

The Persian Brief Illness Perception Questionnaire: validation in patients with chronic non-specific low back pain

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Abstract

Background: The Brief Illness Perception Questionnaire (BIPQ) is used as an instrument to assess the patients' perception of illness. Illness perceptions of patients vary across different conditions. The psychometric properties of the Persian version of BIPQ have not been adequately evaluated. The aim of this study was to determine the reliability and validity of the Persian BIPQ in patients with chronic non-specific low back pain (LBP).

Methods: In this cross-sectional study, 116 patients with chronic non-specific LBP with a mean (standard deviation) age of 36.4 years (10.7) participated. Fifty patients reexamined after 10-12 days for test-retest reliability. Internal consistency reliability, construct validity, concurrent criterion validity, and structural validity were evaluated. The concurrent validity was examined by using the Short Form -36 Health Survey.

Results: There were no floor and ceiling effects. The Cronbach's alpha for the total score was 0.9. The intraclass correlation coefficient (ICC) for test-retest reliability was 0.9. The standard error of measurement and the minimal detectable change was found 3.26 and 9.04, respectively. The convergent correlations confirmed the construct validity. The concurrent criterion validity was demonstrated by significant negative correlations with the SF-36. The Exploratory Factor Analysis produced the two factors (Emotional illness representations and Cognitive illness representations) with an eigenvalue > 1.0 that jointly accounted for 58.86% of the total variance.

Conclusions: The Persian BIPQ is a reliable and valid two-factor instrument and can be used for assessing illness perception in patients with chronic non-specific LBP.

Background

Low back pain (LBP) is one of the most common conditions associated with dysfunction, which has high social problems and financial costs [1, 2]. The LBP prevalence in Iran is estimated about 27% [3]. Epidemiological studies identified several psychological factors in addition to risk factors associated with work, which contribute to non-specific chronic low back pain (LBP) [4].

It is recognized that the ways patients with various diseases percept their illness and interpret their situation reflect their transient or chronic illnesses [5]. The paradigm of illness perception indicates how the patients view their condition in terms of cause, previous experiences, symptoms, expectations about recovery process, and coping behaviors [6]. In the context of LBP, the illness perception of patients with LBP can influence their adaptation to their disease, the treatment efficacy, and LBP-related problems of pain and discomfort. In patients with chronic pain, negative illness perception has been shown associated with maladaptive behavior, dysfunction, and poor outcomes [7]. Since the illness perception of patients may have an impact on coping behaviors, the illness perception should be considered in the assessment and treatment planning of patients with LBP. It follows that the assessment of patients' perceptions of their LBP is important as their illness perception can influence their treatment outcome and recovery.

The Brief Illness Perception Questionnaire (BIPQ) is a simple, easy to used outcome measure to rapid assess the impact of illness representations of cognition and emotion [8]. The BIPQ has eight items with five items on cognitive illness representations assessing consequences (Item 1), timeline (Item 2), personal control (Item 3), treatment control (Item 4), and identity (Item 5); two items on emotional representations assessing concern (Item 6) and emotions (Item 8); and one item that assesses illness comprehensibility (Item 7). The causal representation uses an open ended response item asking patients to list the three most likely factors in having roles in their illness. Each item is scored on a 0 to 10 ordinal scale producing a total score from 0 to 80 and higher scores indicate higher negative illness presentation of disease, chronic non-specific LBP. The reliability and validity of the original English BIPQ have been demonstrated [8].

The BIPQ is a widely used, reliable and valid measure applied in many countries. The BIPQ has been translated and culturally adapted into different languages [9–12] including Persian language [13]. The patients' illness presentation may vary across different patient populations, and that illness presentation can affect coping behavior and the extent of complaints. The BIPQ has been used and validated in people with various illnesses [14]. However, the Persian version of BIPQ has been only validated in diabetes populations and the psychometric properties are incompletely evaluated. Authors suggest further validation studies with different languages versions [14]. The illness presentation of patients with chronic non-specific LBP and psychological perception of pain can affect the recovery course and risk of chronic complaints. It follows that the illness presentation of patients with chronic non-specific LBP should be determined and assessed using a reliable and valid scale. Therefore, the aim of the present study is to validate the Persian BIPQ in patients with chronic non-specific LBP.

