Patellofemoral pain syndrome (PFPS) is a clinical condition described as retropatellar and/or peripatellar pain associated with activities involving the lower limbs, such as ascending or descending stairs, squatting, kneeling, or sitting for long periods. PFPS is known to be multifactorial, and its point prevalence ranges from 15% to 18%

Assessment of individuals with PFPS is common in clinical practice and research. The numeric pain rating scale (NPRS) is one of the instruments currently used in Brazil for this purpose. Although the NPRS has already been translated and cross-culturally adapted for the Brazilian population, its measurement properties have not been tested in patients with PFPS. The Global Perceived Effect scale (GPE) assesses global impression of recovery. It has also been translated and cross-culturally adapted for the Brazilian population; however, it was not tested in a sample of patients with PFPS. The Anterior Knee Pain Scale (AKPS), the Functional Index Questionnaire (FIQ), and the Pain Severity Scale (PSS) for PFPS are condition-specific instruments used to assess patients with PFPS (TABLE 1) that have not yet been translated, cross-culturally adapted, and tested for their measurement properties in a sample of Brazilian patients with PFPS.

To our knowledge, there are no data in the literature regarding which of the measurement properties have not been tested in patients with PFPS. The AKPS, the FIQ, and the PSS (Pearson r >0.60, P<.05). No floor or ceiling effects were observed for any of the instruments. Effect sizes used for measuring internal responsiveness ranged from moderate to high for all measures. The NPRS and the AKPS were the measures with the highest external responsiveness.


**KEY WORDS:** anterior knee pain syndrome, knee, measurement properties, questionnaires
above self-reported instruments has acceptable measurement properties to be used in Brazilian patients with PFPS. Portuguese is spoken by approximately 240 million people worldwide, and the number of scientific articles published by Brazilian authors is increasing. Brazil is currently ranked 17th among the 146 most highly cited countries for scientific research. Growth of publications on clinical populations requires that self-report instruments be appropriately translated, cross-culturally adapted, and tested for their measurement properties. Therefore, the aims of this study were (1) to translate and cross-culturally adapt the AKPS, FIQ, and PSS into Brazilian Portuguese; and (2) to test the measurement properties of the Brazilian Portuguese versions of the AKPS, FIQ, and PSS, as well as the NPRS and GPE scale, which have already been translated and culturally adapted into Brazilian Portuguese.

### METHODS

This study was performed in 2 stages: (1) translation and cross-cultural adaptation, and (2) measurement property assessment. The first stage was conducted according to published guidelines for translation and cross-cultural adaptation of health-related questionnaires, and the second stage employed the quality criteria for the measurement properties of questionnaires.

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Construct</th>
<th>Origin Country (Language)</th>
<th>Origin Population</th>
<th>Language Versions</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AKPS¹⁸</td>
<td>Disability</td>
<td>Finland (English)³⁹</td>
<td>Patients with anterior knee pain, patellar subluxation, and patellar dislocation²⁸</td>
<td>Turkish, English (Australia)²⁸</td>
<td>Specific questionnaire for anterior knee pain comprising 13 items with separate categories related to different levels of knee function. Categories inside each item are rated, and answers are added to result in a global index in which a score of 100 represents &quot;no deficit&quot; and a score of zero represents &quot;the highest possible deficit.&quot;²⁸</td>
</tr>
<tr>
<td>FIQ⁴</td>
<td>Disability</td>
<td>Canada (English)¹⁰</td>
<td>Patients with PFPS⁴</td>
<td>English (Australia)²⁸</td>
<td>Multiple-choice, PFPS-specific questionnaire comprising 8 questions representing everyday life activities. There are 3 answer options for each activity: (1) unable to do (0 points), (2) can do with a problem (1 point), and (3) no difficulty (2 points). The total score is obtained by adding the points from each question; a total score of 0 indicates &quot;complete inability to perform everyday life activities,&quot; and a score of 16 indicates &quot;no problems performing everyday life activities.&quot;²⁰</td>
</tr>
<tr>
<td>PSS²⁰</td>
<td>Pain intensity during different activities</td>
<td>Canada (English)¹⁰</td>
<td>Patients with PFPS²⁰</td>
<td>...</td>
<td>Specific scale to assess pain intensity in PFPS, comprising 10 questions on different activities. For each question, a numerical scale rates pain from zero (no pain) to 10 (the worst possible pain). The maximum score is 100. The higher the score, the higher the pain intensity.²⁰</td>
</tr>
<tr>
<td>NPRS²⁰</td>
<td>Pain intensity</td>
<td>Australia and New Zealand (English)²⁴</td>
<td>Patients with low back pain²⁰</td>
<td>Portuguese (Brazil)²⁴</td>
<td>An 11-point scale that assesses pain intensity, with scores ranging from zero (no pain) to 10 (strongest possible pain).²⁰</td>
</tr>
<tr>
<td>GPE²¹</td>
<td>Global measurement of change</td>
<td>United States (English)²¹</td>
<td>Patients with lateral elbow tendinopathy²¹</td>
<td>Portuguese (Brazil)²¹</td>
<td>Numerical 11-point scale with scores ranging from -5 (&quot;much worse&quot;) to +5 (&quot;completely recovered&quot;) through zero (&quot;no change&quot;). In this study, for all measurements, participants were asked the following question: &quot;How do you describe your PFPS today compared to the first episode?&quot; Higher scores indicate higher clinical recovery.²¹</td>
</tr>
</tbody>
</table>

