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Cross-Cultural Adaptation and Validation of the Russian Version of the Pain Beliefs and Perceptions Inventory (R-PBPI) in Patients with Chronic Pain

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Abstract The Pain Beliefs and Perceptions Inventory (PBPI) is one of the most applicable measures for assessing beliefs among pain patients. To date, this instrument has not been tested for its applicability and validity in Belarusian populations. To translate the English language version of the PBPI into Russian (R-PBPI) and to evaluate its reliability, validity, and factor structure. A total of 238 Belarusian patients with heterogeneous chronic pain were recruited from a neurologic outpatient clinic of a public hospital in Minsk. In addition to the pain beliefs, some the other factors such as pain catastrophizing, depression, disability, pain intensity and demographic characteristics were examined. Exploratory factor analyses, using the principal components analysis, revealed a four-factor structure for R-PBPI. Results also showed that R-PBPI has adequate internal consistency (Cronbach's αs: 0.73–0.85). The four R-PBPI scales showed significant positive correlations with DASS-d, PCS, pain intensity, and disability. Results of hierarchical multiple regression analyses showed the R-PBPI scales predicted concurrent depression ($F(4, 221)=3.75$, $p<0.000$), pain intensity ($F(4, 218)=6.01$, $p<0.000$), and pain disability ($F(4, 215)=4.41$, $p<0.000$) scores. These findings support the factorial validity of the scales of the R-PBPI as well as its reliability and construct validity. Our study support the use of the R-PBPI for clinical or research purposes identifying or evaluating pain beliefs.

Keywords Pain beliefs · Chronic pain · Validity · Reliability

Introduction

A number of investigators have suggested that patients' beliefs and expectancies are important mediators of the chronic pain experience (Williams, and Thorn

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1989; Gottlieb 1986). Williams and Thorn (1989) defined pain beliefs as "a subset of a patient's belief system which represents a personal understanding of the pain experience". Several investigations have demonstrated a significant association between patients' beliefs about their pain and various aspects of emotional adjustment, disability status and responsiveness to treatment (Gottlieb 1984). For example, Jensen and Karoly (1991) found that patients' beliefs regarding their ability to control pain were positively related to psychological adjustment. Furthermore, these authors found that beliefs regarding control over pain interacted with pain intensity in predicting activity levels. In a subsequent study, Jensen and Karoly (1992) reported that patients' beliefs regarding their extent of disability were negatively correlated with activity level and psychological well-being, and positively related to health care utilization. Several dimensions of pain beliefs are correlated with level of psychosocial dysfunction, degree of physical disability and number of pain-related emergency room visits (Jensen et al. 1994). These results suggest that the various dimensions of pain beliefs are differentially related to several elements of patients' physical and psychological functioning. Williams and Thorn (1989) provide preliminary evidence that pain beliefs may also be related to treatment compliance and outcome. Collectively, these findings underline the importance of accurately assessing pain beliefs of chronic pain patients.

The Pain Beliefs and Perceptions Inventory (PBPI) is a widely used instrument for assessing pain beliefs (Williams and Thorn 1989). The PBPI was designed to assess the representations and the meanings patients hold regarding pain (Williams and Thorn 1989). The initial version of the PBPI consisted of 16 items grouping into three subscales: 1) Time, 2) Mystery, and 3) Self-Blame. The three PBPI scales were shown to have satisfactory internal consistency, with Cronbach's α ranging from 0.65 to 0.80. Higher scores on the Time scale were associated with greater pain intensity and decreased compliance with pain interventions, whereas the Mystery scale was positively associated with worse psychological distress and negatively correlated with any improvements in psychological distress over time (Williams 1988).

Five recent investigations examining the factor structure of the PBPI (Herda et al. 1994; Strong et al. 1992; Morley and Wilkinson 1995; Williams et al. 1994) reported a four-factor solution (i.e., acceptance or permanent, constancy, self-blame and mystery), and also recently the four-factor structure obtained in the Australian, German and American samples was replicated in a Chines sample drawn from a pain clinic (Wong et al. 2011). In these studies, the Time subscale emerged as two separate factors: acceptance (or pain permanence; Morley and Wilkinson 1995) and constancy.