Methods

Design

This was a cross-sectional study to assess the psychometric characteristics of Persian BIPQ in patients with chronic non-specific LBP.

Participants

Persian-speaking patients who had at least 12 weeks LBP with no specific pathology were included.

Participants were excluded if they had known pathology (e.g. neurological signs and symptoms, discopathy, spinal stenosis, history of psychiatric and psychotic diseases, cancer, infection, or any other conditions leading to the LBP).

Sample size

Guidelines suggest at least 100 subjects for evaluation of psychometric properties in cultural adaptation studies [15]. In this study, we were able to include 116 subjects.

Procedure

A questionnaire was used to record the demographic data of sex, age, LBP duration, BMI, and level of physical activity. After that, patients completed the Persian version of the BIPQ, Pain Catastrophizing Scale (PCS), Roland-Morris Disability Questionnaire (RMDQ), Pain Anxiety Symptom Scale-20 (PASS-20), and Short Form-36 (SF-36) health survey. Fifty patients recompleted the questionnaire after 10-12 days to evaluate test-retest reliability.

BIPQ

The BIPQ is a questionnaire covering three representations of cognition, emotion, and illness comprehensibility [8]. It consists eight items with an additional item on the causes of illness. Five items assess the cognitive representation: Item 1 (consequences), Item 2 (timeline), Item 3 (personal control), Item 4 (treatment control), and Item 5 (identity). Two items assess the emotional representation: Item 6 (concern), and Item 8 (emotional impact). One item, Item 7 assesses the illness comprehensibility. All items are scored from 0 to 10, with higher scores reflecting greater illness representations [8].

Roland-Morris Disability Questionnaire (RMDQ)

The RDMQ is a reliable and valid self-reported questionnaire on physical disability due to low back pain [16-17]. The RMDQ score ranges from 0 (no disability) to 24 (max. disability).

Visual analog scale (VAS)

The VAS is a self-reported measure of the pain intensity. The patient is asked to present the pain intensity by marking the VAS line between the two end points of “no pain” and “unbearable pain”. The VAS pain score is determined by measuring the distance on the 10 cm line between the “no pain” endpoint and the patient’s mark [18].

Pain Catastrophizing scale (PCS)

The PCS is a widely used measure to quantify the types of thoughts and feelings of individuals when they are in pain. It is a 13-item scale asking patients about the degree of pain related catastrophic thoughts using a Likert-scale from 0 (not at all) to 4 (all the time). The total score of PCS is ranged from 0 to 52 [19] (. In this study, the Persian version of PCS was used [20].

Pain Anxiety Symptom Scale-20 (PASS-20)

The PASS-20 was used to measure the pain-related anxiety. It consists of 20 items, each item is rated from 0 (never) to 5 (always) with the total score ranging between 0 and 100. A higher score indicates greater pain-related anxiety. The Persian version of PASS-20 was used in the present study [21].

Short Form-36 (SF-36)

The eight-scale SF-36 is a quality of life widely used instrument that is used in different conditions including LBP to measure physical and mental health [22]. It has been validated in many foreign

languages including Persian language [23].

Data analysis

The two-way random-effects model intraclass correlation coefficient (ICC) with a 95% confidence interval was used to evaluate the test-retest reliability. The internal consistency was assessed by Cronbach's alpha. Values ≥ 0.7 are acceptable for ICC and Cronbach's alpha. The standard error of measurement (SEM) (SD) and minimal detectable change (MDC) ($1.96 \sqrt{2} \cdot \text{SEM}$) were used to evaluate absolute reliability. Pearson's correlation coefficient was used to assess the item-total correlation (ITC). Correlation coefficients ≥ 0.3 were considered acceptable [24]. To assess the construct validity and concurrent validity of the Persian BIPQ, Pearson's correlation coefficients were calculated and interpreted as excellent (1.0-0.81), very good (0.80-0.61), good (0.60-0.41), fair (0.40-0.21), and poor (0.20-0.00) [25]. The factor structure of the Persian BIPQ was analyzed using principal component analysis with varimax rotation. The cut-off point for factor loading was determined at 0.4 [26]. Floor and ceiling effects were calculated by computing the percentage of individuals who scores lowest and highest possible score on the Persian BIPQ. The cut-off for significant floor and ceiling effects was set at 15%. The SPSS Statistical software version 17.0 (SPSS Inc., Chicago, IL) was used for all analyses.

