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# Clinimetric testing of two instruments that measure attitudes and beliefs of health care providers about chronic low back pain

Testes clinimétricos de dois instrumentos que mensuram atitudes e crenças de profissionais de saúde sobre a dor lombar crônica

Mauricio O. Magalhães<sup>1</sup>, Leonardo O. P. Costa<sup>1</sup>, Manuela L. Ferreira<sup>2</sup>, Luciana A. C. Machado<sup>3</sup>

## Abstract

**Background:** There are no clinimetrically tested instruments for measuring attitudes and beliefs of health care providers with regards to chronic low back pain in Brazil. **Objectives:** To translate and cross-culturally adapt the Pain Attitudes and Beliefs Scale for Physiotherapists (PABS.PT) into Brazilian-Portuguese and to test the clinimetric properties of the Brazilian-Portuguese versions of the Health Care Providers' Pain and Impairment Relationship Scale (HC-PAIRS) and the PABS.PT. **Methods:** The PABS.PT was cross-culturally adapted following the recommendations of current guidelines. The PABS.PT and the HC-PAIRS were clinimetrically tested in 100 physical therapists who routinely treat patients with low back pain in their clinical practice. The internal consistency, construct validity and ceiling and floor effects were tested using only baseline values from the participants while reproducibility was evaluated in a test-retest design with a seven-day interval. **Results:** Both scales demonstrated adequate levels of internal consistency (Cronbach's alpha ranging from 0.67 to 0.74). Their reproducibility ranged from moderate to substantial (Intraclass Correlation Coefficient<sub>2,1</sub> ranging from 0.70 to 0.84; Standard Error of the Measurement ranging from 3.48 to 5.06). The validity coefficients of the scales ranged from weak to moderate (Pearson's correlation coefficient ranging from 0.19 to 0.62). No ceiling or floor effects were detected. **Conclusions:** The results of the present study indicate that both PABS.PT and HC-PAIRS are reproducible scales for the measurement of attitudes and beliefs towards chronic low back pain in Brazilian physical therapists.

**Keywords:** low back pain; questionnaires; clinimetrics; physical therapy.

## Resumo

**Contextualização:** Não existem instrumentos clinimetricamente testados que mensuram atitudes e crenças de profissionais de saúde sobre a dor lombar crônica no Brasil. **Objetivos:** Traduzir e adaptar transculturalmente a escala *Pain Attitudes and Beliefs Scale for Physiotherapists* (PABS.PT) para o português-brasileiro e avaliar as propriedades clinimétricas das versões em português-brasileiro da *Health Care Providers' Pain and Impairment Relationship Scale* (HC-PAIRS) e da PABS.PT. **Métodos:** A PABS.PT foi adaptada transculturalmente seguindo recomendações das diretrizes existentes. Em seguida, as versões em português-brasileiro da PABS.PT e da HC-PAIRS foram clinimetricamente testadas em 100 fisioterapeutas que rotineiramente trabalhavam com pacientes portadores de dor lombar em sua prática clínica. A consistência interna, validade do construto e efeitos de teto e piso foram testados utilizando somente as respostas dos participantes na linha de base do estudo, e a reprodutibilidade foi testada em um delineamento de teste-reteste com intervalo de sete dias. **Resultados:** Os instrumentos apresentaram valores adequados de consistência interna (Alfa de Cronbach variando entre 0,67 e 0,74). Sua reprodutibilidade variou de moderada a substancial (Coeficiente de Correlação Intraclassa tipo 2,1 variando entre 0,70 e 0,84; Erro-Padrão da Medida variando entre 3,48 e 5,06). Os índices de correlação entre os instrumentos variaram de fraco a moderado (Índice de Correlação de Pearson variando entre 0,19 e 0,62). Não foram detectados efeitos de teto e piso nos instrumentos. **Conclusões:** Os resultados do presente estudo indicam que ambas as escalas PABS.PT e HC-PAIRS são instrumentos reprodutíveis para mensurar as atitudes e crenças relacionadas à dor lombar crônica em profissionais de saúde brasileiros.

