.

The final models were obtained on the fourth step after examining MIs. The fit indices of the PIKQ-UI and PIKQ-POP to the final one-factor model with covariance parameters

Table 1 Physical and demographic characteristic of participants

Characteristics	Participants ($n = 341$)
Age [year, median (min–max)]	42 (19–80)
Height [cm, median (min–max)]	160 (145–180)
Weight [kg, median (min–max)]	70 (45–127)
BMI [kg/m^{2,} median (min–max)]	27.34 (16.94–46.88)
Education [year, median (min–max)]	8 (1–15)
Employed in a medical field [*n* (%)]	80 (23.5)
Ever had UI [*n* (%)]	127 (37.2)
Ever had POP [*n* (%)]	44 (12.9)
Acquaintance with UI [*n* (%)]	194 (56.9)
Acquaintance with POP [*n* (%)]	103 (30.2)

BMI Body mass index, *UI* urinary incontinence, *POP* pelvic organ prolapse

are given Table 2. All fit indices except SRMR indicated acceptable fit for the final models of both scales. Although bootstrap confidence intervals did not include the model values for some fit indices, they were within the acceptable threshold (Table 2).

The standardized factor loadings (SFLs) for POP items were at least 0.460, while all UI items except i2 and i11 had SFL > 0.30. While all covariance parameters of the model for UI were positive, one of the covariance parameters was negative in POP (Table 3, Fig. 1). In addition, the mean scores for items and scales are in Table 5 of the Appendix. The maximum mean score was of items 2, 5, and 12 in the PIKQ-UI and items 2 and 6 in the PIKQ-POP.

In 50 participants, the median scores of the VAS for the UI, PIKQ-UI, and IQ were 2.5 (min–max: 0–10), 9 (min–max: 2–12), and 8 (min–max: 2–11), respectively. The median score was 0.5 (min–max: 0–10) for the VAS for the POP and 8 (min–max: 0–11) for the PIKQ-POP as well. There were positive and weak linear correlations between the PIKQ-UI and PIKQ-POP scores and their corresponding perceived knowledge scores (rho = 0.351, $p = 0.013$ for the UI and rho = 0.345, $p = 0.014$ for the POP). The PIKQ-UI was positively and moderately correlated with the IQ (rho = 0.679, $p < 0.001$).

The median PKQ-UI and PIKQ-POP scores were 10.5 (min–max: 3–12) and 9 (min–max: 0–12) for medical staff and 8 (min–max: 1–12) and 7 (min–max: 0–12) for other participants, respectively. Both scores of medical staff were significantly higher than those of the other participants (for both comparison, $p < 0.001$).

When the participants with UI history or who had an acquaintance with UI were compared with those without UI history or who had no acquaintance with UI, there was no significant difference between the PIKQ-UI and PIKQ-POP scores ($p = 0.852$ and $p = 0.185$, respectively, Table 4). The same results were obtained for the comparison of the participants with POP history or who had any acquaintance with POP with those without POP history or who had no acquaintance with POP ($p > 0.05$).

KR-20 was determined as 0.678 for the PIKQ-UI scale and 0.756 for the PIKQ-POP scale. ICC was 0.914 (95% CI: 0.858–0.948; $p < 0.001$) for the PIKQ-UI and 0.904 (95% CI: 0.839–0.943; $p < 0.001$) for the PIKQ-POP. The median PIKQ-UI score was 10 (min-max:3–12) for both test and retest. The median score of PIKQ-POP was 7 (min–max:1–12) for test and 7 (min–max:2–12) for retest. Test and retest scores of the PIKQ-UI were similar ($Z = 1.891$, $p = 0.059$), while the retest score of the PIKQ-POP was significantly higher than the test score ($Z = 2.610$, $p = 0.009$).