Ethical and consent considerations

The study protocol was reviewed and approved by the Review Board and the Ethics Committee of the University of Social Welfare and Rehabilitation Sciences. All subjects voluntarily participated in the study and gave their written signed informed consent.

Results

Characteristics of participants

One hundred and sixteen with LBP (82 females, mean age 36.4 ± 10.7 years, duration 28.3 ± 37.6 months; BMI 24.4 ± 3.6 kg/m²) participated in this study.

Floor and ceiling effects

Table 1 shows the mean, standard deviation for the Persian BIPQ and all outcome measures. The Persian BIPQ demonstrated no floor and ceiling effects; 2 had minimum total score and 4 had maximum total score. The total scores on the Persian BIPQ ranged from 19.0 to 68.0.

Internal consistency reliability

The Cronbach's α for the Persian BIPQ was 0.9. The three items when omitted raised the alpha values; "Personal control, 0.912", "Treatment control, 0.916", "Understanding, 0.902". The alpha values when omitting remaining items were from 0.885-0.891.

The corrected item-total correlations for two items did not meet the cut-off value of 0.3 (Personal control, -0.15, Treatment control, 0.12).

Test-retest reliability

The test-retest reliability for the Persian BIPQ total score was excellent (ICC=0.9, 95% CI: 0.82–0.94, $P<0.001$).

The SEM and MDC

The absolute reliability measures of the SEM and the MDC for Persian BIPQ were 3.26 and 9.04, respectively.

Construct Validity

The total score of the Persian BIPQ had significant correlation with the total scores of the PCS (0.52, $p<0.001$), RMDQ (0.51, $p<0.001$), and PASS-20 (0.57, $p<0.001$). There was no significant correlation between the Persian BIPQ and the VAS ($p=-0.13$).

Concurrent validity

There were a negative correlations between the Persian BIPQ total score and the SF-36 total score (-0.46, $p<0.001$), SF-36 physical health (-0.44, $p<0.001$), and SF-36 mental health (-0.40, $p<0.001$).

Exploratory Factor Analysis

Results of the Kaiser–Meyer–Olkin (KMO) test (0.77) and Bartlett test of sphericity (Chi-Square = 300/097, $df = 28$, $p < 0.001$) showed the adequacy of sampling. Two factors were extracted with an eigenvalue > 1.0 that together accounted for 58.86% of the total variance. The first factor (Emotional illness representations, Items 1, 2, 5, 6, and 8) accounted for 40.83% of variance (eigenvalue 3.27), the second factor (Cognitive illness representations, Items 3, 4, and 7) accounted for 18.03% of variance (eigenvalue 1.44) (Table 2).

Discussion

This study evaluated the psychometric properties of the Persian BIPQ in assessing the illness perceptions in patients with non-specific chronic LBP and found it reliable and valid, in line with the original English version [8] and other language versions [11, 13, 14].

Floor and Ceiling Effects

There were no significant floor and ceiling effects in this study with non-specific chronic LBP patients, indicating the content validity of Persian BIPQ. This finding further indicates that it is able to show the changes after interventions, either worsening or improvement. The floor and ceiling effects are not

evaluated in patients with type I diabetes that used the Persian BIPQ [13]. The floor and ceiling effects are not evaluated for the original English version [8], and other language versions of Chinese, Polish, Dutch, and Malay [9-11]. A study with the Malay version in adult patients with type 2 diabetes found the floor effects in the item Understanding (19.4%) at the first assessment, and the ceiling effects for the items Timeline (35.3%) and Concern (26.1%) at the first assessment, and in item Timeline (27.7%) at the 4-week retest [12]. Floor and ceiling effects were not reported for the Malay BIPQ total scores [12]. A further study with Dutch version of the BIPQ in acute non-specific LBP patients in primary care physical therapy did not evaluate the floor and ceiling effects, as well [27].