**Palavras-chave:** dor lombar; questionários; clinimetria; fisioterapia.

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## Introduction ::::

Low back pain is one of the most common reasons for patients to seek medical care<sup>1</sup>. In Brazil, low back pain represents up to 15% of the annual consultations in the public health services<sup>2</sup>. The high prevalence of low back pain leads to substantial social expenditure that is not only related to direct costs, but also to indirect costs due to work absenteeism<sup>3</sup>. Patients with chronic low back pain (i.e. with a duration of symptoms of 12 weeks or more) are responsible for the greatest proportion of these costs<sup>4</sup>.

The disability associated with low back pain is extremely variable and its magnitude is not likely to be explained by the intensity of pain<sup>5</sup>. On the other hand, psychosocial factors have been considered as key elements for the development of chronic disability<sup>6</sup>; for instance, those patients who believe that their spine is vulnerable tend to demonstrate a cautious behavior with regards to the muscular activity and movement. Consequently, they would be more likely to present higher levels of disability<sup>7,8</sup>. Moreover attitudes and beliefs about the relationship between pain and disability are also able to influence the choices of health care providers with regards to the treatment of patients with low back pain<sup>9</sup>.

In the last decade, there was a great change on the understanding of several aspects related to chronic low back pain<sup>10,11</sup>, however many of this new knowledge were still not incorporated into clinical practice by physical therapists or other rehabilitation-related professionals<sup>12</sup> due to the attitudes and beliefs that these professionals acquired over time. For example, although clinical practice guidelines do not recommend bed rest or passive treatments for low back pain<sup>10</sup>, several professionals still prescribe this kind of intervention<sup>12</sup>. The identification of these professionals with inadequate beliefs and attitudes may potentially help in better therapeutic outcomes in the future. This identification is essentially based on scales or questionnaires developed to measure the construct of attitudes and beliefs. The choice of the best scales should be based on their applicability, adaptation to the target population and, mainly, on their measurement properties (clinimetric properties), such as reproducibility, validity and internal consistency<sup>13</sup>.

In a recent systematic review of the literature<sup>14</sup>, five scales aimed to evaluate the attitudes and beliefs of health care providers about low back pain were identified and the *Health Care Providers' Pain and Impairment Relationship Scale* (HC-PAIRS)<sup>15</sup> and the *Pain Attitudes and Beliefs Scale for Physiotherapists* (PABS.PT)<sup>16</sup> were more frequently used. These scales are described as it follows.

## HC-PAIRS

The HC-PAIRS was developed from the *Pain and Impairment Relationship Scale* (PAIRS), which was originally developed to assess attitudes and beliefs of patients with low back pain<sup>15</sup>. Fifteen items that suggest a direct relationship between pain and disability are scored on a 7-point Likert scale (0 = "totally disagree" and 6 = "totally agree"). The total score of HC-PAIRS ranges from 0 to 90 points, being higher scores representing a stronger belief in the relationship between chronic pain and disability and lower scores representing a lower belief on this relationship. The clinimetric properties of the originally developed HC-PAIRS are satisfactory, including appropriate internal consistency and discriminant validity<sup>15</sup>.

## PABS.PT scale

The PABS.PT scale was developed to evaluate the role of the attitudes and beliefs of physical therapists in the development and maintenance of low back pain<sup>16</sup>. Similar to the HC-PAIRS, twelve of the 31 items that compose the PABS.PT were derived from existing questionnaires that evaluate the attitudes and beliefs of patients with chronic low back pain, such as the *Tampa Scale for Kinesiophobia* (TSK)<sup>17,18</sup>. Later, the authors proposed the exclusion of 15 of the 31 original items and the inclusion of three new items (i.e., 19 items in total). The clinimetric analysis of the modified scale confirmed its previous factorial structure<sup>19</sup>. Through the factorial analysis of PABS.PT, two factors were identified: the biomedical factor (composed by items 1 to 10) and the biopsychosocial factor (composed by items 11 to 19). The items of both factors are scored on a 6-point Likert scale (0 = "totally disagree" and 5 = "totally agree"). The total score of the biomedical component ranges from 0 to 50 points and the total score of the biopsychosocial component ranges from 0 to 45 points. A high score on the first factor represents the conviction on the relationship between pain and structural damage, while a high score on the second factor indicates the absence of this relationship<sup>19</sup>.

