Interferência da Dor na Vida Diária: Validação de uma versão Portuguesa da Escala de Interferência da Dor do Brief Pain Inventory

Pain-related Interference in Daily Life: Validation of a Portuguese version of the Brief Pain Inventory Interference Scale[1]

M. Alexandra Ferreira-Valente

Faculdade de Psicologia e Ciências da Educação da Universidade do Porto / Fundação para a Ciência e a Tecnologia (Portugal)

José L. Pais-Ribeiro

Faculdade de Psicologia e Ciências da Educação da Universidade do Porto (Portugal)

Mark P. Jensen

University of Washington School of Medicine, Seattle (USA)

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O objectivo deste estudo foi avaliar as propriedades psicométricas da Escala de Interferência (da dor) da versão Portuguesa do Brief Pain Inventory (P-BPI). A dor, particularmente a dor crónica, é um importante problema de saúde presente em num largo espectro de patologias, a qual impacta significativamente a qualidade de vida dos que dela padecem. A fim de prestar os cuidados adequados a este sinal vital e sintoma frequente, e afim de poder monitorizar as alterações na dor ao longo do tempo, são necessárias medidas de dor fiáveis e válidas. Uma avaliação adequada da dor deve incluir a monitorização da sua intensidade, localização e interferência no funcionamento e actividades diárias. São necessários instrumentos válidos de avaliação da interferência da dor para fins clínicos e de investigação inter-cultural. A Escala de Interferência do BPI é uma das medidas mais comummente utilizadas e encontra-se validada em numerosos idiomas e culturas. Embora existisse já uma validação linguística desta escala para Português (Portugal), ainda não existia

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uma validação psicométrica da mesma em amostras clínicas. Uma amostra de conveniência de 83 indivíduos com dor crónica músculo-esquelética respondeu à escala de interferência do P-BPI, e a medidas de funcionamento físico e psicológico. O coeficiente Alfa de Cronbach foi calculado para avaliar a consistência interna, e as correlações com as medidas de funcionamento físico e psicológico foram calculadas para avaliar a validade preditiva. A análise factorial dos itens foi também realizada. Os resultados suportam a consistência interna (alfa = .82) e dão apoio preliminar à validade do P-BPI. Finalmente, a análise factorial aponta para uma solução de um factor, tal como previsto. É necessária futura investigação para avaliar a generalização dos resultados do presente estudo, bem como para determinar a responsividade da escala às mudanças na interferência da dor ao longo do tempo.

The purpose of this study was to evaluate the psychometric properties a Portuguese Brief Pain Inventory (P-BPI) interference scale. Pain, particularly chronic pain, is a significant health problem present in a large number of health conditions, which impacts the quality of life of who suffer from it. In order to provide adequate care to this common symptom and vital sign, and to be able to monitor changes in pain over time, valid and reliable measures of pain are needed. An adequate evaluation of pain should include the assessment of its severity, location and its interference with functioning. Valid measures of pain-related interference are needed for clinical trials and cross-cultural research. The BPI interference scale is one of the most commonly used measures and has been validated in numerous languages. Although a linguistically validated Portuguese (Portugal) version of the BPI interference scale exists, it has not yet been validated in clinical samples. A convenience sample of 83 chronic musculoskeletal were administered the Portuguese BPI interference scale, and measures of physical and psychological functioning. Cronbach's alpha was computed to assess internal consistency, and correlations with physical and psychological functioning measures were computed to evaluate predictive validity. A factor analysis of the P-BPI items was also performed to determine items would yield one factor. The results provide strong support the internal consistency (alpha = .82) and preliminary support for the validity of the P-BPI. Moreover, the factor analysis yielded a hypothesized 1-factor solution which was interpretable and showed a good fit for the data. Research is needed to evaluate the generalizability of the current findings, as well as to determine the responsivity of the P-BPI to changes in pain interference over time.