Abbreviations: AKPS, Anterior Knee Pain Scale; FIQ, Functional Index Questionnaire; GPE, Global Perceived Effect scale; NPRS, numeric pain rating scale; PFPS, patellofemoral pain syndrome; PSS, Pain Severity Scale for PFPS.
speakers who were also fluent in the English language. One of the translators was aware of the outcomes analyzed by the questionnaires (pain and function), but the other 2 translators were not. This strategy was used to obtain 1 conceptual translation of the outcome measures and 2 translations that accurately reflected the standard linguistic practice of the population not influenced by scholarly concerns.1

Synthesis These 3 versions of each questionnaire were compared and synthesized by the authors of this study together with the 3 translators who produced the Brazilian Portuguese versions, and an initial consensual Brazilian Portuguese–language version of each instrument was developed.1

Backward Translation The initial consensual Brazilian Portuguese version of each instrument was back translated into English by 3 bilingual professional translators who were unaware of the purpose of the instruments. Next, these backward-translated versions were compared with the original English versions.1

Expert Committee A committee of 3 bilingual rehabilitation specialists was established. They were assisted by all translators whenever necessary. Each committee member independently analyzed the semantic, idiomatic, experiential, and conceptual equivalence of each item in all 3 instruments. During this process, committee members had the original English version, the Brazilian Portuguese forward-translated version, and the English backward-translated version available. Whenever any item was identified as nonequivalent by any committee expert, it was reviewed and discussed by the committee members until an agreement was reached to produce a final version culturally adapted for the Brazilian population.1

Pretesting The Brazilian Portuguese–language version of each instrument adapted for the Brazilian population was tested for cultural equivalence. During this stage, a “not applicable” option was added to all Brazilian Portuguese–version items to identify questions that the Brazilian population would not comprehend, as well as activities that would not be regularly performed by Brazilians.14 This option was only used during the pretesting stage and was not retained in the final version of the questionnaires.

At this stage, the instruments were completed by 31 patients who were receiving treatment in physical therapy clinics in the city of São Paulo, Brazil and were diagnosed with PFPS by a medical doctor. Exclusion criteria for these patients included history of surgery on the affected lower limb; less than 3 years of schooling; and a history of any neurological, musculoskeletal (other than PFPS), or systemic condition that could influence the assessment of knee pain and function. After the completion of the questionnaires, the volunteers were asked about the difficulty they might have had comprehending and answering questions, and any unanswered or “not applicable” items were discussed. To establish the final Brazilian Portuguese–language version of all 3 instruments, an acceptable upper limit of 15% was established for the percentage of items for which difficulties were reported, including the number of unanswered and “not applicable” answers.1,14

Measurement Property Testing To assess measurement properties, a group of Brazilian patients seeking care for PFPS was recruited from 6 different physical therapy clinics in São Paulo, Brazil. All patients had a medical diagnosis of PFPS. Exclusion criteria were the same as those used in the pretesting phase. The total sample consisted of 83 patients with PFPS who completed all instruments at baseline. From this group, 52 were invited to complete the instruments again at 48 to 72 hours from baseline and at 4 weeks from baseline, to calculate reproducibility and responsiveness, respectively.