Internal consistency reliability

The Cronbach alpha for the total score found in the present study exceeded the cut-off value of 0.7. The alpha values if each item omitted were also satisfactory and did not change substantially relative to the alpha of Persian BIPQ total score. These findings indicate the all items in the Persian BIPQ are necessary for measuring illness perception, consistent with those reported for the versions of Dutch (Cronbach's α 0.73) [27], Chinese (Cronbach's α 0.783) [9], Polish (Cronbach's α 0.74) [10], and Turkish (Cronbach's α for subscales between 0.715 and 0.774) [28]. The internal consistency reliability is not evaluated for the versions of original English [8], Malay [12], Dutch in patients with Chronic Obstructive Pulmonary Disease (COPD) patients [11] and the Persian BIPQ used in patients with diabetes [13].

Test-retest reliability

In this study, the ICC for the Persian BIPQ total score showed excellent test-retest reliability which was better than those reported for the original English BIPQ [8] and the Persian BIPQ evaluated in patients with diabetes [13]. The higher test-retest reliability in our study with Persian BIPQ (ICC=0.9) might be explained by the fact that the ICC was calculated for the total score while the correlation values for the original English BIPQ (range 0.48-0.70 with 3 weeks interval, range 0.42-0.75 with 6 weeks interval) [8] and that reported with Persian BIPQ in diabetes patients were calculated for the items. The translated versions of Dutch (ICC=0.72) [27] and Malay (0.39 to 0.70 with 2-week interval, and 0.58 to 0.78 with 4-week interval) [12] found acceptable test-retest reliability, as well. The Dutch version evaluated in patients with COPD found test-retest reliability at 1 week, weighted Kappa > 0.70 for the Consequences, Concern and Emotional response, and weighted Kappa < 0.70 for the Personal control, Treatment control, Identity [11]. Test-retest reliability for the translated versions of Polish [10] and Turkish [28] are not evaluated. The excellent test-retest reliability found in this study for the Persian BIPQ indicates the stability of the measurements in patients with chronic non-specific LBP.

The SEM and MDC

The SEM and MDC were calculated in this study as the measures of absolute reliability. They are important measures as they provide information helping clinicians to be ensured that the change observed after treatment is real and not an error in the measurements. The SEM calculated in this study is small that indicates the reliability and sensitivity of the Persian BIPQ.

The SEM for the total score of the Persian BIPQ is 3.26 points representing 3.26% of the possible range of the total score (0-80). This means that one can be 95% confident that the true score of a patient with chronic LBP is situated between -6.5 and +6.5 points of the observed score.

The MDC is important as it defines the minimal difference between measurements required to be considered real for a change in the Persian BIPQ scores. The MDC for the Persian BIPQ was 9.04; this indicates that changes in scores achieved by a patient with chronic non-specific LBP must be ≥ 9.0 point to be defined as a real change occurred due to an intervention. The MDC was reported for the Dutch language version ($MDC_{\text{individual}}$ 3.0-4.0, MDC_{group} 1.0) [11]. Differences in the MDC values could be that the MDC was calculated for the Persian BIPQ total score, while the MDC was calculated for each dimension of the Dutch language version. Another possible reason for the variability between the two studies could be from the population included as the SEM and MDC vary with the population from whom these values are calculated, chronic LBP in this study and COPD in the study of de Raaij et al, 2012 [11]. A study with patients with acute non-specific LBP used the Dutch version and reported a MDC of 42 point [27] that is much larger than that we found in our study ($MDC=9.04$). The larger MDC value reported for the Dutch version could be due to either the acuteness of the LBP patients, random error in the Dutch BIPQ scores, or low agreement between the test and retest scores [27]. The SEM and MDC are not evaluated for the original English [8] (Broadbent et al, 2006) and the other adapted versions [9, 10, 12, 13, 28].