Discussion

Assessment of knowledge through a questionnaire, quiz, or scale requires a translation process for them to be used in any target group speaking a language different from the original

Table 2 Model fit statistics

Fit statistics	PIKQ-UI		PIKQ-POP	
	Final model	95% CI of bootstrap	Final model	95% CI of bootstrap
χ^2	59.120	65.931–143.006	64.260	73.765–142.366
df	51	–	52	–
p	0.203	–	0.118	–
χ^2/df	1.159	1.293–2.804	1.236	1.419–2.738
CFI	0.989	0.879–0.983	0.990	0.926–0.987
TLI	0.986	0.843–0.978	0.988	0.906–0.984
RMSEA	0.022	0.029–0.073	0.026	0.035–0.071
SRMR	0.081	0.085–0.126	0.085	0.088–0.125

PIKQ-UI Prolapse and Incontinence Knowledge Quiz-Urinary Incontinence, *PIKQ-POP* Prolapse and Incontinence Knowledge Quiz-Pelvic Organ Prolapse, *CI* confidence interval, *df* degree of freedom, *CFI* comparative fit index, *TLI* Tucker-Lewis index, *RMSEA* root mean square error of approximation, *SRMR* standardized root mean square residual

Table 3 CFA results of PIKQ-UI and PIKQ-POP

Items	PIKQ-UI		PIKQ-POP	
	FL ± SE	SFL ± SE	FL ± SE	SFL ± SE
1	1.000	0.352 ± 0.077	1.000	0.658 ± 0.054
2	0.570 ± 0.256	0.201 ± 0.087	0.934 ± 0.133	0.614 ± 0.072
3	2.137 ± 0.490	0.753 ± 0.055	0.752 ± 0.106	0.494 ± 0.062
4	1.570 ± 0.385	0.553 ± 0.067	0.988 ± 0.108	0.650 ± 0.054
5	1.272 ± 0.353	0.448 ± 0.083	0.895 ± 0.112	0.588 ± 0.057
6	1.513 ± 0.364	0.533 ± 0.069	1.069 ± 0.143	0.703 ± 0.085
7	0.870 ± 0.285	0.306 ± 0.078	1.069 ± 0.118	0.703 ± 0.054
8	1.909 ± 0.431	0.673 ± 0.061	0.807 ± 0.118	0.531 ± 0.065
9	1.463 ± 0.378	0.515 ± 0.069	1.211 ± 0.112	0.796 ± 0.045
10	1.926 ± 0.465	0.678 ± 0.059	0.788 ± 0.121	0.518 ± 0.067
11	0.698 ± 0.278	0.246 ± 0.087	0.792 ± 0.118	0.521 ± 0.067
12	1.904 ± 0.470	0.671 ± 0.073	0.795 ± 0.110	0.523 ± 0.061
Covariance				
i5-i11	0.295 ± 0.088		i8–i12	0.205 ± 0.076
i2-i11	0.296 ± 0.099		i1–i3	−0.226 ± 0.077
i4-i9	0.195 ± 0.078			

PIKQ-UI Prolapse and Incontinence Knowledge Quiz-Urinary Incontinence, *PIKQ-POP* Prolapse and Incontinence Knowledge Quiz-Pelvic Organ Prolapse, *CFA* confirmatory factor analysis, *FL* factor loading, *SFL* standardized factor loading, *SE* standard error, *i* item

language of the assessment tool. Psychometric properties of the translated version should also be assessed to ensure the validity and reliability. While the PIKQ is widely used in different countries [18–20], to our knowledge, this is the first adaptation study to translate and test the validity and reliability of the PIKQ. The findings of this study showed that the Turkish version of the PIKQ is a valid and reliable instrument to be used to assess knowledge about UI and POP in the Turkish population.

The study was performed with 341 participants. A sample size of around 300 with 5 to 10 subjects per item was considered as adequate [21]. In the same paper, another set of guidelines attributed to Comrey was cited, which classifies a sample of 100 as poor, 200 as fair, 300 as good, 500 as very good, and 1000 as excellent [22]. It was also stated that a sample size of 200 is adequate in most cases of ordinary factor analysis involving no more than 40 items [23]. Although the relationship of the sample size with the validity of factor analytic solutions is more complex than these rules of thumb indicate, they will probably serve investigators well in most circumstances.