The participants filled out the Brazilian Portuguese–language version of the AKPS, the FIQ, and the PSS adapted for the Brazilian population, as well as 2 other instruments previously adapted for the Brazilian population,2 the NPRS and GPE scale. The characteristics of all instruments used in this study are described in Table 1. The choice of the intervals between testing sessions (48 to 72 hours for reproducibility and 4 weeks for responsiveness) was based on a Cochrane systematic review of patients with PFPS, which indicated that this clinical condition did not show improvement after 48 to 72 hours of treatment but did exhibit improvement after 4 weeks.25 All self-report instruments were completed by patients who were receiving physical therapy treatment for PFPS in 1 of 6 physical therapy clinics.

Data Analysis

The measurement properties tested in this study for the 5 instruments were internal consistency, reproducibility (ie, reliability and agreement), construct validity, ceiling and floor effects, and internal and external responsiveness.

Internal Consistency Internal consistency (homogeneity) of the AKPS, FIQ, and PSS was measured using the Cronbach alpha index and “alpha if item deleted” statistics. Estimates ranging from .70 to .95 were considered to be adequate.1,24 The NPRS and the GPE scale were not tested for internal consistency, as these instruments are composed of a single item.

Reproducibility Reproducibility was assessed by determining reliability (relative measurement error) and agreement (absolute measurement error). Reliability was calculated with intraclass correlation coefficients (ICC2,1), using the scores from the baseline assessment and the follow-up assessment at 48 to 72 hours. ICCs were interpreted as poor if less than 0.40, moderate if between 0.40 and 0.75, substantial if between 0.75 and 0.90, or excellent if greater than 0.90.25 Agreement was measured by calculating the standard error of measurement (SEM), using data from the baseline assessment and the assessment taken 48 to 72 hours later. The SEM is expressed in the same units as those used in each instrument.
The SEM was calculated as the standard deviation of differences between scores from the 2 testing sessions divided by the square root of 2. The percentage of the SEM relative to the total score range is considered an important indicator of agreement and was interpreted as very good if 5% or less, good if greater than 5% and less than or equal to 10%, doubtful if greater than 10% and less than or equal to 20%, or negative if greater than 20%. Construct Validity Construct validity was measured by calculating the level of association, using Pearson r, for the scores obtained at baseline among the translated, cross-culturally adapted instruments. We also calculated the correlations among the instruments using the change scores between baseline and 48 to 72 hours on the AKPS, PSS, NPRS, and FIQ. For same-construct instruments, correlation coefficients equal to or greater than 0.70 are recommended; when comparing similar constructs, correlations ranging from 0.70 to 0.40 are considered to be moderate. Floor and Ceiling Effects Floor and ceiling effects were measured by calculating the percentage of respondents who reached the lowest or highest possible scores in any given instrument. Floor or ceiling effects were considered to occur when more than 15% of all respondents obtained the lowest or highest possible total score. Internal Responsiveness The internal responsiveness of each instrument was measured using effect-size estimations with a corresponding 84% confidence interval (CI). Effect size was estimated using the mean differences between the scores at baseline and the 4-week follow-up, divided by the standard deviation at baseline. For direct comparisons of the effect sizes of different instruments, we calculated the 84% CI. Nonoverlapping 84% CIs are equivalent to a 0.05 z-score and can be used to compare the effect sizes of different instruments. Effect sizes indicate the questionnaire’s sensitivity in measuring clinical changes in patients, with a score of less than 0.20 indicating slight change, of 0.50 moderate change, and of 0.80 or greater large change. Only the 17 patients who had a change of at least 3 points on the GPE scale were included in this analysis.