The four-factor structure of the PBPI were then correlated with important pain indices such as measures of pain quality, psychological states (i.e., depression and anxiety), personality traits, physical functioning, and coping strategies. Each belief appears to have a unique association with the pain indices thus supporting the rescoring of this instrument with four scales. Belief in pain constancy is associated with greater pain self-report (Williams and Thorn 1989; Williams et al. 1994), permanence is associated with anxiety (Williams et al. 1994) and disability (Turner et al. 2000), mystery is associated with greatest overall distress and predicted the mental health dimension of quality of life (Dysvik et al. 2004), and self-blame is associated with depressive symptoms (Williams et al. 1994). Patients holding stronger beliefs in pain being an enduring part of life and as being mysterious were more likely to catastrophize

and less likely to use cognitive coping strategies such as reinterpretation of pain sensation (Williams and Keefe 1991).

Despite the well-documented relationships between pain beliefs and patient functioning, the existing data have been obtained exclusively from Western populations. Beliefs have been defined as personally formed or culturally shared cognitive configurations (Wine and Syme 1981), but research in the cross- cultural similarities and differences in the associations between specific pain-related beliefs and measures of patient functioning has been limited. The importance of culture in pain experience has been acknowledged since the seminal work of Zborowski (1952; 1969). In addition, previous clinical and laboratory pain research has demonstrated cultural differences in pain perception (Greenwald 1991; Lipton and Marbach 1984), and responses (Edwards and Fillingim 1999; Zatzick and Dimsdale 1990). Thus far, only a few studies have examined cross-cultural differences in pain beliefs (Bates et al. 1993; Burnett et al. 2009). These studies support the hypothesis that pain beliefs are influenced by cultural background and can be different across ethnicities. Therefore, the PBPI should be adapted in any special culture.

The utility of the scale in Russian pain population remains unknown, and no empirical data to date has documented the pain belief systems amongst Belarusian patients with chronic pain. Therefore, the goal of this study was to address these gaps by examining the factor structure and other psychometric properties of a Russian translation of the PBPI among Belarusian individuals with chronic pain. Validation of a Russian version of the PBPI would inform cross-cultural perspectives of pain beliefs and help clarify cultural similarities and differences among patients with chronic pain.

Methods

Study Design

The study was carried out in a two-step procedure; firstly, the PBPI was translated and cross-culturally adapted; and secondly, the Russian PBPI was tested for psychometric properties in a cross-sectional design with a 1-week follow-up for test-retest.

Translation and Cross-Cultural Adaptation

The official language of Belarusian People is Russian language. At first, the translation into Russian and cross-cultural adaptation of the original English version of the PBPI into Russian was carried out in accordance with previously published guidelines (Guillemin et al. 1993). Two native Russian speakers (T-1, T-2) carried out independent translations of the PBPI from English to Russian. T-1 was a psychologist; T-2 was a professional translator. The forward translations were compared with one another and with the original English version. After discussing any discrepancies, the two versions were synthesized to form one common Russian version before it was translated back to English. Two translators and native speaker of English, who were blinded to the original PBPI, performed the back translation. Then one expert committee consisting of the translators, one health professional and the researchers in our research group reviewed all

translations. The task of this expert committee was to ensure semantic and idiomatic equivalence and experiential and conceptual equivalence (i.e., to address any peculiarities specific to the cultures examined) between the Russian and English versions of the questionnaire. After discussion about discrepancies, consensus on a penultimate version was achieved. The goal of the penultimate Russian PBPI was that it should be as concise and easy to understand as possible. The first 15 patients with pain at each participating clinic reviewed the pre-final Russian PBPI. None of the patients had difficulties in understanding the meaning of items or responses. Since the penultimate version was highly acceptable and easy-to-comprehend, no changes were made and the final version of the Russian PBPI was equal to the penultimate.