In methodologic studies, the CFA or other methods based on the Item Response Theory are used to examine the internal construct validity of the scales [24]. In this study, the unidimensional structures of the scales were assessed by CFA. All fit indices except SRMR (slightly higher) were within an acceptable threshold indicating that the internal construct validity was ensured. Since the internal validity was not examined in the original study and also no translation study of the scale was available, we could not compare our findings with the original study of the questionnaire [10]. However, similar to

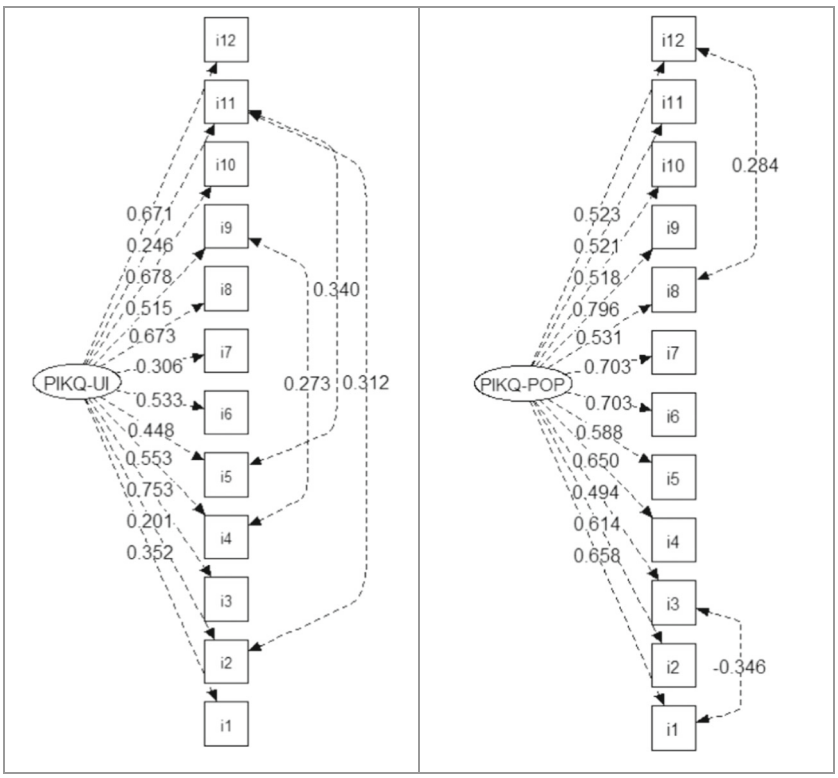

Fig. 1 Path diagrams of final models for the PIKQ-UI and PIKQ-POP scales

Table 4 Comparisons of PIKQ-UI and PIKQ-POP scores across some characteristics

Characteristics	*n*	PIKQ-UI Median (min–max)	PIKQ-POP Median (min–max)
Ever had UI or acquaintance with UI			
Yes	234	9 (1–12)	7 (0–12)
No	107	9 (1–12)	8 (0–12)
Z; p		0.060; 0.852	1.324; 0.185
Ever had POP or acquaintance with POP			
Yes	128	9 (2–12)	8 (0–12)
No	213	9 (1–12)	7 (0–12)
Z; p		1.773; 0.076	1.530; 0.126

PIKQ-UI Prolapse and Incontinence Knowledge Quiz-Urinary Incontinence, *PIKQ-POP* Prolapse and Incontinence Knowledge Quiz-Pelvic Organ Prolapse

the original study, the Turkish version of the scale showed that the factor loading of item 11 was < 0.30. A low item-factor loading for item 2 was also found in our study. To maintain the originality of the questionnaire, no changes were made regarding the factors.

According to analysis of item and total scores of the PIKQ-UI and PIKQ-POP, participants' knowledge about UI or POP differed regarding pathogenesis, diagnosis, and treatment. They had particularly lower knowledge scores regarding diagnosis (item 10) and some types of treatment (item 11) of POP. A wide spectrum of treatment approaches of POP includes lifestyle interventions, pelvic floor muscle training, pessaries, or surgery [25]. In our country, the longtime interval from the onset of symptoms to the first doctor visit is likely to contribute to delayed diagnosis of POP where surgery is often required instead of conservative approaches. Therefore, surgery may be more familiar to the participants than pessaries. In addition, blood tests have usually been used to diagnose a wide variety of conditions in clinics; however, patients might have assumed that blood samples were taken to diagnose POP. This might be an explanation of the lower knowledge scores of item 10. These findings might be especially important since the lack of knowledge about POP and its treatment can be a major hindrance against good management.