### TABLE 2

#### Characteristics of the Study Participants*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Baseline (n = 83)</th>
<th>48-72 h (n = 52)</th>
<th>4 wk (n = 52)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender, n (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>59 (71%)</td>
<td>34 (65%)</td>
<td>34 (65%)</td>
</tr>
<tr>
<td>Male</td>
<td>24 (29%)</td>
<td>18 (35%)</td>
<td>18 (35%)</td>
</tr>
<tr>
<td>Age, y</td>
<td>31.3 ± 12.2</td>
<td>31.5 ± 11.4</td>
<td>31.5 ± 11.4</td>
</tr>
<tr>
<td>Weight, kg</td>
<td>69.1 ± 10.8</td>
<td>69.8 ± 11.2</td>
<td>69.8 ± 11.2</td>
</tr>
<tr>
<td>Height, m</td>
<td>1.68 ± 0.07</td>
<td>1.68 ± 0.08</td>
<td>1.68 ± 0.08</td>
</tr>
<tr>
<td>Affected knee, n (%)†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Right</td>
<td>30 (36%)</td>
<td>19 (37%)</td>
<td>19 (37%)</td>
</tr>
<tr>
<td>Left</td>
<td>16 (19%)</td>
<td>12 (23%)</td>
<td>12 (23%)</td>
</tr>
<tr>
<td>Both</td>
<td>37 (45%)</td>
<td>21 (40%)</td>
<td>21 (40%)</td>
</tr>
<tr>
<td>AKPS (0-100)</td>
<td>70.5 ± 14.1</td>
<td>72.7 ± 14.7</td>
<td>75.3 ± 15.8</td>
</tr>
<tr>
<td>FIQ (0-36)</td>
<td>11.3 ± 2.9</td>
<td>11.0 ± 3.3</td>
<td>11.9 ± 3.1</td>
</tr>
<tr>
<td>PSS (0-100)</td>
<td>32.1 ± 21.5</td>
<td>32.7 ± 21.7</td>
<td>29.9 ± 21.3</td>
</tr>
<tr>
<td>NPRS (0-10)</td>
<td>4.3 ± 2.7</td>
<td>4.2 ± 2.8</td>
<td>3.3 ± 2.6</td>
</tr>
<tr>
<td>GPE (–5 to +5)</td>
<td>0.2 ± 2.4</td>
<td>0.2 ± 2.4</td>
<td>1.8 ± 2.4</td>
</tr>
</tbody>
</table>

*Values are mean ± SD unless otherwise indicated.
†Some patients had bilateral pain; in these cases, we asked the patients to fill out the measures based on the knee with the most severe pain.

**RESULTS**

### Translation and Cross-cultural Adaptation

No semantic, linguistic, or cultural difficulties were encountered during the translation process of the AKPS, FIQ, and PSS instruments. All discrepancies could be clearly elucidated and resolved by the expert committee. During the cultural equivalence pretesting, all questions and options were answered and were determined to be satisfactorily comprehensible and applicable by all 31 participants. None selected the “not applicable” option that was added in the pretesting version of the 3 instruments. Therefore, we decided to
use the data from these participants in the baseline clinimetric testing stage (internal consistency, construct validity, and ceiling and floor effects). Consequently, the Portuguese-language versions of the AKPS, the FIQ, and the PSS did not require additional modifications (ie, the numbers of items from the original English versions were maintained in the Portuguese versions) and were used to test measurement properties.

**Measurement Properties Testing**

Eighty-three volunteers completed all 5 instruments at baseline. Fifty-two participants were invited to complete the instruments again 48 to 72 hours later and a third time 4 weeks later. The mean ± SD age of the participants at baseline was 31.3 ± 11.2 years. The majority of participants were women (71%, n = 59), and nearly half had bilateral knee pain (45%, n = 37). The demographic characteristics of the sample and total scores on the instruments at baseline and at follow-ups are provided in **TABLE 2**.

**Internal Consistency**

We used the baseline data of 83 patients with PFPS for this analysis. The internal consistency of the Brazilian Portuguese–language versions of the AKPS, FIQ, and PSS was rated as adequate (Cronbach alpha index ranging from .75 to .87). When assessing alpha if item deleted, no item was identified as contributing more to the construct than any other (alpha if item deleted ranged from .70 to .87). The results from the internal consistency assessments for each instrument and the comparisons with internal consistency reported in other studies are presented in **TABLE 3**.

**Reproducibility**

We used data from 52 patients with PFPS in this analysis. The reliability analysis indicated that the AKPS, FIQ, PSS, and NPRS instruments exhibited excellent reliability, with ICC values ranging from 0.90 to 0.97. The GPE exhibited substantial reliability, with an ICC of 0.78. The percentage of the SEM to the total score was classified as very good for the AKPS and PSS, good for the FIQ and NPRS, and doubtful for the GPE. **TABLE 3** describes the reproducibility of the instruments and comparisons with previous studies.