Chronic pain is a significant health problem in individuals with various musculoskeletal conditions (Arnstein, 2000; Breivik, Collet, Ventafridda, Cohen, & Gallacher, 2006; Cleeland & Ryan, 1994; Mirò et al., 2007; Morlion et al., 2008). It can be defined as a multidimensional and private experience that lasts for at least 3 months (Merskey & Bogduk, 1994; Miró, Nieto & Huguet, 2008; Soares, 1999). Chronic pain is a source of suffering that can come to dominate the life of the patient and his/her family and friends, as it results in a complex set of somatic and psychosocial changes that undermine quality of life (Breivik, Collet, Ventafridda, Cohen & Gallacher, 2006; Morlion et al., 2008). Although large regional and national differences have been reported in overall prevalence, severity and primary causes of pain, chronic pain affects about one in each five European adults (Breivik et al., 2006).

In order to provide adequate care, and to be able to monitor changes in pain over time, valid and reliable measures of pain are needed. However, an adequate evaluation of chronic pain should include the assessment of more than just its severity and location (Caraceni et al., 1996); it should also include a measure of its interference with functioning (IMMPACT; Dworkin et al., 2005). Moreover, translated measures assessing pain interference are needed for cross-cultural research to determine if the same treatments have similar effects on outcomes across cultures and if factors shown to be predictive of pain interference replicate across languages and cultures.

The Brief Pain Inventory (BPI; Cleeland, 1989; Cleeland, 1990; Cleeland, 1991; Cleeland & Ryan, 1994) Interference scale has proven validity for evaluating the impact on daily life in English speaking samples. Initially developed and widely used in the USA for the assessment of cancer-related pain (Cleeland, 2009; IMMPACT; Dworkin et al., 2005; Jensen, 2003), the BPI Interference scale is now one of the most commonly used measures around the world, having been translated into many different languages, and validated across multiple cultural groups (e.g. Aisyaturridha, Naing, & Nizar, 2006; Badia et al., 2003; Caraceni et al., 1996; Cleeland & Ryan, 1994; Kalyadina et al., 2008;

Klepsatd et al., 2002; Mystakidou et al., 2001; Radbruch et al., 1999; Saxena, Mendoza, & Cleeland, 1999; Yun et al., 2004). The measure has also proved to be useful across a broad range of pain conditions (including, for example, individuals with multiple sclerosis, spinal cord injury, musculoskeletal conditions, diabetic peripheral neuropathy, herpes zoster and postherpetic neuralgia; e.g. Coplan et al., 2004; Cleeland, 2009; Cleeland & Ryan, 1994; Mendoza, Mayne, Rublee, & Cleeland, 2006; Osborne, Raichle, Jensen, Ehde, & Kraft, 2006; Raichle, Osborne, Jensen, & Cardenas, 2006; Tan, Jensen, Thornby, & Shanti, 2004; Zelman, Gore, Dukes, Tai, & Brandenburg, 2005). The BPI Interference Scale is also one of the two measures recommended by the IMMPACT consensus group (Dworkin et al., 2005) for the assessment of pain-related impact on functioning for both research and clinic purposes.

Although pain interference is recognized as an important outcome domain, very few measures of this domain exist that can be used in individuals who speak Portuguese. In fact, in the Portuguese clinical panorama, some of the translated and validated measures most used to assess disability are not pain specific instruments. Furthermore, although linguistically validated into Portuguese (Portugal) but still not psychometrically and culturally validated for the Portuguese population, BPI is well known and considered useful for both clinical and research purposes among the Portuguese pain specialists community.

The purpose of this study is to address the need to translate and validate a Portuguese version of the BPI Interference Scale in order to facilitate its use in clinical and cross-cultural studies. Specifically, we sought to (1) estimate the internal consistency of the measure and (2) evaluate its predictive validity with respect to its associations with other important pain-related variables. Based on the published findings using the BPI in other samples, we hypothesized that: (1) the internal consistency (Cronbach's alpha) of the Portuguese version of the BPI would be high (i.e., range between 0.78 and 0.95; e.g., Badia et al., 2003: Caraceni et al., 1996; Saxena et al.; Ger, Ho Sun, Wang, & Cleeland, 1999; Kalyadina et al., 2008); (2) the Portuguese version of the BPI Interference Scale would evidence predictive validity via a pattern of significant and