Although attitudes and beliefs of health care providers be known as one of the factors that are likely to influence the outcomes observed in the treatment of patients with chronic low back pain, this research topic is still incipient<sup>14</sup>. In Brazil, such topic was studied just once, in which the HC-PAIRS was translated and cross-culturally adapted into Brazilian-Portuguese and was used to investigate the attitudes and beliefs of physical therapy students about chronic low back pain<sup>20</sup>. However, the clinimetric properties of the adapted scale were not still performed. Moreover the Brazilian-Portuguese version of PABS.PT was not still developed. Therefore, the objectives of the present study were to translate and cross-

culturally adapt the Brazilian-Portuguese version of PABS.PT and to evaluate the clinimetric properties of both Brazilian-Portuguese versions of HC-PAIRS and of PABS.PT.

## Methods

This study was performed in two stages. The first stage consisted on the translation and cross-cultural adaptation of the PABS.PT scale into Brazilian-Portuguese (the HC-PAIRS has already been previously adapted to Brazilian-Portuguese following the same cross-cultural adaptation procedures used in this study)<sup>20</sup>. The second stage consisted on testing the clinimetric properties of the Brazilian-Portuguese version of the HC-PAIRS and PABS.PT in 100 physical therapists who routinely worked with patients with low back pain in their clinical practice. The following hypotheses were tested:

1. The Brazilian-Portuguese versions of the HC-PAIRS and PABS.PT scales would demonstrate an acceptable level of internal consistency;
2. The Brazilian-Portuguese version of the HC-PAIRS would be positively correlated with the Brazilian-Portuguese version of the PABS.PT;
3. The Brazilian-Portuguese versions of the HC-PAIRS and the PABS.PT would demonstrate an acceptable reproducibility in a test-retest design with seven-day interval;
4. The Brazilian-Portuguese versions of the HC-PAIRS and the PABS.PT would demonstrate low levels of ceiling and floor effects.

## Translation and cross-cultural adaptation

The translation and cross-cultural adaptation procedures followed the *Guidelines for the process of cross-cultural adaptation of self report measures*<sup>21</sup>, as described below:

1. Forward translation: the original PABS.PT scale was translated into the Brazilian-Portuguese by two independent bilingual translators who were unaware of the instrument;
2. Synthesis of the translations: after the discussion and revision of the two translations, the translators produced a consensual version of the PABS.PT into Brazilian-Portuguese;
3. Back translation: the new Brazilian-Portuguese version of PABS.PT was then back translated into English by two independent bilingual translators, who did not have previous knowledge of the original version of the questionnaire;
4. An expert committee composed by the four translators and the authors of this study revised all the previous procedures, compared all translations and corrected possible discrepancies so that the final version of PABS.PT could be tested in Brazil.

The translation and cross-cultural adaptation procedures of the HC-PAIRS<sup>20</sup> were identical to the ones used for the PABS.PT. Pre-tests were not performed to check the understanding of items of the instruments as suggested by the guidelines<sup>21</sup>. The participants of the study were asked about the comprehensibility of the items of these instruments and they reported no major problems when answering the instruments.

## Clinimetric properties testing

The clinimetric properties of the Brazilian-Portuguese versions of the HC-PAIRS and PABS.PT scales were tested in a sample of 100 physical therapists who routinely treat patients with low back pain in their clinical practice. They were recruited by convenience in four major Brazilian cities (São Paulo, Belém, Maceió and Belo Horizonte). To participate in the study, the physical therapists should be registered in any Brazilian registration board, have experience in the treatment of patients with low back pain (this information was obtained through the question: *How many patients with low back pain on average do you treat per week?*) and to sign the informed consent form agreeing to participate.