In this study, criterion validity was determined by the correlation of the IQ and perceived knowledge scores with the PIKQ. A significant moderate relationship between the IQ and the PIKQ-UI was observed. The level of the correlations was lower but significant for the perceived knowledge scores of UI and POP. Therefore, instead of counting on participant perceptions of their own knowledge, the knowledge tests might be a better option to assess knowledge objectively. The known group validity analysis also did not show significant differences indicating that participants did not have enough knowledge about UI and/or POP even though they had the condition and were acquainted with UI or POP. Several studies showed that patients with UI or POP reported embarrassment regarding their condition, feelings of humiliation, feeling somehow unnatural or less like a women, which subsequently led to shame and silence about the condition [6, 26]. In addition, misconceptions and prejudices, such as UI is the natural process of aging, have been proposed as barriers to effective treatment [27]. The above-mentioned attitudes toward UI or POP might be an explanation for participants with UI-POP history or any acquaintance with it having limited knowledge. Furthermore, it was found in our study that the medical staff had more knowledge according to both the PUKI-UI and PUKI-POP scores compared with the participants employed in a medical field with the participants employed in other fields. Both the education and the experiences they encounter in their working life may be the reason for this difference in their level of knowledge.

In the reliability analysis, internal consistency, intercorrelations among the items of a questionnaire, was measured using the KR-20 coefficient instead of Cronbach's alpha coefficients. Although the interpretation of these coefficients is the same, the KR-20 analysis is recommended to assess the internal consistency reliability of a knowledge instrument with a dichotomous response pattern. It has been reported that values < 0.5 are indicative of low reliability, those between 0.5 and 0.8 indicate moderate reliability, and values > 0.80 indicate high reliability [28]. The internal consistency of this study was moderate (reliability coefficient = 0.67–0.75), which was lower than that of the original study (coefficient: 0.82–89).

Moreover, the reliability of the PIKQ was also measured using test-retest reliability (extent to which the questionnaire produces the same results in different temporal conditions). The time interval between test-retest measurements is especially important since participants' knowledge should remain stable [29]. Therefore, we repeated the test within 7 days. Although the comparison of test-retest scores of PIKQ-UI was similar in our study, significantly higher retest scores of PIKQ-POP were obtained. Test-retest analysis of the instruments to assess knowledge carries the risk of the participants' "becoming familiar with the context." In addition, their awareness might be raised, or the statements might generate interest to learn further. Thus, the test-retest analysis is not considered the standard method for an instrument developed to assess knowledge. Test-retest reliability was also assessed through ICC coefficients. An ICC < 0.5 is indicative of poor reliability, those between 0.5 to 0.9 indicate moderate-to-good reliability, and values > 0.90 indicate excellent reliability [30]. In our study, the ICC values were excellent for the PIKQ-UI and PIKQ-POP at 0.90 and 0.91, respectively. The ICC values of the PIKQ-POP in our study were consistent with the original study of the questionnaire (10) showing an ICC of 0.94. However, the internal consistency of the Turkish version of the PIKQ-UI was higher than that of the original study,

showing an ICC of 0.67. Studying the reliability and validity of this instrument in other countries and potentially in other languages was recommended by the authors of the original study [10]. Hence, this study was conducted to fill the gap in the relevant literature.

Our study had some limitations. There was the Turkish version of the IQ evaluating the knowledge level about UI for criterion validity of the PIKQ-UI; however, there was no questionnaire in Turkish evaluating the knowledge level about POP for criterion validity of the PIKQ-POP. Therefore, participants' knowledge level about UI and POP separately was assessed with the VAS, commonly used in studies of urogynecologic problems [14].