positive relationships with validity criteria consistent with those found in other versions of the scale (i.e., correlations between .48 and .67 with pain intensity ratings [e.g., Badia et al., 2003; Mendoza et al., 2006; Osborne et al., 2006; Raichle et al., 2006], correlations between .34 and .57 with measures of global physical functioning [e.g., Badia et al., 2003; Radburch et al., 1999], correlations between .41 and .52 with measures of global psychological functioning [e.g., Keller et al., 2004; Osborne et al., 2006; Radbruch et al., 1999; Raichle et al., 2006], and correlations between .34 and .62 with measures of anxiety and depression [e.g., Poulos, Gertz, Pankratz, & Post-White, 2001; Zelman et al., 2005]); and (3) a factor analysis of the BPI interference items would yield one factor that explains a substantial portion of the variance in the items.

METHOD

Subjects

The subjects were 83 patients with chronic musculoskeletal pain. They came from a convenience sample of patients in the Departments of Orthopedics or Physical Medicine and Rehabilitation of two hospitals in northern and central Portugal. In addition to reporting a history of chronic pain, all subjects had to be older than 18 years with no cognitive impairments that could prevent participation.

Most of the sample was female (60.2%), between 20 and 85 years of age (M = 53.04 years, SD = 15.26). In our sample, 62.2% of the participants were married or living with a significant other, 22.0% were single and 12.2% lived alone. The education level of the sample tended to be low; the majority had only a primary school education (53.1%) and just 11.0% of the participants continued to study after high school. Almost half of the subjects reported having chronic pain for at least two years (49.4%), and 19.3% reported having had pain for more than 10 years. A considerable number of participants reported having pain in two or three body regions (29.6%), or even four or more locations of pain (12.3%). The most common pain locations were the hip (25.9%) and knee (24.7%).

Measures

Demographic and Pain History Information. All participants were asked to provide information related to age, sex, marital status, cohabitation status, education status, professional status, pain duration, pain location and cause of pain.

Pain Intensity and Pain Interference. Pain intensity was assessed using the Visual Analogue Scale (VAS) (Huskisson, 1983). The VAS consists of a horizontal line of 100mm, with the end points "no pain" and "worst possible pain" written on each end of the line. Research supports the validity of the VAS as a measure of pain intensity through its strong association with other pain intensity measures, and responsivity to treatments known to impact pain (Jensen, Chen, & Brugger, 2003; Kahl & Cleland, 2005; Price, McGrath, Rafi, & Buckingham, 1983).

Pain interference was assessed using a Portuguese version of the pain Interference scale of the Brief Pain Inventory. With this scale, respondents are asked to indicate the relative interference of pain in seven daily life activities (i.e. general activity, mood, walking ability, normal work, relations with other people, sleep, and enjoyment of life) on 0 to 10 numerical scales, with 0 = "does not interfere" and 10 = "interferes completely." As described above, a great deal of evidence supports the validity and reliability of the BPI Interference Scale across many samples, cultures, and translations (Cleeland & Ryan, 1994), although to our knowledge no data have yet been published demonstrating its reliability and validity in patients who speak Portuguese.

Physical Functioning. Physical functioning was assessed using the Physical Component Summary (PCS) of the Portuguese SF-12 (Pais-Ribeiro, 2005). SF-12 is a shorter alternative to SF-36 health survey, and contains 12 items from the larger scale, measuring all of its eight domains. The SF-12 is a commonly used measure with demonstrated validity (Keller & Ware, 1996). The PCS is a composite score of six items, ranging from 0 to 100, with higher scores indicating better physical functioning. The standard recall period (4 weeks) was used. The Portuguese version has shown satisfactory psychometric characteristics (Cronbach's alpha of 0.79 for PCS, with this

score explaining 92% of the variability of the same component of the SF-36; Pais-Ribeiro, 2005).

