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Original Research

Translation, cross-cultural adaptation, and measurement properties of the prolapse and incontinence knowledge quiz (PIKQ-Br) for Brazilian women with urinary incontinence

Carla Coutinho da Silva [a], Rodrigo Cappato de Araújo [b], Danielly Alves Amorim [b], Ana Eliza Rios de Araújo Mathias [c], Ana Carolina Rodarti Pitangui [b,*]

[a] Postgraduate Program of Nursing, Universidade de Pernambuco – UPE/UEPB, Recife, Pernambuco, Brazil
[b] Postgraduate Program of Rehabilitation and Functional Performance, Universidade de Pernambuco (UPE), Petrolina, Pernambuco, Brazil
[c] Department of Physical Therapy, Universidade de Pernambuco – UPE, Petrolina, Pernambuco, Brazil

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ABSTRACT

Background: The Prolapse and Incontinence Knowledge Quiz (PIKQ) was developed to assess women's knowledge of pelvic organ prolapse (POP) and urinary incontinence (UI).
Objective: To perform the translation, cross-cultural adaptation, and measurement properties of the PIKQ for Brazilian women with UI (PIKQ-Br).
Methods: The measurement properties were tested for validity (content and face, structural, and hypotheses testing) and reliability (internal consistency, test-retest, and measurement error) in 130 women with UI from Recife, Brazil. Hypotheses testing for construct validity was assessed by Spearman's correlation coefficients. The standard error of measurement and the smallest detectable change were used to determine the measurement error. The structural validity was examined using a confirmatory factor analysis. Test-retest reliability and internal consistency were determined using the intraclass correlation coefficient (ICC) and Cronbach's alpha.
Results: The structural validity was analyzed with a single factor and 12 questions, revealing the goodness-of-fit was inappropriate (TLI=0.60; RMSEA=0.07). The two factors and 10-question version presented adequate values and factor loading (>0.30), except questions 1, 7, and 8 in PIKQ-POP. Positive and moderate correlations for hypotheses testing were observed for PIKQ-UI-10 (rho=0.439). Positive and weak correlations were observed for PIKQ-POP-10 (rho=0.278). Cronbach's alpha coefficients for PIKQ-UI-10 were 0.718 and 0.710 for PIKQ-POP-10. Both scales showed excellent reliability (ICC>0.93). The PIKQ-UI-10 and PIKQ-POP-10 had SEM values of 0.24 and 0.31 and SDC of 0.66 and 0.85, respectively.
Conclusions: The PIKQ-Br with 10 questions and two-factor presented adequate measurement properties, and can be a useful instrument to assess women's knowledge about UI and POP.

Introduction

Urinary Incontinence (UI) is defined as the involuntary loss of urine.[1] It is experienced by one-quarter of women.[2] Its prevalence differs for various reasons, such as differences in study populations, definitions, and measurements.[3] The sense of shame regarding the condition has impaired women's lives.[4] Uro-genital prolapse is the symptomatic descent of one or more of the anterior vaginal walls.[5] Although it affects all ages, it is more common in older women, and the prevalence increases with age, reaching a peak of 5% between 60 and 69 years old.[6] The elderly have a higher likelihood of pelvic floor dysfunction (PFD) compared to other age groups. Factors such as being female, being over 60 years old, and anxiety symptoms are recognized as risk factors for experiencing at least one type of PFD.[7] Awareness campaigns have been disseminated to reduce negative beliefs about UI and pelvic organ prolapse (POP) through media and health information meetings. Despite

Abbreviated title:Portuguese translation of the PIKQ-Br.

* Corresponding author: Department Postgraduate Program of Rehabilitation and Functional Performance - PPGRDF. Institution, University of Pernambuco – UPE, Brazil.
E-mail addresses: carllacoutinho@gmail.com (C.C. da Silva), rodrigo.cappato@upe.br (R.C. de Araújo), danielly.alvesamorim@upe.br (D.A. Amorim), eliza.mathias@upe.br (A.E.R.A. Mathias), carolina.pitangui@upe.br (A.C.R. Pitangui).