**Construct Validity**

This analysis was performed using the baseline data of 83 patients with PFPS. All associations among the instruments indicated that they measure similar constructs (r>0.70, P<.05). The correlations among the AKPS, FIQ, and PSS were statistically significant (P<.05) and higher than 0.60 (**TABLE 4**). The correlation values among instruments for the change scores ranged from weak to moderate (**TABLE 5**).

**Floor and Ceiling Effects**

We used the

| TABLE 3 | Internal Consistency (Cronbach Alpha) and Reproducibility (Reliability and Agreement) of the Instruments |
|-----------------|-----------------|-----------------|-----------------|
| **Cronbach Alpha Index** | **Reliability** | **Agreement** |
| **This Study (n = 83)** | **Other Studies** | **This Study (n = 52)** | **Other Studies** | **This Study (n = 52)** | **Other Studies** |
| AKPS (0-100) | 0.75 (0.70-0.77) | 0.84 (n = 40) | 0.95 (0.91-0.97) | ICC3,1 = 0.90 (n = 50) | 2.98 (2.29%) | 4.71 |
| FIQ (0-16) | 0.75 (0.74-0.85) | 0.90 (0.83-0.94) | ICC3,1 = 0.94 (n = 50) | 0.99 (6.2%) | 1.6 |
| PSS (0-100) | 0.87 (0.85-0.87) | 0.97 (0.94-0.98) | Spearman rho = 0.95 | 3.50 (3.5%) | ... |
| NPRS (0-10) | NA | NA | 0.92 (0.87-0.95) | ... | 0.75 (75%) | ... |
| GPE (-5 to +5) | NA | NA | 0.78 (0.65-0.87) | ... | 1.10 (11%) | ... |

**TABLE 4** | Pearson Correlation Between Measurements at Baseline |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AKPS</strong></td>
<td><strong>FIQ</strong></td>
<td><strong>PSS</strong></td>
<td><strong>NPRS</strong></td>
</tr>
<tr>
<td>AKPS</td>
<td>1.00</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>FIQ</td>
<td>0.66*</td>
<td>1.00</td>
<td>...</td>
</tr>
<tr>
<td>PSS</td>
<td>-0.63*</td>
<td>-0.67*</td>
<td>1.00</td>
</tr>
<tr>
<td>NPRS</td>
<td>-0.26</td>
<td>-0.26</td>
<td>0.37*</td>
</tr>
</tbody>
</table>

**Abbreviations:** AKPS, Anterior Knee Pain Scale; FIQ, Functional Index Questionnaire; GPE, Global Perceived Effect scale; ICC, intraclass correlation coefficient; NA, not available; NPRS, numeric pain rating scale; PSS, Pain Severity Scale for patellofemoral pain syndrome.

*Values in parentheses are the range of the alpha if item deleted.
†Values are ICC3,1 (95% confidence interval).
‡Values are standard error of measurement (percent of total score).
§Values are standard error of measurement.
answers for all completed instruments at baseline, 48 to 72 hours after baseline, and 4 weeks after baseline to perform this analysis. No respondent reached the highest or the lowest possible score on any instrument examined in this study. Therefore, no floor or ceiling effects were observed at any of the time points.

**Internal Responsiveness** Analyses of responsiveness were performed using data from 17 participants who completed the instruments at baseline and 4 weeks after baseline (Table 6).

The effect sizes from all measures ranged from moderate (0.60 for the FIQ) to high (−4.61 for the GPE). We observed overlaps in most of the 84% CIs, with few exceptions (GPE versus AKPS, GPE versus FIQ, and GPE versus PSS), meaning that most of these measures were equally responsive and that the GPE was more internally responsive than the AKPS, FIQ, and PSS.

**External Responsiveness** We observed an absence of correlations between the change scores for each of the questionnaires and the GPE score at 4 weeks, with the exception of the NPRS (r = −0.78, P = .01) and FIQ (r = 0.51, P = .04). With regard to the AUC, only the AKPS and the NPRS can be considered responsive (AUC, 0.70 or greater). This means that the AKPS and the NPRS are the only instruments that are able to discriminate patients who improved from those who did not improve after 4 weeks of intervention. It is important to highlight that the results of the AUC are highly dependent on the GPE scale, which is a subjective measure, whereas the AKPS, FIQ, and PSS are more objective measures.