Psychological Functioning. Psychological functioning was measured using the Mental Component Summary (MCS) of the Portuguese SF-12 (Pais-Ribeiro, 2005) and the Depression and Anxiety scales of the Hospital Anxiety and Depression Scale (HADS; Pais-Ribeiro et al., 2007). The MCS is a composite score of six items with a recall period of four weeks, ranging from 0 to 100, with higher scores indicating better psychological functioning. The Portuguese version has shown good reliability (Cronbach's alpha of 0.81) and validity (Pais-Ribeiro, 2005). The Portuguese version of the 14-item Hospital Anxiety and Depression Scale (HADS; Pais-Ribeiro et al., 2007) asks respondents to rate the severity of each depressive or anxiety symptom on 4-point Likert scales. The HADS is a commonly used measure with a great deal of evidence supporting its reliability and validity (Bjelland, Dahl, Haug, & Neckelmann, 2002; Zigmond & Snaith, 1983). The Portuguese version used in this study demonstrated good to excellent reliability (Cronbach's alpha of 0.76 and 0.81, for anxiety and depression scales respectively), in the validation for the Portuguese population study (Pais-Ribeiro et al., 2007).

Procedures

The inpatients and outpatients with chronic musculoskeletal pain were invited to complete all of the study measures. After signing the informed consent, the patients completed the questionnaires, which were then placed in an opaque urn, separate from the signed informed consent forms. Some patients (about 30% of the sample) who were unable to read or write were assisted by the investigators in completing the measures.

Data Analysis

We first computed the means and standard deviations for all demographic and study variables for descriptive purposes. We then computed a Cronbach's alpha of the translated BPI Interference Scale to assess the internal consistency of the measure. To

evaluate the predictive validity of the scale, we computed Pearson correlation coefficients between the total BPI pain interference score and the criteria measures of pain intensity, physical dysfunction and psychological functioning. Finally, we performed a confirmatory factor analysis (CFA) using EQS V6.1 (Bentler & Wu, 1995) to test a hypothesized one-factor model for the seven BPI interference items, using the Comparative Fit Index (CFI) to determine fit. The CFI evaluates the adequacy of the hypothesized model in relation to the worst (independent) model. If the hypothesized model is not a significant improvement on the independent model, the fit indices will be close to zero (Bentler, 1995). CFI seems to be the best index because it avoids the underestimation of fit often noticed in small samples (Bentler, 1990).

RESULTS

Descriptive information

Tables 1 and 2 present the means and standard deviations of the study variables. The sample was characterized by mild to moderate levels of pain-related disability (BPI Interference) [mean (SD) = 4.60 (2.35) on the 0-10 scale] on average, with the highest levels of interference reported for general activities (M = 5.42, SD = 2.35) and normal work (M = 5.19, SD = 3.48). On average, pain intensity was in the moderate range [mean (SD) pain intensity in the past week = 6.37 (2.75)]. The mean scores of the SF-12 Physical Component Summary (M = 36.71, SD = 23.64) and Mental Component Summary (M = 52.88, SD = 20.87) indicate marked dysfunction in these areas, comparatively to the norms for healthy individuals (Ware, Kosinski, & Keller, 1998; Pais-Ribeiro, 2005). Finally, the mean scores on the HADS, for anxiety (M = 9.62, SD = 3.81) and depression (M = 9.64, SD = 3.69), were suggestive of mild anxiety similar to individuals with a variety of medical disorders, but significant depressive symptoms higher than many individuals with medical disorders (Pais-Ribeiro et al., 2007).