Construct validity

To assess the construct validity of the Persian BIPQ, various measures were used. The Persian BIPQ, as hypothesized, showed significant good positive correlations with the RMDQ, PCS, and PASS-20, while no correlation was detected between the Persian BIPQ and the VAS pain. This finding indicates the construct validity of the Persian BIPQ and the influence of the functional and psychological aspects of chronic LBP on illness perception in this population. In the other words, the functional and psychological consequences of pain are important in the determination of illness perception in patients with chronic LBP [29]. It follows that the emotional factors such as anxiety and beliefs about pain catastrophizing are associated, which in turn can influence the illness perception and development of functional disability. The implication of this finding is that the Persian BIPQ measures a construct covering the functional and psychological aspects of low back related pain which indicates the usefulness of Persian BIPQ. The construct validity of the Persian BIPQ is consistent with that reported for the Chinese version evaluated in patients with breast cancer which showed good construct validity reflected by positive correlations with the physical symptom distress, anxiety, and depression measures [9]. The Malay version of BIPQ was also found to have construct validity and showed moderate correlation coefficients with the patient-reported outcome measures [12]. Construct validity of the BIPQ confirms its usefulness in measuring construct of illness perception or mental representations and personal ideas about illness [14].

Concurrent validity

To examine the concurrent validity of the Persian BIPQ, we assessed the correlations between the Persian BIPQ and the SF-36. As hypothesized, we found good negative correlations between the Persian BIPQ total score and the SF-36 total score and the SF-36 subscales of mental health and physical health. The significant negative correlations between the two indicates the influence of illness perception of patients with chronic LBP included in this study on the quality of life such that the negative illness perception of individuals about their pain and disability was associated with the low quality of life. Our findings are consistent with the original English version that used the mental health subscale of the SF-36 to determine concurrent validity in patients with myocardial infarction and found negative correlations for four items of the BIPQ [8] (Broadbent et al, 2006). These findings support the concurrent validity of the Persian BIPQ in agreement with the original English and translated versions [8, 10,11, 13, 27]. A systematic review and meta-analysis of the BIPQ with 188 papers administered in various illnesses from 26 languages and 36 countries demonstrated the concurrent validity of the BIPQ [14].

Exploratory factor analysis

In this study, the dimensionality of the Persian BIPQ was assessed by examining the ITC and the exploratory factor analysis. The three items of “Personal control”, “Treatment control”, and “Understanding” when removed, relatively raised the alpha values. This finding together with the low ITC values for the items “Personal control” and “Treatment control” indicate that the Persian BIPQ is not one-dimensional instrument. These three items constitute a factor as confirmed with the factor analysis (Cognitive illness representations, Items 3, 4, 7). The Understand item is a meta-cognition item and it seems logical to be included with the items defining the cognition presentation of illness. It follows that the remaining 5 items also extracted from the factor analysis constitute the second factor (Emotional illness representations, Items 1, 2, 5, 6, 8). The ITCs are not reported for the original English BIPQ [8] and while the factor analysis is not performed, the dimensionality of the BIPQ (Cognitive illness representations and Emotional illness representations) has been acknowledged [14]. Our two factor solution for the Persian BIPQ is in agreement with the original English and translated versions [14] supporting its internal structural validity.