The sample size of 100 physical therapists was defined following the recommendations of the *Quality criteria for measurement properties of health status questionnaires*<sup>22</sup> which suggest that, at least, 50 participants would be necessary for the reproducibility, validity and ceiling and floor effects analyses, and at least 100 participants would be needed for the internal consistency analysis.

The following clinimetric properties were tested:

1. Internal consistency: internal consistency is the measurement property that tests if the items of an instrument (or the subscales of the instrument) are correlated (homogeneous), in other words, if multiple items of an instrument measure the same construct. The internal consistency of the instruments was tested through the Cronbach's alpha statistics<sup>22</sup>. Cronbach's alpha values ranging from 0.70 to 0.95 represent acceptable internal consistency<sup>22,23</sup>.
2. Reproducibility: refers to the ability of an instrument to obtain similar answers in a test-retest design in stable conditions. Reproducibility is an umbrella term that covers two properties: reliability and agreement<sup>22,24</sup>.
  - a. Reliability: evaluates to what extent individuals can be distinguished to each other despite the measurement error. In other words, the reliability is the relative measurement error<sup>22,24</sup>. Reliability was measured in this study by using the Intraclass Correlation Coefficient (ICC) type 2,1<sup>25,26</sup>. ICCs lower than 0.40 represents poor reliability; ICCs ranging between 0.40 and 0.75 represents moderate reliability; between 0.75 and 0.90

represents substantial reliability and higher than 0.90 represents excellent reliability<sup>23</sup>.

- b. Agreement: agreement is defined as the absolute error of the measurement. The statistical procedure of agreement is able to determine how close two scores measured in different time points are from each other. Agreement is always expressed in the same measurement units of the instrument through the Standard Error of the Measurement (SEM). SEM was calculated by the ratio of the standard deviation (SD) of the differences and the square root of 2 (SD of differences /  $\sqrt{2}$ )<sup>24</sup>. Agreement was evaluated by the percentage of SEM in relation to the total score of the questionnaires, being lower or equal to 5% representing very good agreement; between 5.1% and 10% representing good agreement; between 10.1% and 20% representing doubtful agreement and above 20.1% representing low agreement<sup>27</sup>.
3. Construct validity: refers to what extent the score of one instrument correlates with the score of another instrument that measures the same construct (or similar constructs). The construct validity is evaluated by testing *a priori* hypotheses. The statistical test used in our study was the Pearson Correlation Coefficient ( $r$ )<sup>22</sup>. The construct validity ranges from weak to good, being considered weak if  $r < 0.30$ ; moderate if  $0.30 \leq r < 0.60$  and good if  $r \geq 0.60$ <sup>28</sup>.
4. Ceiling and floor effects: ceiling and floor are considered when more than 15% of the participants answer the maximum (ceiling) or minimum (floor) score of the questionnaire<sup>22</sup>. One of the consequences of the ceiling and floor effects is the inability to distinguish patients who answered very low or very high scores, which influences the reliability of the instrument. The ceiling and floor effects were calculated through frequency analyses starting from summing the number of participants who answered the questionnaires with maximum (ceiling) and minimum (floor) scores and through the subsequent conversion of these values into percentages.

All physical therapists answered the HC-PAIRS and PABS.PT scales twice through interviews, being the first interview at baseline (day 0) and the second one seven days later (day 7). The seven-day interval was chosen to avoid the recall from the first interview, but also to ensure that there was not enough time that the beliefs with regards to low back pain could be changed (for example due to continuous education courses). The baseline interview and the one seven days later were previously scheduled with the participants, and there were no drop outs between the first and the second interview. Demographic data, such as age, gender, workplace and professional experience were also collected at baseline.

This study has been approved by the Ethical Research Committee of the Pontifícia Universidade Católica de Minas Gerais (PUC-MG), Belo Horizonte, MG, Brasil, reference number FR-146074.

## Results

A total of 100 physical therapists of both genders, being most young adults, with professional experience lower than 5 years, following different treatment approaches for low back pain and attending in different types of clinical environment participated in the study (Table 1).