**DISCUSSION**

The Brazilian Portuguese versions of the AKPS, the FIQ, and the PSS (APPENDIX, available online) did not need any specific cross-cultural changes. These adaptations might not have been necessary because the activities evaluated by these instruments were common in both the source (English-speaking) and target (Portuguese-speaking) populations. In addition, the questions from the original versions of these 3 instruments were described clearly and directly, making it easy to understand and to translate into Brazilian Portuguese. The AKPS, the FIQ, and the PSS have adequate internal consistency, which is similar to the results observed in the Turkish version of the AKPS \(^\text{5}^3\) (Table 3). To our knowledge, there are no studies assessing the internal consistency of the FIQ and the PSS in the literature.

The Brazilian Portuguese versions of the AKPS, FIQ, PSS, and NPRS have excellent reliability, whereas the GPE has substantial reliability. Previous studies of different AKPS versions yielded reliability results ranging from substantial \(^\text{6}^3\) to excellent. \(^\text{7}^3\) Similar estimates were observed for the FIQ, \(^\text{5}^3\) the PSS, \(^\text{20}^3\) the NPRS, \(^\text{5}^3\) and the GPE. \(^\text{1}^3\) The differences in reliability results among studies may be explained by the different time points established for retest, differences in populations, and different statistical analyses used, but, in general, we found similar results to those reported in the literature. \(\text{5}^3,\text{6}^3,\text{20}^3\) Even though the test-retest interval of 48 to 72 hours might allow memorization of answers by the participants, this short interval helps to ensure that treatments do not cause major changes in the clinical conditions.

The agreement measured by the percentage of the SEM related to the total score range was rated as very good for the AKPS and the PSS and good for the FIQ.
and the NPRS. These results are consistent with other studies that found very good agreement for the AKPS and the FIQ.\textsuperscript{2,6} The agreement of the GPE was classified as doubtful. We could not identify any previous study that had assessed GPE agreement.

The AKPS and FIQ correlated moderately with each other, indicating acceptable construct validity. The different characteristics of the questions in these 2 instruments might explain this moderate relationship. Correlations among the AKPS, the FIQ, and the PSS were also moderate and statistically significant. Although these instruments measure similar features, there are likely some differences in what each tool measures in patients with PFPS. The correlation between the PSS and the NPRS was low. Although both instruments assess pain intensity, the PSS assesses pain intensity related to specific activities, whereas the NPRS provides a more general assessment of pain intensity. Similar results were observed in previous measurement properties studies in individuals with PFPS.\textsuperscript{2,6,20}

No ceiling and floor effects were detected for any of the measures. Therefore, the 5 instruments analyzed by this study are able to identify participants whose condition may improve or worsen, without hampering the reliability and responsiveness of the instruments.\textsuperscript{25}

We observed moderate to large effect sizes in the analysis of internal responsiveness, with the GPE as the measure that had the highest effect size. Both general measures (the GPE and the NPRS) had the highest effect sizes, which may indicate that patients with PFPS who participated in the study showed general improvement instead of activity-specific improvement. Although these estimates provide evidence of good responsiveness of these measures, it is important to highlight that the analysis was performed in only 17 of 52 participants (ie, the patients who experienced substantial changes), and therefore the results have to be interpreted with caution.

External responsiveness, analyzed by the AUC, showed that the AKPS and the NPRS were the best instruments to distinguish between patients who had improved and those who had not. Similar findings were observed in a study that measured the responsiveness of the AKPS and the visual analog pain scale, using the global rating of change (GROC) as a comparator for measuring improvement.\textsuperscript{6} The GPE measures clinical change from the onset of symptoms, whereas the GROC measures changes in status within a specific period of time,\textsuperscript{8} similar to the AKPS, FIQ, PSS, and NPRS instruments. Nevertheless, the comparison of responsiveness of the AKPS and the FIQ using the GPE as a standard instrument to measure improvement in this study was similar to that of another study using the GROC scale.\textsuperscript{6}

The GPE as a global measure of change has been criticized by some authors, because it assesses change from the onset of the condition, which may affect the interpretation of our results and be considered a limitation of the study. However, the GPE is the only global measure of change available in Brazil\textsuperscript{8} and, therefore, the only available instrument to calculate the external responsiveness of these measures. Future studies using different comparators, such as the GROC\textsuperscript{6} scale, may help to validate our results.