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this, many women continue to not seek professional help because they do not consider their condition severe enough. They often have inappropriate beliefs because they believe these conditions are inherent to aging[8] or because of a lack of knowledge about PFD.[8,9] Improved knowledge could lead to changes in women's health-seeking experiences and increase the number of patients who benefit from treatment. An education plan to raise awareness about PFD, which can direct strategies for prevention, treatment effectiveness, and management, first requires assessing the level of existing knowledge.[10]

The Prolapse and Incontinence Knowledge Quiz (PIKQ) assesses women's knowledge about UI and POP with statements about epidemiology, pathogenesis, diagnosis, and treatment.[11] The instruments available in the literature are not validated and published for Portuguese-Brazil. Many studies have used their own tools to evaluate knowledge.[12-14] However, the PIKQ is an effective tool to identify the knowledge gap about POP and UI[11] because it was developed specifically to assess this aspect and has been used in other studies.[10,11] It is essential that the translated instruments are correctly adapted to the social and cultural characteristics of the population assessed.[15] Considering the importance of making the PIKQ available in Brazilian Portuguese, this study perform the translation, cross-cultural adaptation, and measurement properties of the PIKQ-Br for Brazilian women with UI.

Methods

Study design and sample

A cross-sectional study with repeated measures assessment, which started with the transcultural translation and adaptation of the PIKQ to the Portuguese language according to Beaton et al.,[16] and proceeded with the validation. This study collected data from December 2020 to December 2021 with 130 women. All volunteers who had scheduled a medical appointment at the public climacteric outpatient clinic in the city of Recife, Pernambuco, Brazil, and who attended on the data collection days were included. Women with a medical diagnosis of UI, aged over 31 years, were included. Volunteers who did not understand or speak Portuguese were excluded.

Study tool

The PIKQ is a reliable and validated instrument that examines knowledge about UI and POP in general gynecology and urogynecology women's patients. It is composed of two scales with 12 questions each. The item receives a score of one if answered correctly and zero if answered incorrectly or as "I don't know." The average score is calculated for each scale individually through the sum of the correct answers. The scores range from 0 to 12, and higher scores indicate better knowledge.[11]

The patients for the PIKQ study[11] were recruited from the gynecology and urogynecology clinics. Both scales had excellent internal consistency (Cronbach's alpha > 0.8). Mean test scores were slightly higher upon retest (UI, 0.46; POP, 0.33). The Pearson's correlation between initial and repeat scores was high for UI (0.67) and POP (0.94).

Cross-cultural adaptation of PIKQ-UI and PIKQ-POP to Brazilian-Portuguese

The translation and cross-cultural adaptation followed five stages: 1. initial translation into Portuguese, 2. synthesis of translations, 3. back-translation, 4. the Committee of Experts, and 5. testing of the pre-final version of the questionnaire.[17-19]

The English version was submitted to the initial translation into Brazilian-Portuguese by four translators (T): one of whom was a layperson on the subject (T4) and three experts on the topic (T1; T2; T3). The translators were invited to fill in the "additional comments" when uncertainties arised. An impartial person was added to mediate discussions. A synthesis was produced from working with the original quiz and the versions of all translators (T1, T2, T3, and T4), resulting in a single document (T-1234).

The T-1234 version was translated back into the original language. This is a validity process to ensure that the translated version accurately reflects the item content of the original version.[17] The back-translations were produced by two bilingual people with English as their native language. To avoid bias, the translators were not informed of the concepts and did not have access to the original version.

The expert committee included translators, healthcare professionals, and experts in women's health. They reviewed all translations, discussed possible differences, and developed the final version.

The translators were asked to achieve equivalence of the source (English) and target (Portuguese) words and phrases, taking into account four areas: 1. Semantic equivalence (i.e., does the words mean the same thing?); 2. Idiomatic equivalence: colloquialisms are difficult to translate. The committee was asked to formulate an equivalent expression in the target version; 3. Experiential equivalence: the items seek to experience everyday life; however, often in a different culture, a certain attitude may not be experienced. The questionnaire item would have to be replaced with a similar item that is experienced in the target culture; and 4. Conceptual equivalence: words often have different conceptual meanings between cultures. The committee must examine the source and back-translated questionnaires for all such equivalences.[17]

The pre-test is the final stage of the process and uses the pre-final version with between 30 and 40 people.[17] In our pre-test, 43 women aged over 31 years, with UI, answered the last version of the quiz, and expressed their impressions about answers, instructions, and layout. The interviewer had to be aware of many identical responses to different items, which may lead to exclusion from the sample. This stage has aspects of content and face validation.[16]