The Turkish BIPQ used in cancer patients found the ITC for subscales of emotional illness representations (between 0.57 and 0.76) and cognitive illness representations (between 0.62 and 0.70 [30]. The two factors produced for the Persian BIPQ in the present study are exactly similar with those found for the Turkish version using a confirmatory factor analysis [30]. The Arabic version of BIPQ used in a group of patients with cardiac disease reported corrected ITC between 0.220 and 0.588; Items Understanding and Personal control showed the least values (ITC 0.220 and 0.153, respectively) [31]. The factor analysis was not performed for the Arabic version [31]. The validation study of Chinese version of BIPQ in Hong Kong Chinese breast cancer survivors used a confirmatory factor analysis and reported an acceptable seven-item two-factor solution (Cognitive illness representations subscale and Emotional illness representations subscale) with the Understand item omitted [9]. The factorial validity was not evaluated with the Persian BIPQ in Diabetes patients [13], Malay [12], Polish language version [10] and Dutch [11, 27].

Limitations

The limitations in this study must be noted. First, this study adopted a cross-sectional design. A further study considering a longitudinal study design is required regarding predictive validity and changes in illness perceptions over time. Second, the discriminative validity and predictive validity were not evaluated. Third, although the lack of floor and ceiling effects imply the responsiveness of Persian BIPQ [32], responsiveness was not evaluated in this study in the context of an intervention trial using effect size methodology. Forth, this study treated the Persian BIPQ as a single construct tool and used the total score to reflect that all items measure the same illness perception construct. However, The BIPQ is an instrument with single-item scales and it is thus required the items to be individually analyzed. A study to compare the Persian BIPQ total score relative to the individual single-item score is warranted to establish which scoring approach is appropriate for interpretation of illness perception. Fifth, the causal dimension of was not evaluated in this study.

Conclusions

The Persian BIPQ demonstrated an excellent reliability and validity as a two-factor questionnaire for assessing the illness perception in patients with chronic non-specific low back pain. Further examination of Persian BIPQ in a longitudinal study is required to assess the predictive validity, discriminant validity, responsiveness, and changes in low back pain perception over time.

Abbreviations

LBP: low back pain

BIPQ: Brief Illness Perception Questionnaire

PCS: Pain Catastrophizing Scale

RMDQ: Roland-Morris Disability Questionnaire

PASS-20: Pain Anxiety Symptom Scale-20

SF-36: Short Form-36

VAS; Visual analog scale

ICC: intraclass correlation coefficient

SEM: standard error of measurement

MDC: minimal detectable change

ITC: item-total correlation

Declarations

Ethics approval and consent to participate

The study protocol was approved by the Ethics Committee at University of Social Welfare & Rehabilitation Sciences (No: IR.USWR.REC.1396.205). All participants gave their written informed consent.

Consent for publication

Not applicable.

Availability of data and materials

The datasets used and/or analyzed in the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

SK, BA, AS, STM contributed to the study concept and design. SK collected the data. SK and AS performed the statistical analyses. SK, AS, and NNA participated in the interpretation of data. SK drafted the manuscript. NNA contributed to the manuscript writing and substantially revised the manuscript for critical intellectual content. All authors read and approved the final manuscript for submission.

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References

1. Shmagel A, Foley R, Ibrahim H. Epidemiology of chronic low back pain in US adults: data from the 2009-2010 National Health and Nutrition Examination Survey. *Arthritis Care Res (Hoboken)*. 2016;68(11):1688-1694.
2. Deyo RA, Dworkin SF, Amtmann D, et al. Report of the National Institutes of Health task force on research standards for chronic low back pain. *J Manipulative Physiol Ther*. 2014; 37(7):449-467.
3. Noormohammadpour, P., M. A. Mansournia, J. Koohpayehzadeh, F. Asgari, M. Rostami, A. Rafei and R. Kordi (2017). "Prevalence of Chronic Neck Pain, Low Back Pain, and Knee Pain and Their Related Factors in Community-Dwelling Adults in Iran: A Population-based National Study." *Clin J Pain* 33(2): 181-187.
4. van Wilgen, C. P., M. W. van Ittersum and A. A. Kaptein (2013). "Do illness perceptions of people with chronic low back pain differ from people without chronic low back pain?" *Physiotherapy* 99(1): 27-32.
5. Weinman J, Petrie KJ: Illness perceptions: a new paradigm for psychosomatics? *J Psychosom Res* 1997, 42:113–116.
6. Leventhal H, Brisette I, Leventhal EA: The common-sense-model in health and illness, The self-regulation of health and illness behavior. London: Routledge; 2003:42-65.
7. Leysen, M., J. Nijs, M. Meeus, C. Paul van Wilgen, F. Struyf, A. Vermandel, K. Kuppens and N. A. Roussel (2015). "Clinimetric properties of illness perception questionnaire revised (IPQ-R) and brief illness perception questionnaire (Brief IPQ) in patients with musculoskeletal disorders: A systematic review." *Man Ther* 20(1): 10-17.
8. Broadbent E, Petrie KJ, Main J, Weinman J: The brief illness perception questionnaire. *J Psychosom Res* 2006, 60:631-637.