Participants

A total of 250 participants were recruited from different clinical settings in Minsk, Belarus, between June 2013 and October 2013. Eligible participants were patients with heterogeneous chronic pain for 6 months or more prior to inclusion, aged 18 and over, and were able to speak, read and write in Russian. The only exclusion criterion was serious immediate life-threatening diseases and having very intensive pain (Waddell 2004). The inclusion was performed by a clinician, mostly a neurologist, seeing the patients at their clinic. Twelve patients were excluded because they did not return the baseline questionnaires without giving any reason for not participating. A total of 238 patients, 148 women and 90 men, were included; 78 patients from outpatient neurology clinic in hospital and 160 patients from a clinic in Institute of Neurology and Neurosurgery. Thirty-six patients participated in the test-retest design and filled the PBPI at retest. All patients received oral information about the study. Signed informed consent was obtained from all patients.

Procedures and Measures

The included patients filled in the PBPI, socio-demographic information, and concurrent measures at the first attendance for assessment. Patients consenting to participate at the retest filled in the PBPI between test and retest at the second attendance, preferably with a one-week interval.

The Pain Beliefs and Perceptions Inventory (PBPI)

The PBPI consists of 16 items assessing four dimensions of pain beliefs: (1) the "Mystery" dimension (4 items) measures the belief that pain is mysterious and is a poorly understood experience; (2) the "Permanence" dimension (5 items) assesses the belief that pain is an enduring part of life; (3) the "Constancy" dimension (4 items) measures the temporal dimension of daily pain; and (4) the "Self-blame" dimension (3 items) taps patient's beliefs that they themselves are responsible for their own experience of pain. The four scales possessed satisfactory internal consistency (Cronbach's α: 0.64–0.83) (Herda et al. 1994). Patients are asked to rate using a 4-point Likert scale (−2=strongly disagree, −1=Disagree, +1=Agree, +2=strongly agree) their level of

agreement with each of 16 statements about beliefs and perceptions concerning pain (Williams and Thorn 1989; Williams et al. 1994).

Concurrent Measures

From the literature, interrelationships were expected between pain-related beliefs and various other variables. Therefore, the patients were asked to complete a questionnaire booklet, which contained a series of questionnaires intended to assess the PBPI's construct validity.

Depression-Anxiety-Stress Scale (DASS)

The DASS-21 is a 21 item self-report questionnaire designed to measure the severity of a range of symptoms common to both depression and anxiety. In completing the DASS, the individual is required to indicate the presence of a symptom over the previous week. DASS-21 has three subscales: each of the three sub-scales: depression (DASS21-D), Anxiety (DASS21-A), and Stress (DASS21-S) has seven items. Each item comprises a statement and four short response options to reflect severity and scored from 0 (*Did not apply to me at all*) to 3 (*Applied to me very much*, *or most of the time*) (Lovibond and Lovibond 1995). Psychometric properties (i.e., validity and reliability) of the DASS have been confirmed in previous studies (Tran et al. 2013) and also in a study among Russian population (Puls 2010).

Physical Disability Questionnaire (PDQ)

The Roland and Morris Physical Disability Questionnaire (PDQ) was originally developed and validated for assessing the functional impact of back pain (Roland and Morris 1983). In addition, this scale measures disability in everyday activities due to chronic pain (Roland and Fairbank 2000). Because the present study was conducted on a heterogeneous group of patients with chronic pain, so the word of "back pain" was replaced with "pain". This modified questionnaire has been employed in previous studies and has been confirmed the validity and reliability (Asghari et al. 2008; Nicholas and Asghari 2006). The Russian version of this scale has high level of internal consistency, Cronbach's α for the scale has been estimated as 0.90, and high level of intraclass correlation coefficient in test-retest with 1-week interval (ICC=0.91) (Goli and Yanchuk 2013).