Measurement properties

We followed the COnsensus-based Standards for the selection of health status Measurement Instrument's (COSMIN) to assess the validity (content and face, structural, and hypothesis testing) and reliability (internal consistency, test-retest, and measurement error) of the PIKQ.[17]

A sample of 130 women was used to verify the internal consistency.[19-21] There was a random selection among patients with a stable UI condition to select 30 participants to complete the instrument again 7–14 days after to verify the reliability. This period was used to avoid recalling the previous answers rather than giving an independent response, in scales with few items.[22]

Data analysis

Statistical analyzes were performed by JAMOVI version 2.2.5 and SPSS AMOS version 26, with a significance level of 5 %. The absolute and relative frequencies of the missing values were evaluated for content validity analysis.

Structural validity

The factorability of the data was initially investigated using an exploratory factor analysis (EFA) procedure. Assuming the eventual interdependence of factors, we adopted the oblique rotation method (direct oblimin) to test the proposed original model with a single factor and other models with more factors obtained through the parallel analysis technique.[23] In EFA, the following indicators were obtained and analyzed: Kaise-Mweyer Olkin (KMO > 0.60), Bartlett's sphericity test ($p < 0.05$), the percentage of explained variance, and the factor loading of each item (> 0.30).[24]

Then, verifying the violation of multivariate normality, the CFA was performed using the bootstrap maximum likelihood method (ML) with 2000 resamples.[23] The quality of the fit of the factor structure was assessed using some criteria: the Tucker-Lewis Index (TLI ≥ 0.90),

Comparative Fit Index (CFI $\geq$ 0.90), root mean square error of approximation (RMSEA $\leq$ 0.06), Standardized root mean square residuals (SRMSR $\leq$ 0.08), and Consistent Akaike Information Criterion (CAIC).[23,25,26]

Hypotheses testing for construct validity

Hypotheses testing for construct validity was assessed using Spearman's correlation coefficients between PIKQ scores and knowledge measured by 11-point Numerical Rating Scale (NRS). In the hypotheses testing moderate correlations for construct validity were hypothesized between the PIKQ and the NRS. The NRS provides a simple and efficient measurement.[27] Numerical ordinal scales are considered easy to apply as humans have been in contact with numbers since childhood.[28] The NRS had the extremes "no knowledge" and "maximum of knowledge." The question used was "Mark the number that corresponds to how much you perceive your level of knowledge about Urinary Incontinence and Pelvic Organ Prolapses".

Internal consistency, reliability, and measurement error

The internal consistency analysis was performed through the Cronbach's alpha coefficient method, which was considered very low ($\alpha \leq 0.30$), low (α 0.30 $\leq$ 0.60), moderate (α 0.60 $\leq$ 0.75), high (α 0.75 $\leq$ 0.90), and very high ($\alpha > 0.90$).[29]

Test-retest reliability was analyzed using an intraclass correlation coefficient ($ICC_{3,1}$) with a two-way mixed model and absolute concordance, presenting a 95 % confidence interval (CI). ICC values above 0.75 were considered excellent, between 0.40 and 0.74, moderate, and below 0.40, poor.[30]

The standard error of measurement (SEM agreement) was calculated to estimate the variance of each score and the smallest detectable change (SDC agreement) was evaluated to determine the threshold value for the measurement error. Both were calculated using the equations: $SEM_{95\%} = SD \cdot \sqrt{(1 - CCI_{test-retest})}$, for which the SD is the standard deviation of the mean of the first evaluation (test). $SDC = 1.96 \cdot SEM_{95\%} \cdot \sqrt{2}$, for which constant 1.96 represents the Z score associated with the confidence level of 95 %.[31]

Ethical aspects

Permission to translate the PIQK was obtained through email with the authors. This study is based on the Resolution of the National Health Council and was approved by the Ethics and Research Committee of the Universidade de Pernambuco, CAAE: 39,871,920.4.0000.5195. All participants signed an informed consent form.

Results

Participants

The sample consisted of 130 women with a median age of 56 years (range from 31 to 83) and complaints of UI. Table 1 shows the profile and clinical characteristics of the sample.

Content and face validity

A total of 43 participants, with a median age of 63 years (31–83) (Table 1), were interviewed. All participants reported that the format of the questions of the PIKQ 12 item-version was adequate. There were no suggestions for changes. No missing items were observed. But, four women (9.1 %) reported having difficulty understanding question 4 on the PIKQ-UI, while five women (11.6 %) reported having difficulty understanding question 7 on the PIKQ-POP. None of the questions presented a misunderstanding rate greater than 20 %.