The final version of the PABS.PT scale translated and cross-culturally adapted into Brazilian-Portuguese is described in appendix 1. Tables 2 and 3 present the results for the internal

**Table 1.** Characteristics of the participants.

| Variable   |         |
|--|---------|
| Gender <sup>a</sup>                              |         |
| Male   | 51 (51) |
| Female   | 49 (49) |
| Age (years) <sup>a</sup>                         | 26 (4)  |
| Number of patients with low back pain per month* | 8 (7)   |
| Professional experience (in years)*              | 4.5 (4) |
| University <sup>b</sup>                          |         |
| Public   | 23 (23) |
| Private  | 77 (77) |
| Academic degree <sup>b</sup>                     |         |
| Bachelor   | 20 (20) |
| Especialist                                      | 63 (63) |
| Master   | 12 (12) |
| PhD  | 3 (3)   |
| No information                                   | 2 (2)   |
| Main treatment approaches used <sup>b</sup>      |         |
| Yes <sup>b</sup>                                 | 44 (44) |
| McKenzie   | 4 (4)   |
| Motor control exercises                          | 6 (6)   |
| Postural reeducation                             | 14 (14) |
| Pilates  | 1 (1)   |
| Osteopathy                                       | 10 (10) |
| Other  | 9 (9)   |
| No <sup>b</sup>                                  | 56 (56) |
| Work environment <sup>b</sup>                    |         |
| Private office                                   | 21 (21) |
| Public hospital                                  | 21 (21) |
| Public physical therapy clinic                   | 20 (20) |
| Private multidisciplinary clinic                 | 10 (10) |
| Private physical therapy clinic                  | 11 (11) |
| Home care provider                               | 9 (9)   |
| Fitness center                                   | 4 (4)   |
| Private hospital                                 | 2 (2)   |
| No information                                   | 2 (2)   |

<sup>a</sup>Continuous data are presented as mean and standard deviation (SD) and <sup>b</sup>Categorical data are presented as number and percentages \*Median and interquartile range.

consistency, reproducibility and construct validity of the instruments as well as their respective subscales. The internal consistency estimates ranged from 0.67 to 0.74; the reliability estimates ranged from 0.70 to 0.84; the agreement ranged from 3.48 to 5.06 and finally the percentage of the SEM in relation to the total scores of the questionnaires ranged from 4.8% and 7.7% (Table 2). These results reflect appropriate estimates of internal consistency and reproducibility. The correlation matrix with the results of the construct validity analysis shows correlation estimates that ranged from weak to moderate in most of the cases, except for the correlation between the subscale *PABS.PT*<sub>Biomedical factor</sub> and HC-PAIRS which did not reach statistical significance (Table 3).

## Discussion

The objectives of this study were to translate and to cross-culturally adapt the PABS.PT scale into Brazilian-Portuguese and to test the clinimetric properties of the Brazilian-Portuguese versions of the HC-PAIRS and PABS.PT. The sample recruited was derived from several Brazilian cities (Belém, Maceió, São Paulo and Belo Horizonte). Moreover the participants were physical therapists with different levels of academic degrees and professional experience, who worked in different clinical environments. These factors together are relevant with regards to the external validity of the study.

Internal consistency is a measure of homogeneity of the questionnaire's items, in other words, it evaluates if a group of items that compose the instrument (or one of the factors/subscales of the instrument) refers to a same construct<sup>13,22</sup>. An acceptable Cronbach's alpha value was observed (0.71) for the Brazilian-Portuguese HC-PAIRS scale. Two studies presented

similar estimates. The first study<sup>15</sup> analyzed attitudes and beliefs of health care providers in relation to patients with chronic low back pain. This study recruited 150 American health care providers (i.e. medical doctors, physical therapists, nurses, psychologists, occupational therapists and exercise physiologists) and a Cronbach's alpha estimate of 0.78 was observed. The second study<sup>7</sup> recruited a sample of 156 Dutch therapists (i.e., chiropractors, physical therapists, manual therapists and osteopaths) and this study also observed an acceptable value of internal consistency for the same scale (Cronbach's alpha = 0.83).