Pain Intensity

Pain intensity was measured by pain severity subscale of Multidimensional Pain Inventory (MPI). This scale consists of three questions that are about the degree of experienced pain in present time, in last week and the degree of suffering the patient experiences because of his pain. The validity of the MPI pain severity has been well documented and has a good reliability and validity that has been approved in previous studies (Kerns et al. 1985; Asghari and Golak 2008), also in the current study the MPI pain severity was found to have a good internal consistency with a Cronbach's alpha of 0.8 amongst Belarusian population (Nunnally and Bernstein 1994).

Pain Catastrophising Scale (PCS)

Pain Catastrophising scale (PCS) is used to assess individual responses to pain and to predict levels of pain and distress among clinical patients (Sullivan et al. 1995). The PCS comprises 13 items focusing on thoughts and feelings. The original PCS was found to be a reliable and valid measure of catastrophizing with a three factor solution; rumination (4 items), magnification (3 items), and helplessness (6 items) (Sullivan et al. 1995). Patients score the 13 items on a 5-point likert scale, ranging from 0 (not at all) and 4 (all the time), relating the items to the past painful experience. A higher score indicates higher pain catastrophizing. Reliability and validity of this scale among clinical and non-clinical population is high (α 0.90) (Fernandes et al. 2012). The Russian version of the PCS has very good reliability with Cronbach's alpha equal 0.83–0.92 and excellent intraclass correlation coefficient (0.98) (Goli and Yanchuk 2013).

Data Analysis

SPSS (Statistical Package for the Social Sciences) version 16.0 was used to compute sample descriptive statistics, internal consistency coefficients (Cronbach's α) for each of the R-PBPI scales, and associations between the R-PBPI scales and the validity criteria (pain intensity subscale of MPI, disability-PDQ, DASS-d, and PCS score). Reproducibility indicates the extent to which the same results are obtained on repeated administrations of a given instrument when no change is expected. The intraclass correlation coefficient of agreement (ICC) and the standard error of measurement (S.E.M.) for the repeated trials were computed to examine the reproducibility of measurements (De Vet et al. 2006). The S.E.M. was used to indicate the "minimum detectable change" (MDC 95 %) for the PBPI, that is, the degree of change required in an individual's score in order to establish it (with a given level of confidence) as being a "real change," over and above measurement error (Beaton 2000). Principal components analysis (Pallant 2007) was used to assess the underlying structure of the PBPI items. Components were extracted with an eigenvalue greater than one. Finally, three hierarchical multiple regression models were fitted to evaluate the extent to which the R-PBPI scales were associated with concurrent criterion variables (depression, pain intensity, disability) and predicted them. Before analysis of the multiple regression, all of correlation coefficients among four PBPI scales, which should be entered as a block to this analysis, were assessed in order to evaluate the risk of multicollinearity problem. The highest correlation was between permanent and constancy (r=0.46) that is lower than 0.7, so there was not risk of multicollinearity problem (Tabachnick and Fidell 1996). Since there were a significant correlation among criterion variables (pain intensity, depression, disability) (p<0.05), and there was a significant correlation among socio-demographic variables (age, pain duration) and disability and pain intensity (p<0.05), so in all models, pain intensity, age and pain duration were entered in the separated blocks to control for potential confounding effects. PCS was entered in next block and the four R-PBPI scales were entered in a final step. The dependent variables of pain intensity and disability were indexed by the Pain Intensity subscale of MPI, and PDQ Score, respectively. Depression was indexed by the DASS-d score.

Results

Pain and Sample Characteristics

Of the 250 patients eligible, 238 patients signed the informed consent letter and returned the baseline questionnaire booklet. They had a mean (S.D.) age of 47.22 (14.72) years. One hundred and forty eight (62 %) were female and ninety (38 %) male.

Patients reportedly experienced an average of 40.66 months (SD=70.39) of pain problems. While about 34.3 % had pain for up to 2 year's duration, 21.2 % had suffered from chronic pain for more than 5 years. The mean score of pain intensity was 4.21 (SD=1.27; range: 0–6). The sample reported a mean of 11.13 (SD=5.94; range: 0–24) of pain disability and a mean of 4.21 (SD=1.27) of pain intensity. The mean total scores of PCS and DASS-d were 20.32 (SD=10.96) and 5.09 (SD=4.45), respectively.