Table 1
Sociodemographic profile and clinical characteristics of the participants.

Variables	*n* = 130	%	*n* = 43	%
Race				
White	47	36.2	14	32.6
Brown	54	41.5	19	44.2
Black	26	20.0	9	20.9
Native	3	2.3	1	2.3
Marital Status				
Single	20	15.4	2	4.7
Married	41	31.5	13	30.2
Stable Union	29	22.3	9	20.9
Divorced	18	13.8	6	14.0
Widow	22	16.9	13	30.2
Schooling				
Incomplete elementary school	37	28.5	10	23.6
Complete elementary school	29	22.3	9	20.9
Incomplete high school	28	21.5	11	25.6
Complete high school	29	22.3	12	27.9
Complete Undergraduate	7	5.4	1	2.3
Income				
< 1 minimum wage	50	38.5	10	23.3
1 to 2 minimum wages	72	55.4	32	74.4
≥ 2 minimum wages	8	6.1	1	2.3
Time of urinary incontinence complaint				
< 1year	52	40.0	14	32.6
>1 year	78	60.0	29	67.4
Participation in the educational activity of the PFM				
Yes	1	0.8	6	14.0
No	129	99.2	37	86.0

Minimum wage, $252.82; PFM, pelvic floor muscle.

Structural validity

The EFA results demonstrated that the PIKQ-UI with 12 questions and one factor presented a cumulative explained variance of 17.90 %, with a KMO index of 0.60 and Bartlett's index ($p < 0.001$). However, only four questions had adequate factorial loading (> 0.30), and two questions had negative loadings (Table 2), evidencing the inadequate factorability of the single-factor model.

The PIKQ-UI was tested with two factors and 10 questions (questions

Table 2
Results of the exploratory factor analysis and factor load for the one-factor and two-factor models of the PIKQ-UI and PIKQ-POP.

Questions	PIKQ-UI 12 1 Factor Factorial load	PIKQ-UI 10 2 Factors Factorial load		PIKQ-POP 12 1 Factor Factorial load	PIKQ-POP 10 2 Factors Factorial load	
	Factor 1	Factor 1	Factor 2	Factor 1	Factor 1	Factor 2
1	0.19	−0.04	0.51	0.16	0.25	0.06
2	0.07	−0.06	0.32	0.36	−0.12	0.30
3	0.17	−0.01	0.41	0.39	0.12	0.33
4	0.03	−0.15	0.41	0.45	0.11	0.50
5	0.19	0.12	0.31	0.66	−0.02	0.65
6	0.48	0.25	0.48	−0.13	–	–
7	−0.31	–	–	0.13	0.25	−0.03
8	0.47	0.43	−0.05	0.19	−0.09	0.23
9	−0.15	–	–	−0.03	–	–
10	0.06	−0.10	0.40	0.06	0.09	0.30
11	0.40	0.99	−0.01	0.32	−0.16	0.40
12	0.80	0.32	0.15	0.10	0.99	−0.06
% of the explained variance	17.90	25.6	42.5	9.57	15.3	33.9

10, ten questions; 12, twelve questions; CI, confidence interval; ICC, intraclass coefficient correlation; MDC, minimum detectable difference; PIKQ, prolapse and incontinence knowledge quiz; POP, pelvic organ prolapse; SEM, standard error of measurement; UI, urinary incontinence.

7 and 9 were excluded because they had negative factor loadings and/or <0.10 in all factors) and showed adequate values for KMO (0.68), Bartlett's index ($p < 0.001$). All questions had adequate factor loading (> 0.30) for one of the tested factors, and the percentage of cumulative explained variance was 42.50 %.

The EFA results for the PIKQ-POP showed that the model with 12 questions and one factor had an inadequate KMO value (0.55), and the percentage of cumulative explained variance was 9.57 %. Only five questions had factor loadings greater than 0.30, and two questions had negative factor loadings. The model was tested with two factors and 10 questions (questions 6 and 9 were excluded because they had factor loadings lower than 0.10 in all factors) and showed adequate values for KMO (0.60) and Bartlett's index ($p < 0.001$). All questions had factor loadings greater than 0.30 in at least one factor, except questions numbers 1, 7, and 8.