In conclusion, the Turkish version of the PIKQ is a valid and reliable instrument to assess knowledge about UI and POP. After identifying the level of knowledge, education to increase awareness and knowledge can be planned to change attitudes, social norms, and behaviors related to UI and POP. We think that the patients with increased knowledge will be more likely to seek care and treatment at an earlier stage in clinics.

Compliance with ethical standards

Conflicts of interest None.

Appendix

Model development

Construct validity of the PIKQ-UI was first investigated with a model where all items were loaded to one latent trait called UI. The χ^2 and SRMR values of the first model were beyond the acceptable fit values. After examining MI, the covariance parameter between items 5 and 11, which had the highest MI, was added to improve model fit, since both items were related to the etiology of UI. Then, covariance parameters between items 2 and 11 and items 4 and 9 were added to the model step by step. While the former parameter had the highest MI, the latter had the third highest MI, coming after the MIs of covariance parameters between items 4 and 12 and items 5 and 12. There were three parameters whose MIs were > 5 for the fourth model. However, these parameters were between items 4 and 12, items 5 and 12, and items 3 and 4, which were related to different concepts of the scale. Thus, the fourth model was taken as the final model. Model fit indices are given Table 2.

CFA analysis was performed for the PIKQ-POP in the same manner as the PIKQ-UI. Two covariance parameters were added separately to the initial model. The MI of the covariance between items 2 and 10 exceeded 5 in the last model. Since these items were related to different concepts, the procedure was terminated.

Table 5 Item and total scores for PIKQ-UI and PIKQ-POP

(n = 341) Items	PIKQ-UI Mean ± SD	PIKQ-POP Mean ± SD
1	0.70 ± 0.46	0.63 ± 0.48
2	0.83 ± 0.38	0.79 ± 0.41
3	0.61 ± 0.49	0.56 ± 0.50
4	0.61 ± 0.49	0.66 ± 0.47
5	0.80 ± 0.40	0.60 ± 0.49
6	0.71 ± 0.46	0.89 ± 0.31
7	0.56 ± 0.50	0.71 ± 0.45
8	0.72 ± 0.45	0.67 ± 0.47
9	0.67 ± 0.47	0.71 ± 0.45
10	0.59 ± 0.49	0.25 ± 0.43
11	0.78 ± 0.42	0.18 ± 0.38
12	0.85 ± 0.35	0.50 ± 0.50
Total	8.44 ± 2.52	7.16 ± 2.81

PIKQ-UI Prolapse and Incontinence Knowledge Quiz-Urinary Incontinence, *PIKQ-POP* Prolapse and Incontinence Knowledge Quiz-Pelvic Organ Prolapse, *SD* standard deviation

Mean item scores

Table 5 shows the mean scores for items and scales. The maximum mean score was for items 2, 5, and 12 in the PIKQ-UI and items 2 and 6 in the PIKQ-POP.

References

1. Raizada V, Mittal RK. Pelvic floor anatomy and applied physiology. Gastroenterol Clin N Am. 2008;37(3):493–vii.
2. Hodges PW, Sapsford R, Pengel LH. Postural and respiratory functions of the pelvic floor muscles. Neurourol Urodyn. 2007;26(3):362–71.
3. Wu JM, Vaughan CP, Goode PS, Redden DT, Burgio KL, Richter HE, et al. Prevalence and trends of symptomatic pelvic floor disorders in US women. Obstet Gynecol. 2014;123(1):141–8.
4. Davis K, Kumar D. Pelvic floor dysfunction: a conceptual framework for collaborative patient-centred care. J Adv Nurs. 2003;43(6):555–68.
5. Jundt K, Peschers U, Kentenich H. The investigation and treatment of female pelvic floor dysfunction. Dtsch Arztebl Int. 2015;112(33–34):564–74.
6. Shaw C, Tansey R, Jackson C, Hyde C, Allan R. Barriers to help seeking in people with urinary symptoms. J Fam Pract. 2001;18(1):48–52.
7. Mitteness LS. Knowledge and beliefs about urinary incontinence in adulthood and old age. J Am Geriatr Soc. 1990;38(3):374–8.
8. Barber MD, Walters MD, Bump RC. Short forms of two condition-specific quality-of-life questionnaires for women with pelvic floor disorders (PFDI-20 and PFIQ-7). Am J Obstet Gynecol. 2005;193(1):103–13.
9. Branch LG, Walker LA, Wetle TT, DuBeau CE, Resnick NM. Urinary incontinence knowledge among community-dwelling