Factorial Validity of the R-PPBI

The principal components analysis (varimax rotation with Kaiser Normalization) revealed a four-factor structure, which accounted for 62.7 % of the total variance (Table 1). The items loading on the first component (item 3, 6, 10, 16) had loadings ranging from 0.72 to 0.83, the second component (item 1, 4, 8, 14) from 0.66 to 0.74, and the third component (item 2, 5, 9, 12, 15) from 0.45 to 0.8, and the forth component (7, 11, 13) from 0.76 to 0.87 respectively. The first component accounted for 28.8 % of the total variance, whereas component two, three and four accounted for 14.1, 11.2 and 8.6 %, respectively.

Reliability and Validity the R-PBPI

The four R-PBPI scales demonstrated acceptable internal consistency, with Cronbach's α 0.73 for permanent and mystery, 0.85 for constancy and 0.78 for self-blame. The mean score of permanent was −3.83 (S.D=4.38), constancy −0.8 (S.D=4.3), self-

Table 1 Pain beliefs and perception inventory factor structure by principal components analysis with loadings (n=238)

Components	Items					% of variance
Component 1	3	6	10	16		28.8 %
	0.83	0.82	0.79	0.72		
Component 2	1	4	8	14		14.1 %
	0.69	0.7	0.66	0.74		
Component 3	2	5	9	12	15	11.2 %
	0.45	0.65	0.69	0.62	0.8	
Component 4	7	11	13			8.6 %
	0.76	0.87	0.85			

Extraction Method: Principal Component Analysis; varimax rotation with Kaiser normalization

blame −1.63 (S.D=3.31) and mystery −0.27 (S.D=3.98). The Mystery scale obtained the highest mean, suggesting that it was the most highly endorsed pain belief in the present sample. Permanence was among the lowest R-PBPI scales, suggesting that this pain belief was not commonly endorsed as compared to the other three pain beliefs assessed.

Table 2 presents the correlation of the four R-PBPI scales with four validity criteria. As shown in this table, there were significant association between permanence and constancy scales (r=0.46), permanence and mystery scales (r=0.33), and constancy and mystery scales (r=0.45) (p<0.05). The strength of association was the highest between constancy and permanence (r=0.46, p<0.01). As it is commonly accepted that correlations below 0.60 indicate unidimensionality between scales (Anastasi 1976), the results lend support for the present data that, they measure significantly different dimensions of R-PBPI (i.e., the scores obtained on each subscale are distinct from those obtained on the other subscales). On the other hand, because the intercorrelations between the subscales were substantially lower than Cronbach's alpha coefficients, so can be said that each of the subscales of PBPI measured different constructs (Strong et al. 1992). The four scales were also significantly associated with the four validity criteria (p<0.01), except the self-blame subscale that did not have any significant association with four validity criteria (p>0.05).

Reproducibility analysis was conducted on the data from the 36 patients with a return interval for the second questionnaire booklet of 7 days. Table 3 reports the results of intraclass correlation coefficients of agreement (ICC) between test-retest, the standard error of measurement (S.E.M.) and the "minimum detectable change" (MDC95%) and the mean difference between repeated measures for the PBPI and its subscales. As

Table 2 The correlation of the four R-PBPI scales with four validity criteria

	PBPI-Permanent	PBPI-constancy	PBPI- Self-blame	PBPI-mystery	PDQ	DASS-d	MPI-Intens	PCS-total
PBPI-Permanent	1							
PBPI-constancy	0.46**	1						
PBPI-Self-blame	0.04	0.07	1					
PBPI-mystery	0.33**	0.45**	0.067	1				
PDQ	0.29**	0.32**	−0.03	0.26**	1			
DASS-d	0.45**	0.31**	−0.07	0.41	0.45**	1		
MPI-Intens	0.19*	0.46**	0.02	0.32**	0.51**	0.35**	1	
PCS-total	0.41**	0.53**	0.08	0.52	0.36**	0.54**	0.24**	1

PBPI-Permanent, PBPI-constancy, PBPI-Self-blame, PBPI-mystery: the four subscales of PBPI; *PDQ*, Physical Disability Questionnaire; *DASS-d*, DASS-depression subscale; *MPI-Intens*, MPI-pain intensity subscale; *PCS-total*, total score of Pain Catastrophising Scale

** p<0.01, * p<0.05

seen in the table, acceptable to good reproducibility was found, and S.E.M. values ranged from 1.2 to 4.6.