The PABS.PT scale is interpreted according to a two-dimensional model. In this study, the analyses of the internal consistency of the PABS.PT scale showed an acceptable Cronbach's alpha estimate for the *PABS.PT*<sub>Biomedical factor</sub> subscale (0.74), but not for the *PABS.PT*<sub>Biopsychosocial factor</sub> subscale (0.67). These results are also similar to the results of clinimetric studies performed previously. Houben et al.<sup>19</sup> analyzed a sample of 295 Dutch therapists and observed a Cronbach's alpha value of 0.73 for the *PABS.PT*<sub>Biomedical factor</sub> subscale and 0.68 for the *PABS.PT*<sub>Biopsychosocial factor</sub> subscale. Another study, in which the clinimetric properties of the German version of the PABS.PT<sup>29</sup> were tested, it was also observed an acceptable Cronbach's alpha value for the *PABS.PT*<sub>Biomedical factor</sub> subscale (0.77), but not for the *PABS.PT*<sub>Biopsychosocial factor</sub> subscale (0.58). The same pattern of results was observed in Ostelo's et al.<sup>16</sup> study, in which the Cronbach's alpha value were 0.84 for the *PABS.PT*<sub>Biomedical factor</sub> subscale and of 0.54 for the *PABS.PT*<sub>Biopsychosocial factor</sub> subscale. In all studies which the internal consistency of PABS.PT were evaluated, the *PABS.PT*<sub>Biomedical factor</sub> was always higher when compared to the *PABS.PT*<sub>Biopsychosocial factor</sub> subscale. Because the internal consistency of the biopsychosocial subscale is problematic in all existent versions in different languages,

**Table 2.** Internal consistency, reliability and agreement of the questionnaires.

| Questionnaire   | Internal Consistency<br>(Cronbach alpha) | Reliability<br>(ICC <sub>2,1</sub> , 95% CI) | Agreement<br>(SEM) | Agreement (% of SEM in relation to the total score) |
|---|--|--|--------------------|---|
| HC- PAIRS (0-90)  | 0.71                                     | 0.84 (0.77 to 0.89)                          | 4.34               | 4.8   |
| <i>PABS.PT</i> <sub>total score</sub> (0-95)            | N/A                                      | 0.80 (0.72 to 0.86)                          | 5.06               | 5.3   |
| <i>PABS.PT</i> <sub>biomedical factor</sub> (0-50)      | 0.74                                     | 0.80 (0.72 to 0.87)                          | 3.57               | 7.1   |
| <i>PABS.PT</i> <sub>biopsychosocial factor</sub> (0-45) | 0.67                                     | 0.70 (0.57 to 0.94)                          | 3.48               | 7.7   |

SEM, Standard Error of the Measurement; ICC<sub>2,1</sub>, Intraclass Correlation Coefficient type 2,1; CI, Confidence Interval; N/A, not applicable; *PABS.PT*, Pain Attitudes and Beliefs Scale for Physiotherapists; HC-PAIRS, Health Care Providers' Pain and Impairment Relationship Scale.

**Table 3.** Construct validity.

|  | <i>PABS.PT</i> <sub>Biomedical factor</sub> | <i>PABS.PT</i> <sub>Biopsychosocial factor</sub> | HC-PAIRS         | <i>PABS.PT</i> <sub>Total score</sub> |
|--|---|--|------------------|---------------------------------------|
| <i>PABS.PT</i> <sub>Biomedical factor</sub>      |   | 0.20 (P = 0.848)                                 | 0.28 (P = 0.005) | 0.41 (P < 0.01)                       |
| <i>PABS.PT</i> <sub>Biopsychosocial factor</sub> | 0.20 (P = 0.848)                            |  | 0.19 (P = 0.055) | 0.62 (P < 0.01)                       |
| HC-PAIRS   | 0.28 (P = 0.005)                            | 0.19 (P = 0.055)                                 |                  | 0.55 (P < 0.01)                       |
| <i>PABS.PT</i> <sub>Total score</sub>            | 0.41 (P < 0.01)                             | 0.62 (P < 0.01)                                  | 0.55 (P < 0.01)  |                                       |