The results from this study are important for clinicians and researchers because they provide robust evidence supporting the use of these measures to assess Brazilian patients with PFPS in the clinical setting and for clinical research by Brazilian researchers. Finally, they also provide evidence to support the pooling of data from Brazilian Portuguese-speaking and English-speaking populations in multisite clinical trials and systematic literature reviews.

**CONCLUSION**

The Brazilian Portuguese versions of the AKPS, FIQ, PSS, NPRS, and GPE instruments have acceptable measurement properties and may be used to assess Brazilian patients with PFPS. The PSS had the highest internal consistency and reliability, and the AKPS was the measure with the highest agreement based on absolute error. In addition, the AKPS, the PSS, and the FIQ measure similar constructs; the GPE and the NPRS are the measures with the highest internal and external responsiveness, respectively.

**KEY POINTS**

**FINDINGS:** The Brazilian Portuguese versions of the AKPS, FIQ, PSS, NPRS, and GPE instruments have acceptable measurement properties and may be used to assess Brazilian patients with PFPS.

**IMPLICATIONS:** In addition to providing a Brazilian Portuguese version of the instruments to be used for clinicians, this study adds evidence supporting the measurement properties of instruments for assessing patients with PFPS.

**CAUTION:** All results presented in this study are only generalizable to Brazilian patients with PFPS.

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APPENDIX

BRAZILIAN PORTUGUESE VERSIONS OF THE INSTRUMENTS

ESCALA PARA DOR ANTERIOR DO JOELHO (EDAJ – AKPS)
Em cada questão, circule a letra que melhor descreve os atuais sintomas relacionados ao seu joelho.

1. Você caminha mancando?
   a. Não
   b. Lervamente ou de vez em quando
   c. Constantemente

2. O seu joelho suporta o seu peso?
   a. Apóio totalmente, sem dor
   b. Apóio, mas sinto dor
   c. É impossível suportar o peso

3. Ao caminhar
   a. Não tenho limites para caminhar
   b. Caminho mais que 2 km
   c. Caminho entre 1 e 2 km
   d. Não consigo

4. Ao subir / descer escadas
   a. Não tenho dificuldade
   b. Sinto um pouco de dor ao descer
   c. Sinto dor ao descer e ao subir
   d. Não consigo

5. Ao agachar
   a. Não tenho dificuldade
   b. Sinto dor após agachamentos repetidos
   c. Sinto dor a cada agachamento
   d. Somente agacho com diminuição de meu peso (me apoiando)
   e. Não consigo

6. Ao correr
   a. Não tenho dificuldade
   b. Sinto dor após correr mais do que 2 km
   c. Sinto dor leve desde o começo
   d. Sinto dor intensa
   e. Não consigo

7. Ao pular/saltar
   a. Não tenho dificuldade
   b. Tenho um pouco de dificuldade
   c. Sinto dor constante
   d. Não consigo

8. Ao sentar com os joelhos flexionados/dobrados por período prolongado
   a. Não tenho dificuldade
   b. Sinto dor para me manter sentado após ter realizado exercícios
   c. Sinto dor constante
   d. A dor faz com que necessite estender (esticar) os joelhos de tempos em tempos
   e. Não consigo

9. Dor
   a. Nenhuma
   b. Leve e ocasional
   c. A dor atrapalha o sono
   d. De vez em quando é intensa
   e. Constante e intensa

10. Inchaço (edema)
    a. Nenhuma
    b. Após esforço intenso
    c. Após atividades diárias
    d. Toda noite
    e. Constante

11. Movimentos anormais (subluxação) e doloridos da rótula (patela)
    a. Não ocorre
    b. Ocorre ocasionalmente durante atividades esportivas
    c. Ocorre ocasionalmente durante atividades diárias
    d. Já tive pelo menos um deslocamento
    e. Já tive mais que dois deslocamentos

12. Atrofia da coxa (tamanho da coxa)
    a. Nenhuma alteração do tamanho da coxa
    b. Leve alteração do tamanho da coxa
    c. Severa alteração do tamanho da coxa