Multivariate Prediction of Concurrent Chronic Pain Adjustment from the R-PBPI Scales

Tables 4, 5 and 6 report the results of hierarchical multiple regression analyses. After controlling for age and pain duration, both PCS ($F(1, 222)=19.54$, $p<0.000$) and R-PBPI scales ($F(4, 218)=6.01$, $p<0.000$) contributed significantly to the prediction of pain intensity. While R-PBPI accounted for 13 % of the total variance in pain intensity scores, only "constancy" emerged as a significant independent correlate of concurrent pain intensity (when controlling for other R-PBPI scales; std $\beta=0.39$, $p<0.000$). 6 % of the total variance was explained by age variable, 12 % was explained by PCS.

As already mentioned, there were not any significant associations between age, pain duration and depression, so age and pain duration as a socio-demographic variable were removed of regression analysis for predicting depression. There were three steps in this regression analysis: in the first block was entered pain intensity, in the second block PCS and in third block entered the four PBPI scales. Similarly, after adjusting for pain intensity, both PCS ($F(1, 225)=46.25$, $p<0.000$) and R-PBPI scales ($F(4, 221)=3.75$, $p<0.000$) contributed significantly to the prediction of concurrent depression (Table 5). While 17 % of the total variance was explained by pain intensity, 21 % was explained by PCS and 6 % was explained by R-PBPI scales, with "Constancy", "permanent" and "mystery" being significant independent predictors of concurrent depression (when controlling for other R-PBPI scales (std $\beta=0.19$, $p<0.04$), (std $\beta=0.24$, $p<0.003$) and (std $\beta=0.14$, $p<0.003$)).

When age, pain duration and pain intensity were controlled, both PCS ($F(1, 219)=20.55$, $p<0.000$), and the four PBPI scales ($F(4, 215)=4.41$, $p<0.000$) contributed significantly to the prediction of concurrent disability (Table 6). The amount of unique variance explained by PCS and pain intensity scales were 14 % and 19 % respectively, and the amount of unique variance explained by the four R-PBPI scales was 5 %.

Discussion

The aim of the present paper was to examine the factor structure, reliability, and construct validity of the Russian version of the PBPI (R-PBPI) in a sample of Belarusian patients with chronic pain. The findings support the reliability and validity

Table 3 Reproducibility of the PBPI

	t2-t1	ICC	S.E.M	MDC_{95}	MDC%
PBPI-constancy	−0.5 (8)	0.85	4.6	12.8	24.6
PBPI-mystery	−0.4 (8)	0.87	2	5.6	23.3
PBPI-self-blame	−0.2 (6)	0.74	2.4	6.7	41.6
PBPI-permanent	0.1 (10)	0.82	1.2	3.5	29

t1−t2, mean values at t1 subtracted from t2 (values in parentheses are the highest possible scores for the given attribute); ICC, intraclass correlation coefficient of agreement (t1*t2)

Table 4 Hierarchical multiple regression analyses in prediction of pain intensity

Variables			Total R^2	R^2 change	F change	Beta[a]
Criterion variable: pain intensity						
Predictive variable	Step 1: age, Pain duration		0.06	0.06	8.48*	0.24* 0.04
	Step 2: PCS		0.18	0.12	19.54**	0.35**
	Step 3: PBPI scales		0.31	0.13	6.01**	
		permanent				−0.07
		constancy				0.39**
		Self-blame				−0.01
		mystery				0.16

** $p<0.01$, * $p<0.05$

of the four R-PBPI scales, as evidenced by its satisfactory internal consistency, replication of a 4-factor structure by factor analysis, univariate associations with depression, pain severity, and disability measures in expected directions, and multivariate associations with the validity criterion.