people 65 years of age and older. J Am Geriatr Soc. 1994;42(12):1257–62.
10. Shah AD, Massagli MP, Kohli N, Rajan SS, Braaten KP, Hoyte L. A reliable, valid instrument to assess patient knowledge about urinary incontinence and pelvic organ prolapse. Int Urogynecol J Pelvic Floor Dysfunct. 2008;19(9):1283–9.
11. Comrey AL, Backer TE, Glaser EMA. Sourcebook for mental health measures. Oxford. Oxford: Human Interaction Research Institue; 1973.
12. Kara KC, Citak Karakaya I, Tunali N, Karakaya MG. Reliability and validity of the incontinence quiz-Turkish version. J Obstet Gynaecol. 2018;44(1):144–50.
13. Altman DG. Practical statistics for medical research. London: Chapman and Hall, CRC press; 1990.
14. Lukacz ES, Lawrence JM, Burchette RJ, Luber KM, Nager CW, Buckwalter JG. The use of visual analog scale in urogynecologic research: a psychometric evaluation. Am J Obstet Gynecol. 2004;191(1):165–70.
15. Kline RB. Principles and practice of structural equation modeling. New York: Guilford Press; 2015.
16. Lt H, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. Struct Equ Model. 1999;6(1):1–55.
17. Marsh HW, Hocevar D. Application of confirmatory factor analysis to the study of self-concept: first-and higher order factor models and their invariance across groups. Psychol Bull. 1985;97(3):562.
18. Berzuk K, Shay B. Effect of increasing awareness of pelvic floor muscle function on pelvic floor dysfunction: a randomized controlled trial. Int Urogynecol J. 2015;26(6):837–44.
19. Liebergall-Wischnitzer M, Cnaan T, Hochner H, Paltiel O. Self-reported prevalence of and knowledge about urinary incontinence among community-dwelling Israeli women of child-bearing age. J Wound Ostomy Continence Nurs. 2015;42(4):401–6.
20. Richter LA, Gutman RE, Tefera E, Estep A, Iglesia CB. Knowledge of erectile dysfunction and pelvic floor disorders among young adults: a cross-sectional study. Can J Urol. 2015;22(2):7715–9.
21. Tinsley HE, Tinsley DJ. Uses of factor analysis in counseling psychology research. J Couns Psychol. 1987;34(4):414.
22. Comrey AL, Lee HB. A first course in factor analysis. Abingdon: Psychology Press; 2013.
23. Comrey AL. Factor-analytic methods of scale development in personality and clinical psychology. J Consult Clin Psychol. 1988;56(5):754–61.
24. Brown TA. Confirmatory factor analysis for applied research. New York: Guilford Press; 2015.
25. Dunivan GC, Anger JT, Alas A, Wieslander C, Sevilla C, Chu S, et al. Pelvic organ prolapse: a disease of silence and shame. Female Pelvic Med Reconstr Surg. 2014;20(6):322–7.
26. Chutka DS, Fleming KC, Evans MP, Evans JM, Andrews KL. Urinary incontinence in the elderly population. Mayo Clin Proc. 1996;71(1):93–101.
27. Abrams P, Andersson KE, Birder L, Brubaker L, Cardozo L, Chapple C, et al. Fourth international consultation on incontinence recommendations of the international scientific committee: evaluation and treatment of urinary incontinence, pelvic organ prolapse, and fecal incontinence. Neurourol Urodyn. 2010;29(1):213–40.
28. Salvucci S, Walter E, Conley V, Fink S, Saba M. Measurement error studies at the National Center for education statistics. Washington, DC: U.S. Department of Education, National Center for Education Statistics; 1997.
29. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics. 1977;33(1):159–74.
30. Koo TK, Li MY. A guideline of selecting and reporting Intraclass correlation coefficients for reliability research. J Chiropr Med. 2016;15(2):155–63.