Table 1: Descriptive Information for the Brief Pain Inventory Interference Scale and Interference Items

BPI Scale/Items	Mean	SD
BPI Total Interference scale	4.60	2.35
BPI items		
General activity	5.42	3.26
Mood	4.72	3.41
Walking ability	4.34	3.48
Normal Work	5.19	3.33
Relations with other people	3.25	3.33
Sleep	4.95	3.38
Enjoyment of life	4.30	3.45

Table 2: Descriptive Statistics for Measures of Pain Intensity, Physical and Psychological Functioning

	Mean	SD
Pain Intensity	6.37	2.75
Physical Functioning (SF-12, PCS)	36.71	23.64
Mental Health (SF-12, MCS)	52.88	20.87
Anxiety (HADS-A)	9.62	3.81
Depression (HADS-D)	8.64	3.69

Note: SF-12 PCS = Physical Component Summary scale; SF-12 MCS = Mental Component Summary scale; HADS-A = Hospital Anxiety and Depression Scale - Anxiety scale; HADS-D = Hospital Anxiety and Depression Scale – Depression scale.

Internal Consistency Reliability

Internal consistency was computed to estimate the reliability of the BPI Interference scale. Coefficient alpha results are presented in Table 3. The scale shows a good internal consistency, with an alpha coefficient of 0.82. Values for alpha if single items are deleted are comparable to the overall alpha, suggesting that no item detracts from the reliability of the measure.

Table 3: Reliability Analyses of Brief Pain Inventory Interference Scale

BPI Total scale or item	Our sample	Italian (Caraceni et al., 1996)	German (Radbruch et al., 1999)	Russian (Kalyadina et al., 2008)	Spanish (Badia et al., 2003)
			Cronbach's Alpha		
BPI Pain Interference Total scale	0.82	0.78	0.88	0.95	0.87
			Cronbach's Alpha if item deleted		
BPI Pain Interference Items					-
General activity	0.79	0.72	0.86	0.93	
Mood	0.78	0.75	0.85	0.94	-
Walking ability	0.79	0.76	0.88	0.95	-
Normal work	0.80	0.72	0.86	0.94	-
Relations with other people	0.82	0.76	0.86	0.95	-
Sleep	0.82	0.79	0.88	0.94	-
Enjoyment of life	0.79	0.72	0.87	0.94	-

Note: BPI = Brief Pain Inventory

Association between the Portuguese BPI Interference Scale and criterion variables

The Pearson correlation coefficients computed between the BPI Interference Scale score and measures of pain intensity during the past week, physical functioning and

psychosocial functioning are presented in Table 4. Statistically significant positive associations were found between pain interference overall score and pain intensity [r = 0.31, p < 0.01], anxiety [r = 0.50, p < 0.01] and depression [r = 0.31, p < 0.05]. In addition, a statistically significant negative association was found between pain interference overall score and SF-12 mental health score [r = -0.45, p < 0.01] and SF-12 physical functioning score [r = -0.42, p < 0.01]. The association between pain intensity and the interference scale was lower than expected, so we performed secondary analyses to determine if this was due to the heterogeneity of the sample (that is, possible differences between individuals with different pain conditions in the association between these variables), and/or to the validity of the pain intensity measure used. The coefficients for the participants with back pain and hip pain due to arthritis were larger (rs = 0.54 and 0.39, respectively), and that for participants with knee pain due to arthritis was lower (r = 0.07), although all were still in the expected direction. Moreover, the correlations between pain intensity and the other criterion variables show a moderate significant association between pain intensity and SF-12 physical functioning score [r = -0.36, p < 0.05], but no significant associations were found between pain intensity and anxiety, depression and SF-12 mental health score.

Table 4: Correlations with Measures of Pain Intensity, Physical Dysfunction and Psychological Functioning

Scale	BPI Interference Scale
Pain Intensity (VAS)	0.31**
SF-12 PCS	-0.42**
SF-12 MCS	-0.45**
HADS-A	0.50**
HADS-D	0.31*

Note: VAS = Visual Analog Scale; SF-12 PCS = Physical Component Summary scale; SF-12 MCS = Mental Component Summary scale; HADS-A = Hospital Anxiety and Depression Scale - Anxiety scale; HADS-D = Hospital Anxiety and Depression Scale – Depression scale.
* p < 0.05; ** p < 0.01

Confirmatory factor analysis

The combinational indices for the CFA support a one-factor solution, $\chi^2(14) = 25.13$, ($p<0.03$), CFI = 0.93; RMSEA =0.09 (95% confidence interval 0.02 – 0.15) (Bentler & Bonett, 1980). According to Bentler and Bonett (1980), when the Goodness-of-Fit and Adjusted Goodness-of-Fit Indexes are greater than 0.90, the analyses indicate adequate fit of the models. Also, according to Bentler and Bonett (1980), when the Root Mean Square Error of Approximation is less than 0.10, the analysis indicates adequate fit of the models.