Given the inadequate results for the factorability and adjustments of the PIKQ-UI and PIKQ-POP with a single factor, we performed the CFA for the alternative models with two factors and 10 questions. After completing the bootstrap ML method, the Bollen–Stine p values for the PIKQ-UI 10 items ($p = 0.47$) and PIKQ-POP 10 items ($p = 0.59$) were acceptable. The statistical adjustment for the final two-factor model with covariance parameters of PIKQ-UI and PIKQ-POP 10 items respectively showed the values: CAIC 165.02 and 154.81, CFI 0.95 and 1.00, TLI 0.95 and 1.07 and, $RMSEA_{(CI\ 90\ \%)}$ 0.04 (0.00 – 0.08) and 0.00 (0.00 – 0.06). All models demonstrated proper fit. Fig. 1 shows the CFA results, with the factor loading of the PIKQ-Br with 10 questions.

Hypotheses testing for construction validity

Positive and moderate correlations for hypotheses were observed between the scores of the PIKQ-UI (rho = 0.430) and PIKQ-UI (10 questions) (rho = 0.439) and the NRS-UI. Positive and weak correlations regarding POP knowledge were observed between the PIKQ-POP (rho = 0.241) and PIKQ-POP (10 questions) (rho = 0.278) scores with NRS-POP. The final version of the PIKQ-Br with 10 questions can be seen in Fig. 2. The scores followed the same used in the original version, with the total score for each scale, however, ranging from 0 to 10. The item receives a score of one if answered correctly and zero if answered incorrectly or as "I don't know ". Higher scores indicate better knowledge.

Internal consistency

Cronbach's alpha coefficient revealed inadequate indicators for the internal consistency analysis of the models with a single factor and 12 questions of both scales. Cronbach's alpha coefficient was 0.571 for PIKQ-UI and 0.472 for PIKQ-POP. The correlation values between the questions and the PIKQ-UI score ranged between 0.35 and 0.54, except for items 7 and 9, which showed a negative correlation. The correlation values for the PIKQ-POP between the questions and the total score ranged between 0.23 and 0.54, except for question 6, which showed a negative correlation.

Cronbach's alpha coefficient to assess the internal consistency of the models with two factors and 10 questions was 0.719 for the PIKQ-UI and 0.676 for the PIKQ-POP, suggesting a good and minimally acceptable level, respectively. The correlations between the questions and the total scores varied between 0.30 and 0.54, demonstrating an adequate correlation of each question with the total score. Cronbach's alpha coefficients for PIKQ-UI (10 questions) with one and two factors were 0.674 and 0.718, respectively, and 0.613 and 0.710 for the PIKQ-POP.

Test-retest reliability and measurement error

Table 3 shows the test-retest reliability and measurement error indicators. All versions of both scales showed excellent reliability (ICC > 0.93). The 12 and 10-item versions of the PIKQ-UI had SEM values of 0.55 and 0.24 and SDC values of 1.51 and 0.66, respectively. The 12-item version of the PIKQ-POP had an SEM of 0.52 and an SDC of 1.44, and the version with 10 items presented values of 0.31 and 0.85, respectively.

Discussion

This study aimed to perform the cross-cultural adaptation of the PIKQ to Brazilian Portuguese. The PIKQ-Br is a simple, self-administered quiz that has proven valid and reliable in its version, in both scales, with