9. Zhang N, Fielding R, Soong I, Chan KKK, Lee C, Ng A, et al. (2017) Psychometric assessment of the Chinese version of the brief illness perception questionnaire in breast cancer survivors. PLoS ONE 12(3): e0174093.
10. Nowicka-Sauer K, Banaszekiewicz D, Staśkiewicz I, Kopczyński P, Hajduk A, Czuszyńska Z, Ejdys M, Szostakiewicz M, Sablińska A, Kałużna A, Tomaszewska M, Siebert J. [Illness perception in Polish patients with chronic diseases: Psychometric properties of the Brief Illness Perception Questionnaire.](#) J Health Psychol. 2016;21(8):1739-49.
11. de Raaij EJ, Schröder C, Maissan FJ, Pool JJ, Wittink H. Cross-cultural adaptation and measurement properties of the Brief Illness Perception Questionnaire-Dutch Language Version. Man Ther. 2012 Aug;17(4):330-5.
12. Chew BH, Vos RC, Heijmans M, Shariff-Ghazali S, Fernandez A, Rutten GEHM. Validity and reliability of a Malay version of the brief illness perception questionnaire for patients with type 2 diabetes mellitus. BMC Med Res Methodol. 2017;17(1):118.
13. Bazzazian, S. and M. A. Besharat (2010). "Reliability and validity of a Farsi version of the brief illness perception questionnaire." Procedia - Social and Behavioral Sciences **5**: 962-965.
14. Broadbent E, Wilkes C, Koschwanez H, Weinman J, Norton S, Petrie KJ. A systematic review and meta-analysis of the brief illness perception questionnaire. Psychol Health. 2015;30(11):1361–85.
15. Terwee CB, Bot SD, de Boer MR, van derWindt DA, Knol DL, Dekker J, et al. Quality criteria were proposed for measurement properties of health status questionnaires. J Clin Epidemiol 2007; 60(1):34-42.
16. Roland MO, Morris RW. A study of the natural history of back pain. Part 1: Development of a reliable and sensitive measure of disability in low back pain. Spine 1983; 8: 141-144
17. Roland M, Fairbank J. The Roland-Morris Disability Questionnaire and the Oswestry Disability Questionnaire. Spine 2000;25(24):3115-24

18. Hawker GA, Mian S, Kendzerska T, French M. Measures of adult pain: Visual Analog Scale for Pain (VAS Pain), Numeric Rating Scale for Pain (NRS Pain), McGill Pain Questionnaire (MPQ), Short-Form McGill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale (CPGS), Short Form-36 Bodily Pain Scale (SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP). *Arthritis Care Res (Hoboken)*. 2011 Nov;63 Suppl 11:S240-52.
19. Sullivan MJL, Bishop SR, Pivik J. The Pain Catastrophizing Scale: Development and Validation. *Psychol Assess*, 1995; 7(4): 524-32.
20. Raeissadat, S., S. Sadeghi, and A. Montazeri, *Validation of the pain catastrophizing scale (PCS) in Iran*. *J Basic Appl Sci Res*, 2013. 3: p. 376-80
21. Shanbehzadeh S, Salavati M, Tavahomi M, Khatibi A, Talebian S, Khademi-Kalantari K. Reliability and Validity of the Pain Anxiety Symptom Scale in Persian Speaking Chronic Low Back Pain Patients. *Spine (Phila Pa 1976)*. 2017 Nov 1;42(21):E1238-E1244.
22. Weir, J. P. (2005). "Quantifying test-retest reliability using the intraclass correlation coefficient and the SEM." *The Journal of Strength & Conditioning Research* 19(1): 231-240.
23. Montazeri A, Goshtasebi A, Vahdaninia M, Gandek B. The Short Form Health Survey (SF-36): translation and validation study of the Iranian version. *Qual Life Res*. 2005 Apr;14(3):875-82.
24. Nakhostin Ansari N, Kashi M, Naghdi S (2017) The Spinal Cord Injury Spasticity Evaluation Tool: A Persian adaptation and validation study, *The Journal of Spinal Cord Medicine*, 40:4, 380-388.
25. Feise RJ, Menke JM. Functional rating index: a new valid and reliable instrument to measure the magnitude of clinical change in spinal conditions. *Spine* 2001; 26: 78 – 87.