DISCUSSION

Overall, the results provide support for the reliability of the Portuguese version of the BPI interference scale. The Cronbach's alpha was greater than 0.80, indicating good internal consistency and little measurement error (Clark & Watson, 1995; Nunnally & Bernstein, 1994; Pais-Ribeiro, 2008; Streiner & Norman, 1995). This value is also in the range of those found in other samples using other translated versions of the scale (e.g. Badia et al., 2003; Caraceni et al., 1996; Kalyadina et al., 2008; Radbruch et al., 1999). The good reliability is also supported by the results of the factor analysis, as indicated by the combinational indices for the CFA, which also provides support for the hypothesized single factor solution.

Most, although not all, of the correlations between BPI interference scale and pain intensity and measures of physical and psychological functioning support the validity of the Portuguese version of the BPI interference scale. Overall, the coefficients are consistent with the guidelines proposed by Raichle and associates (2006), suggesting that measures of pain interference should be at least moderately associated (correlation coefficients greater than 0.30) with measures of pain intensity and physical and psychological functioning. Nevertheless, the overall strength of the associations between the BPI interference scale and pain intensity and depression were lower than expected,

given the findings from other studies (e.g., Badia et al., 2003; Mendoza et al., 2006; Osborne et al., 2006; Radburch et al., 1999; Raichle et al., 2006). Particularly, one of the validity coefficients (reflecting the association between pain interference and pain intensity) was lower than hypothesized.

For a number of reasons, we interpret the finding of a weaker-than-expected association between the BPI-P Interference Scale and the measure of pain intensity used in this study to be because of the possible lack of validity of the latter measure, rather than the former. First, all of the other validity coefficients in the study support the validity of the BPI-P. Second, in this study, the associations between the pain measure used and the other criterion measures are all lower than would be expected if the VAS scale were a valid measure of pain intensity. This potential lack of validity may be related to the fact that some researchers have found the VAS measure to be confusing and sometimes difficult for patients to respond to, especially among older or less educated individuals (see Jensen, 2003). Our sample contained a large number of individuals who are older (almost 25% were older than 65 years, and more than a third were older than 60 years) and the majority had a low level of education, perhaps consistent with the Portuguese population who suffers from chronic musculoskeletal pain. It is possible that invalidity of the VAS measure used may have contributed, at least to some degree, to the lack of a strong association between pain intensity and the BPI-P in this study. Further research is needed to determine the associations between the BPI-P Interference Scale and pain intensity, both in other samples and when using other pain intensity measures.

This study has a number of limitations that should be taken into account when interpreting the results. First, the study used a cross-sectional research design. Thus, we were not able to determine the test-retest stability of the BPI-P over time. Longitudinal research is needed to further evaluate this aspect of reliability of this measure. Second, in hindsight and as previously discussed, the use of VAS as a criterion measure of average pain intensity during the last week may not have been the best choice, due to potential biases resulting from the complexity of this measure, especially among older patients with low education levels. Future research using pain intensity scales that are more easily

understood should be undertaken to further analyse validation of the BPI Interference Scale (for example, the Numerical Rating Scale or Verbal Rating Scale; Jensen, 2003).

Despite the study limitations, the findings provide preliminary support for the reliability and validity of this Portuguese version of the BPI interference scale in chronic musculoskeletal pain patients. Additional research is needed to confirm the findings reported here, as well as to examine the reliability of the measure over time. The availability of a validated measure of pain interference for use in individuals who speak Portuguese will contribute to the ability of Portuguese researchers to determine the effects of treatments on the critical outcome domain of pain interference, and compare findings among patients in Portugal to those from samples in other parts of the world.

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