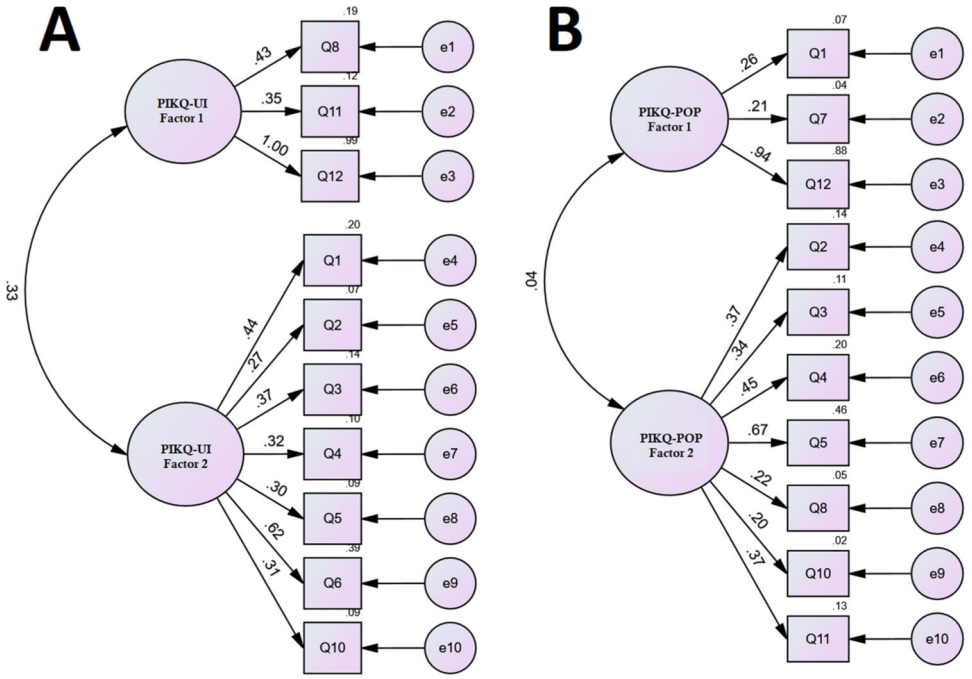

Fig. 1. Path diagram demonstrating the factor structure of PIKQ-IU (A) and PIKQ-POP (B) and describing the factor load of each question. *Q* = question; *e* = error.

Questionário sobre o conhecimento de Prolapso e Incontinência Urinária (PIKQ-Br)

A. Abaixo estão algumas afirmações sobre incontinência urinária (perda de urina ou bexiga gotejante). Por favor, indique se concorda, não concorda ou não sabe.	Pontuação
1. A incontinência urinária (perda de urina ou bexiga gotejante) é mais comum em mulheres jovens do que em mulheres idosas. CONCORDO NÃO CONCORDO NÃO SEI	
2. É mais comum mulheres perderem urina do que homens. CONCORDO NÃO CONCORDO NÃO SEI	
3. Além de usar absorventes e fraldas, não tem muito o que se fazer para tratar a perda de urina. CONCORDO NÃO CONCORDO NÃO SEI	
4. Não é importante diagnosticar o tipo de perda de urina antes de tentar tratá-la. CONCORDO NÃO CONCORDO NÃO SEI	
5. Muitas coisas podem causar perda de urina. CONCORDO NÃO CONCORDO NÃO SEI	
6. Certos exercícios podem ser feitos para ajudar a controlar a perda de urina. CONCORDO NÃO CONCORDO NÃO SEI	
7. Uma vez que as pessoas começam a perder urina, elas nunca mais são capazes de controlar sua urina novamente. CONCORDO NÃO CONCORDO NÃO SEI	
8. A cirurgia é o único tratamento para a perda de urina. CONCORDO NÃO CONCORDO NÃO SEI	
9. Ter tido muitos partos pode levar à perda de urina. CONCORDO NÃO CONCORDO NÃO SEI	
10. A maioria das pessoas que perdem urina pode ser curada ou ter melhora com algum tipo de tratamento. CONCORDO NÃO CONCORDO NÃO SEI	

Respostas: 1- NÃO CONCORDO; 2- CONCORDO; 3- NÃO CONCORDO; 4- NÃO CONCORDO; 5- CONCORDO; 6- CONCORDO; 7- NÃO CONCORDO; 8- NÃO CONCORDO; 9- CONCORDO; 10- CONCORDO.

Pontuação (0 a 10): Resposta correta: 1 ponto; Resposta incorreta: 0 pontos; não sei: 0 pontos.