*PABS.PT*, Pain Attitudes and Beliefs Scale for Physiotherapists; HC-PAIRS, Health Care Providers' Pain and Impairment Relationship Scale.

the hypothesis that the moderate internal consistency of the Brazilian-Portuguese version is due to translation/adaptation problems or misunderstanding of the items by the participants is unlikely. Studies are necessary in order to revise and retest the items of this subscale.

Reproducibility refers to the ability of a measurement instrument to obtain similar answers under stable conditions<sup>24</sup> and it is evaluated through the relative (reliability) and absolute (agreement) error of the instrument. In the present study, reliability estimates ranged from moderate to substantial. For the HC-PAIRS scale, an ICC of 0.84 (95% CI 0.77 to 0.89) was observed. Similarly the study of Rainville et al.<sup>9</sup> also observed a moderate ICC value (0.64) for the reliability of HC-PAIRS. With regards to the PABS.PT scale, we observed an ICC of 0.80 (95% CI 0.72 to 0.87) for the PABS.PT<sub>Biomedical factor</sub> subscale and 0.70 (95% CI 0.57 to 0.94) for the PABS.PT<sub>Biopsychosocial factor</sub> subscale. Similar ICCs estimates were observed in the study of Laekeman, Sitter and Basler<sup>29</sup> (0.83 for the PABS.PT<sub>Biomedical factor</sub> subscale and 0.70 for the PABS.PT<sub>Biopsychosocial factor</sub>).

The agreement values observed in this study were 4.34 for the HC-PAIRS, 5.06 for the PABS.PT<sub>Total score</sub>, 3.57 for the PABS.PT<sub>Biomedical factor</sub> and 3.48 for the PABS.PT<sub>Biopsychosocial factor</sub>. The percentage of the SEM in relation to the total score of the questionnaires ranged from 4.8% (HC-PAIRS) to 7.7% (PABS.PT<sub>Biopsychosocial factor</sub> subscale), representing a good agreement. We are unaware of previous studies that measured the agreement of these instruments.

Construct validity is tested when the score of a certain measurement instrument is correlated with the score of another instrument that measures the same construct (or a similar construct). Construct validity may range from weak to good, being considered weak if  $r < 0.30$ ; moderate if  $0.30 \leq r < 0.60$  and good if  $r \geq 0.60$ <sup>28</sup>. The correlation matrix in Table 3 demonstrates correlations that range from weak to moderate in all cases, except for the correlations between the PABS.PT<sub>Biopsychosocial factor</sub> subscale and the PABS.PT<sub>Biomedical factor</sub> and the HC-PAIRS, which did not reach statistical significance. It is important to highlight that the PABS.PT and the HC-PAIRS do not evaluate identical constructs and a gold standard does not exist for such constructs. Therefore, moderate correlation coefficients can be considerate acceptable given that our results support our a priori hypothesis that these scales would be positively correlated. While the PABS.PT evaluates the attitudes and beliefs of health care providers regarding the development and maintenance of the chronic low back pain, the HC-PAIRS evaluates the belief of health care providers in the relationship between intensity pain and disability in patients with chronic low back pain. So, high correlation values

between these instruments are not expected. In the present study, a positive and weak correlation between the HC-PAIRS and the PABS.PT<sub>Biomedical factor</sub> subscale was observed ( $r=0.28$ ;  $P=0.005$ ). On the other hand, the study of Houben et al.<sup>19</sup> showed a moderate correlation between these scales ( $r=0.51$ ;  $P<0.001$ ). Similarly a weak correlation was observed between HC-PAIRS and the PABS.PT<sub>Biopsychosocial factor</sub> ( $r=0.19$ ;  $P=0.06$ ), while the study of Houben et al.<sup>19</sup> showed a negative correlation ( $r=-0.36$ ;  $P<0.001$ ). The differences in terms of construct validity in different countries may be explained by a combination of cultural aspects, sample differences or still by differences in the educational context of the curricular structure of the educational programs of physical therapy worldwide.