13. Sente dificuldade para flexionar/dobrar o joelho?
    a. Nenhuma
    b. Leve
    c. Muita
### ESCALA DE INTENSIDADE DA SÍNDROME DA DOR FEMOROPATELAR (EISDF – PSS)

Para cada atividade, gostaria que você desse uma nota para o quanto de dor no joelho você sentiu na semana passada numa escala de 0 a 10, onde 0 seria nenhuma dor e 10 seria pior dor possível. Caso alguma das questões não se aplique, como, por exemplo, não conseguir executar a tarefa por muita dor, ou que não esteja relacionado ao seu dia-a-dia, marcar a opção "não se aplica."

<table>
<thead>
<tr>
<th>Número</th>
<th>Atividade</th>
<th>Escore</th>
<th>Nenhuma Dor</th>
<th>Pior Dor Possível</th>
<th>Não se Aplica</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ao subir escadas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Ao agachar</td>
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<tr>
<td>3.</td>
<td>Ao caminhar</td>
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<tr>
<td>4.</td>
<td>Ao correr moderadamente (trotar)</td>
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<tr>
<td>5.</td>
<td>Ao correr muito rápido</td>
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<tr>
<td>6.</td>
<td>Ao praticar uma atividade esportiva</td>
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<tr>
<td>7.</td>
<td>Ao sentar com os joelhos dobrados/flexionados (por 20 minutos)</td>
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<tr>
<td>8.</td>
<td>Ao ajoelhar-se (independentemente da duração)</td>
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<tr>
<td>9.</td>
<td>Pior dor em repouso/dormindo</td>
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<tr>
<td>10.</td>
<td>Pior dor ao descansar após atividade</td>
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</tbody>
</table>
APPENDIX

**QUESTIONÁRIO DO ÍNDICE DE FUNÇÃO (QIF – FIQ)**

Você apresenta atualmente algum problema relacionado com seu joelho:

( ) direito ( ) esquerdo

1. Caminhar cerca de 1.600 metros
   - Não consigo ( )
   - Consigo com dificuldade ( )
   - Nenhuma dificuldade ( )

2. Subir dois lances de escadas (aproximadamente 16 degraus)
   - Não consigo ( )
   - Consigo com dificuldade ( )
   - Nenhuma dificuldade ( )

3. Agachar
   - Não consigo ( )
   - Consigo com dificuldade ( )
   - Nenhuma dificuldade ( )

4. Ajoelhar
   - Não consigo ( )
   - Consigo com dificuldade ( )
   - Nenhuma dificuldade ( )

5. Sentar por longos períodos com seus joelhos dobrados/flexionados na mesma posição
   - Não consigo ( )
   - Consigo com dificuldade ( )
   - Nenhuma dificuldade ( )

6. Subir quatro lances de escada (aproximadamente 32 degraus)
   - Não consigo ( )
   - Consigo com dificuldade ( )
   - Nenhuma dificuldade ( )

7. Correr uma distância curta, cerca de 100 metros (aproximadamente a distância de um campo de futebol)
   - Não consigo ( )
   - Consigo com dificuldade ( )
   - Nenhuma dificuldade ( )

8. Caminhar por uma distância curta (cerca de um quarteirão)
   - Não consigo ( )
   - Consigo com dificuldade ( )
   - Nenhuma dificuldade ( )

**ESCALA DE AVALIAÇÃO NUMÉRICA DA DOR (NPRS)**

Eu gostaria que você desse uma nota para sua dor numa escala de 0 a 10, onde 0 seria nenhuma dor, e 10 seria a pior dor possível. Por favor, dê um numero para descrever sua média de dor:

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>nenhuma dor</td>
<td>pior dor possível</td>
<td></td>
<td></td>
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</table>

**ESCALA DA PERCEPÇÃO DO EFEITO GLOBAL (EPEG – GPE)**

Comparado quando esta dor no joelho começou, como você descreveria seu joelho nestes dias?

<table>
<thead>
<tr>
<th>-5</th>
<th>-4</th>
<th>-3</th>
<th>-2</th>
<th>-1</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>extremamente pior</td>
<td>sem modificação</td>
<td>Completamente recuperada</td>
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