B. Você vai ler abaixo algumas afirmações sobre prolapso dos órgãos pélvicos (bexiga ou útero caído, sensação de bola saindo pela vagina). Indique se você concorda ou não concorda com cada afirmação ou se você não sabe.	**Pontuação**
1. Prolapso dos órgãos pélvicos (bexiga ou útero caído, sensação de bola saindo pela vagina) é mais comum em mulheres jovens do que em idosas. CONCORDO NÃO CONCORDO NÃO SEI	
2. Ter parto pode causar muitas vezes prolapso de órgãos pélvicos. CONCORDO NÃO CONCORDO NÃO SEI	
3. O prolapso de órgãos pélvicos pode acontecer em qualquer idade. CONCORDO NÃO CONCORDO NÃO SEI	
4. Certos exercícios podem evitar que o prolapso dos órgãos pélvicos piore. CONCORDO NÃO CONCORDO NÃO SEI	
5. Sintomas de prolapso dos órgãos pélvicos podem incluir sensação de peso ou pressão na vagina. CONCORDO NÃO CONCORDO NÃO SEI	
6. Quando uma paciente tem prolapso de órgãos pélvicos, não se pode fazer muito para ajudá-la. CONCORDO NÃO CONCORDO NÃO SEI	
7. Pegar peso nas atividades diárias pode levar a prolapso de órgãos pélvicos. CONCORDO NÃO CONCORDO NÃO SEI	
8. Os médicos podem fazer um exame de sangue para diagnosticar o prolapso de órgãos pélvicos. CONCORDO NÃO CONCORDO NÃO SEI	
9. Um anel de borracha chamado pessário pode ser usado para tratar sintomas de prolapso de órgãos pélvicos. CONCORDO NÃO CONCORDO NÃO SEI	
10. As pessoas que são obesas têm menos chances de ter prolapso dos órgãos pélvicos. CONCORDO NÃO CONCORDO NÃO SEI	

Respostas: 1- NÃO CONCORDO; 2- CONCORDO; 3- CONCORDO; 4- CONCORDO; 5- CONCORDO; 6- NÃO CONCORDO; 7- CONCORDO; 8- NÃO CONCORDO; 9- CONCORDO; 10-NÃO CONCORDO.

Pontuação (0 a 10): Resposta correta: 1 ponto; Resposta incorreta: 0 pontos; não sei: 0 pontos.

Fig. 2. Final version of the PIKQ-Br.

Table 3
Test-retest reliability of PIKQ-UI and PIKQ-POP with 12 and 10 questions.

Questionnaire	ICC [95% CI]	SEM	MDC
PIKQ-UI 12	0.931 [0.842, 0.968]	0.55	1.51
PIKQ-POP 12	0.935 [0.866, 0.969]	0.52	1.44
PIKQ-UI 10			
Factor 1	0.94 [0.871, 0.972]	0.49	1.35
Factor 2	0.988 [0.975, 0.994]	0.11	0.30
Total Score	0.974 [0.934, 0.988]	0.24	0.66
PIKQ-POP 10			
Factor 1	0.954 [0.904, 0.978]	0.39	1.08
Factor 2	0.972 [0.939, 0.987]	0.18	0.50
Total Score	0.961 [0.945, 0.992]	0.31	0.85

10, ten questions; 12, twelve questions; CI, confidence interval; ICC, intraclass coefficient correlation; MDC, minimum detectable difference; PIKQ, prolapse and incontinence knowledge quiz; POP, pelvic organ prolapse; SEM, standard error of measurement; UI, urinary incontinence.

10 questions and two factors each, to assess knowledge regarding UI and POP. The instrument was developed and validated in English and has been adapted for use in different countries.[10,32-34]

This is the first study that validated the PIKQ for Brazilians. Standards are needed to evaluate the methodological quality of a study on measurement properties,[19] and in this study, we followed the recommendations of COSMIN[18-21] and Beaton et al.[16,17] Some cultural adaptations in the translation and cross-cultural adaptation of the PIKQ-Br were necessary. However, no changes were required during the pre-final version, suggesting that the translation was done efficiently. Some cultural differences became apparent during the translation, and how much this could influence the semantics of some words. These aspects emphasize the need for a cross-cultural adaptation following the recommendations described in the literature.[35]

None of the PIKQ-Br questions reported misunderstanding, which did not lead to the need for new recruitment in the test stage of the pre-final version and reapplication of the quiz in a new sample. It is estimated that a misunderstanding rate of up to 20 % is acceptable, reducing the need to reapply the instrument.[36] The absence of doubts may be related to the structure of the questions being simple and direct. However, the women's low education level may also have made it difficult for them to suggest any changes.

In the construct validity, the AFE results for the PIKQ models with a single factor and 12 questions demonstrated adequate KMO values for the PIKQ-UI but inadequate for the PIKQ-POP. Both showed two questions with negative loadings and inappropriate model fit quality. Cronbach's alpha coefficient revealed inadequate indicators for both scales. The model's goodness-of-fit was inappropriate, evidencing the inadequate factorability of the single-factor model. The construct validity demonstrated that the instrument with 12 questions and one factor was inappropriate. A factorial solution with 10 questions and two factors for both scales was necessary. Questions with a negative factorial load and negative correlation with the other items were excluded for the PIKQ-UI: question number 7, "Some medications can cause urine loss," and question number 9, "Doctors can make some types of special tests on the bladder to diagnose the loss of urine." Questions 6 and 9 for the PIKQ-POP were removed; "A good way for a doctor to diagnose a POP is by examining the patient" and "Surgery is a type of treatment for POP." Both scales with 10 questions showed adequate KMO values and model fit. All questions had adequate factor loading for one of the tested factors.