The principal components analysis supported a four factor structure similar to the previous studies in English speaking samples (Morley and Wilkinson 1995; Williams et al. 1994), in Australian and German samples (Herda et al. 1994; Strong et al. 1992) and in Chines samples (Wong et al. 2011). These findings offer preliminary support for the cross-cultural validity of the PBPI, in that the underlying latent constructs of the PBPI appear to be similar for both the present Belarusian and patients with chronic pain in the United States (Williams et al. 1994) and the United Kingdom (Morley and Wilkinson 1995). Although we cannot directly evaluate cross-cultural factorial invariance, from a cross-cultural perspective, the findings tentatively suggest that there would be few differences between Belarusian and Western patients in terms of the underlying structure of beliefs about pain as assessed by PBPI. The similarity in factor structure between the R-PBPI (in our sample) and the PBPI (in an American and a British

Table 5 Hierarchical multiple regression analyses in prediction of depression

Variables			Total R^2	R^2 change	F change	Beta[a]
Criterion variable: depression						
Predictive variable	Step 1: pain intensity		0.17	0.17	27.91**	0.41**
	Step 2: PCS		0.39	0.21	46.25**	0.5**
	Step 3: PBPI scales		0.45	0.06	3.75**	
		permanent				0.24**
		constancy				0.19*
		Self-blame				−0.05
		mystery				0.14**

** $p<0.01$, * $p<0.05$

Table 6 Hierarchical multiple regression analyses in prediction of disability

Variables			Total R^2	R^2 change	F change	Beta[a]
Criterion variable: disability						
Predictive variable	Step 1: age Pain duration		0.06	0.06	4.99**	0.12** 0.07
	Step 2: pain intensity		0.29	0.19	22.8**	0.43**
	Step 3: PCS		0.46	0.14	20.55**	0.23**
	Step 4: PBPI scales		0.35	0.04	4.41**	
		permanent				0.19**
		constancy				−0.09
		Self-blame				−0.07
		mystery				−0.02

** $p<0.01$, * $p<0.05$

sample) might be partly explained by the similarities of patient characteristics between the present sample and the sample employed in William et al. (1994) and Morley and Wilkinson (1995). However, this is the first study to examine the factor structure of the R-PBPI; future research is needed to determine if the cross-cultural factorial invariance of PBPI suggested in this study replicates in other samples.

The reliability of the R-PBPI scales was supported with adequate Cronbach's αs ranging from 0.73 to 0.85 for the four scales, that were slightly higher than those reported in the original study of Williams and Thorn (1989) (between 0.65 and 0.8), or study of Strong et al.(1992) (between 0.67 and 0.78) and comparable to or a little lower than those previously reported for samples of outpatients and students (Morley and Wilkinson 1995).

With the exception of the poor and non-significant correlation between self-blame and all of criterion variables, validity was supported with correlations between the R-PBPI scales and measures of depression, catastrophizing, pain intensity, and disability - all in the expected positive directions - with the strengths of the associations found generally comparable with other studies (Williams and Thorn 1989; Strong et al. 1992; Williams et al. 1994; Turner et al. 2000; Jensen et al. 2003). Of the four R-PBPI scales, the degree of association between constancy and the criterion measures was the strongest, indicating that a stronger belief in pain being constant was associated with higher levels of depressive symptoms, more catastrophizing, higher pain intensity and higher levels of disability.

The Russian version of the PBPI showed reasonably good ICCs, ranging from 0.74 to 0.87. ICCs greater than 0.7 are generally considered acceptable; greater than 0.8, good; and over 0.9, excellent (Fayers and Machin 2000); although it is also acknowledged that the ICC is highly dependent on the between-subject variance in the group of subjects under investigation (Altman and Bland 1996). Our sample did not show any significant differences from test to retest in general health, disability, or pain intensity, and all of PBPI subscales, justifying the application of a reproducibility analysis. Our study showed that the constancy score held superior agreement as compared to the other subscales. The percentage of the MDC_{95} in relation to the maximum score for the constancy score was 25 %. Subsequently, an individual has to change 25 % on the constancy score between pre- and post-intervention to exceed measurement error and its 95 % CI and to be classified as having a "real" change in constancy score.