Our study has some limitations that should be considered on the interpretation of the results. First, the pre-tests were not performed to analyze the comprehensibility of the scales' items before starting the data collection. The cross-cultural adaptation guidelines<sup>21</sup> suggest that the pre-test should be carry out in a small sample of patients to test if the final version is easy to understand. Although the participants of this study have considered the instruments as easy to complete, the possibility that the pre-test would have identified the need of a review of some PABS.PT's items cannot be ignored. The HC-PAIRS version used in this study was also not pre-tested<sup>20</sup>. Second, the order of the scales that were completed by the participants was not random. Although this procedure is only mandatory in instruments with high levels of similarity, such as the long and short versions of the McGill Pain Questionnaire<sup>30</sup>, the possibility that the patterns of participants' answers have been influenced by the order of application of the instruments cannot be ruled out.

Several scales have already been developed for the evaluation of the attitudes and beliefs of health care providers about low back pain<sup>14</sup>. However, before the development of this study, the HC-PAIRS were the only scale already translated and cross-culturally adapted for the Brazilian-Portuguese and its clinimetric properties had not still been tested<sup>20</sup>. The results of this study indicate that the Brazilian-Portuguese versions of the PABS.PT and HC-PAIRS have acceptable levels of reproducibility. The levels of construct validity of these scales ranged from weak to moderate. Besides, ceiling and floor effects were not observed in both instruments. Therefore it is now possible to confidently use the Brazilian-Portuguese versions of PABS.PT and HC-PAIRS in future studies, in order to a better understanding with regards to the attitudes and beliefs of health care providers (including physical therapists) and its impact in the patients' outcomes with low back pain in Brazil.

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**Appendix 1.** The Brazilian-Portuguese version of the PABS.PT

|  | Discordo totalmente | Discordo | Discordo parcialmente | Concordo parcialmente | Concordo | Concordo totalmente |
|--|---------------------|----------|-----------------------|-----------------------|----------|---------------------|
| A intensidade da dor é determinada pela severidade da lesão tecidual.  | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| O aumento da dor indica uma nova lesão tecidual ou um aumento da lesão existente.                                      | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Dor é um estímulo nociceptivo, indicando uma lesão tecidual.   | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Se a severidade da dor lombar aumentar, eu imediatamente ajusto a intensidade do meu tratamento.                       | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Se o paciente reclama de dor durante o exercício, eu temo que uma lesão tecidual esteja ocorrendo.                     | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Pacientes com dor lombar devem preferencialmente praticar apenas movimentos livres de dor.                             | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| A redução da dor é um pré-requisito para a restauração da função normal.   | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Se o tratamento não resulta na diminuição da dor lombar, existe um alto risco de restrições severas em um longo prazo. | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Dor lombar indica a presença de uma lesão orgânica.  | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Em longo prazo, pacientes com dor possuem um maior risco de desenvolver disfunções de coluna.                          | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Aprender a lidar com o estresse leva a recuperação da dor lombar.  | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Um paciente com dor lombar severa se beneficiará de exercícios físicos.  | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Mesmo com a piora da dor, pode-se aumentar a intensidade do próximo tratamento.  | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Exercícios que podem estressar a coluna não devem ser evitados durante o tratamento.                                   | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| O tratamento pode ter tido sucesso mesmo se a dor continuar.   | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| A causa da dor lombar é desconhecida.  | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Limitações funcionais associadas com dor lombar são resultados de fatores psicossociais.                               | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Não existe um tratamento eficaz para eliminar a dor lombar.  | 0                   | 1        | 2                     | 3                     | 4        | 5                   |
| Estresse mental pode causar dor lombar mesmo na ausência de lesão tecidual.  | 0                   | 1        | 2                     | 3                     | 4        | 5                   |