The same problem was verified in the other validated versions, with at least one question presenting factor loadings lower than 0.30. However, the authors included the questions in the final version to maintain the originality of the quiz. This also occurs in the English version[11] in PIKQ-UI question 11, in Turkish[10] in PIKQ-UI questions 2 and 11, in Thai[32] in PIKQ-POP questions 10, 11, and 12, in Hebrew[33] in PIKQ-UI questions 1 and 9, and in Spanish in PIKQ-POP question 10.[34] We decided to remove the questions which had negative factor loadings for the Brazilian validation to maintain the reliability and the methodological quality as per the COSMIN recommendations.[18-21]

According to Beaton et al.,[17] the sample size of 30 individuals is considered "good," so the PIKQ-Br's reliability can be regarded as adequate because we used a sample of 43 women. Both scales showed excellent levels of reliability.[37,38] The reliability was measured using test-retest reliability through ICC coefficients. An ICC $\langle$ 0.5 indicates low reliability, those between 0.5 and 0.9 indicate moderate to good, and values $\rangle$ 0.90 indicate excellent reliability.[39] In our study, ICC values were excellent for both scales (ICC 0.98 and 0.97), with better values than other validated versions. The test-retest period was 7–14 days, corroborating the literature[22]; however, some authors consider intervals of up to five weeks appropriate to verify test-retest reliability.[40] A comparison of our findings with other PIKQ versions showed reliability results between moderate and excellent. The versions showed the ICC values for the PIKQ-UI and PIKQ-POP, respectively: English version[11] (ICC 0.67 and 0.94); Turkish[10] (ICC 0.90 and 0.91); Thai[32] (ICC 0.73 and 0.68); Hebrew[33] (ICC 0.73 and 0.68); and Spanish[34] (ICC 0.80 and 0.73).

Positive and moderate correlations were observed regarding the hypotheses testing for construct validity between the scores of the PIKQ-UI with 12 questions and the PIKQ-UI with 10 questions compared with NRS-UI. However, positive and weak correlations were observed regarding POP knowledge between the scores of PIKQ-POP with 12 questions and PIKQ-POP with 10 questions compared with NRS-POP.

One of the factors associated with knowledge is educational and socioeconomic levels.[41] The low education level shown in our sample, combined with the fact that 99.2 % said they had never participated in any educational activity related to PFM, may indicate a lack of knowledge about PFD, which is a barrier to seeking care. Women with a better understanding of PFD will be more likely to seek appropriate care at an early stage of the disease and will improve their quality of life.[10,41] Furthermore, women usually know more about UI than POP, as they are less prevalent and have less easily accessible information.

The PIKQ was developed to identify populations with inadequate knowledge about POP and UI so that these populations can be effectively educated and, as a result, seek timely medical care.[11] This instrument can be implemented in research and the physical therapist's clinical practice for better care quality. Additionally, better health-related knowledge predicts favorable health behavior.[32]

Our study had some limitations, as there was no validated and published questionnaire in Portuguese to assess knowledge about UI and POP, so it was necessary to compare with the NRS. This quiz should be applied to other populations cautiously, as it has only been tested in women with UI. We suggest that future studies be conducted in different populations to test responsiveness and different factorial structures and confirm our findings. We also recommend creating and validating an instrument for this purpose, adapted to Brazilian culture with a sample of women from different socioeconomic and educational levels, which also addresses aspects of knowledge of the pelvic floor muscles, their location, and function.

Conclusion

The PIKQ-Br showed excellent reliability, and two factors were suggested for each scale. Positive and moderate correlations were observed for the hypotheses testing for construct validity between the PIKQ-UI and the NRS-UI; however, positive and weak correlations were observed between the PIKQ-POP and NRS-POP. The PIKQ-Br, with 10 questions and two factors, presented adequate measurement properties, and its use in clinical practice and research is recommended to assess women's knowledge about UI and POP.

Declaration of competing interest

The authors declare no competing interest.

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