The predictive validity of the R-PBPI scales was also supported. The R-PBPI scales contributed significantly to the prediction of depression (6 % unique variance after all other factors in the model were considered), pain intensity (13 % unique incremental variance) and disability (4 % unique incremental variance) in multivariate analyses. After controlling for the other R-PBPI scales, permanence made an independent contribution to the prediction of depression (std $\beta=0.24$, $p<0.001$) and disability (std $\beta=0.19$, $p<0.003$) whereas constancy emerged as independent predictor of pain intensity (std $\beta=0.39$, $p<0.000$) and depression (std $\beta=0.19$, $p<0.04$), and mystery emerged as independent predictor of just depression (std $\beta=0.14$, $p<0.001$). These findings are in line with previous multivariate findings that demonstrated significant independent association between constancy and pain interference (Williams and Thorn 1989; Williams et al. 1994; Stroud et al. 2000) and significant independent association between permanence and disability (Turner et al. 2000). Unlike the results of previous studies that self-blame is associated with depressive symptoms (Williams et al. 1994), in current study was not found any significant correlation between self-blame and depression. The amount of variance explained by pain beliefs in the three regression models is comparable with that of age, pain duration and pain intensity. These findings suggest that patients' representation of pain is as important as their background information (e.g., age, pain duration) in influencing their adjustment outcomes. Although catastrophizing thought was consistently shown to be the important factor predicting chronic pain adjustment, accounting for the proportion of variance in all 3 models tested (12 to 21 %), the significant contribution of pain beliefs to the prediction of three adjustment variables suggests that the relationship between pain beliefs and patient psychological and physical functioning is not entirely mediated by catastrophizing. This implies that cognitive-behavioral interventions that usually target only catastrophic thought could expand its scope by identifying and addressing maladaptive pain beliefs such that the overall effectiveness could be increased.

Conclusion

The Russian PBPI shows evidence for acceptable psychometric properties in terms of being fully comprehensible, internally consistent, reproducible, and comprising a valid construct when applied in patients with chronic pain from different clinical settings. Our study supports the use of the R-PBPI for clinical or research purposes identifying or evaluating pain beliefs. There are a number of limitations that must be considered when interpreting these results. The evidence reported here that support the reliability and validity of the R-PBPI should be considered preliminary, since the R-PBPI translation was validated within Russian-speaking Belarusian patients in Minsk, and the measure was validated on this population. The extent to which the R-PBPI can be generalized to Russian populations that live in other Russian-speaking countries remains unknown. To address this question, the R-PBPI should be studied in other Russian populations. Moreover, the four-factor solution should be confirmed using another Russian-speaking sample via maximum-likelihood estimation CFA to ensure validity of the factors before using these as clinical subscales. Because the PBPI was developed in a Western context and it is in accordance with the western culture and beliefs, so future studies should explore pain beliefs that are unique in the Belarusian

cultures using qualitative methods in order to thoroughly understanding of pain related problems amongst Belarusian pain patients. And also because Kaiser-Guttman criterion has a tendency to overestimate factors (Fabrigar et al. 1999) whereas parallel analysis accounts for sampling error through its use of repeated samplings of raw data, so for future studies it is recommended using parallel analysis (Horn 1965) rather than the Kaiser-Guttman criterion or even the Catell's (1960) scree test to identify the factors in exploratory factor analysis (EFA). In addition, since the validity of the R-PBPI in the present study was based on cross-sectional data, causal conclusions regarding the influence of pain beliefs on adjustment, or vice versa, cannot be made. Future research that employs longitudinal prospective designs could help delineate the causal associations between pain beliefs and adjustment.

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