26. Ruiz-Párraga GT, López-Martínez AE, Rusu AC, Hasenbring MI. Spanish Version of the Avoidance-Endurance Questionnaire: Factor Structure and Psychometric Properties. *Span J Psychol*. 2015 Nov 20;18:E88.
27. Hallegraeff JM, van der Schans CP, Krijnen WP, de Greef MH. Measurement of acute nonspecific low back pain perception in primary care physical therapy: reliability and validity of the brief illness perception questionnaire. *BMC Musculoskelet Disord*. 2013;14:53.
28. Keskin Güler S, Güler S, Gökçe Çokal B, Gunes N, Yon Mİ, Yoldas TK. Validation of the Revised Illness Perception Questionnaire in Turkish epilepsy patients and the effects of earthquake experience on perception of disease. *Neuropsychiatr Dis Treat*. 2017, 21;13:551-556.
29. Main CJ, George SZ: Psychologically informed practice for management of low back pain: future directions in practice and research. *Phys Ther* 2011, 91:820–824
30. Karataş T, Özen Ş, Kutlutürkan S. Factor Structure and Psychometric Properties of the Brief Illness Perception Questionnaire in Turkish Cancer Patients. *Asia Pac J Oncol Nurs*. 2017 Jan-Mar;4(1):77-83.
31. Saarti S, Jabbour H, El Osta N, Hajj A, Khabbaz LR. Cross-cultural adaptation and psychometric properties of an Arabic language version of the Brief Illness Perception Questionnaire in Lebanon. *Libyan J Med*. 2016 Jun 8;11:31976.
32. Nakhostin Ansari N, Naghdi S, Eskandari Z, Salsabili N, Kordi R, Hasson S. Reliability and validity of the Persian adaptation of the Core Outcome Measure Index in patients with chronic low back pain. *J Orthop Sci*. 2016 Nov;21(6):723-726.

Tables

Table 1. Descriptive statistics of BIPQ and other scales

	Mean	SD	Minimum	Maximum
VAS	4.2	1.7	0.0	10.0
PCS	13.7	8.0	0.0	36.0
RMDQ	7.1	4.4	0.0	20.0
PASS-20	35.6	18.4	0.0	90.0
SF36-PH	59.5	19.0	14.3	96.0
SF36-MH	58.8	20.3	5.4	100.0
SF-36	59.1	17.9	13.4	98.0
BIPQ	44.2	10.3	19.0	68.0

VAS, visual analogue scale; PCS, Pain Catastrophizing scale; RMDQ, Roland-Morris Disability Questionnaire; PASS-20, Pain Anxiety Symptom Scale-20; SF-36, Short Form-36; SF36-PH, Short Form-36-Physical Health; SF36-MH, Short Form-36-Mental Health

Table 2. The factors of Persian BIPQ*

Persian BIPQ items	Factor 1	Factor 2
	Emotional Illness Representations	Cognitive Illness Representations
	Factor load	Factor load
Consequence	0.874	
Timeline	0.700	
Identity	0.738	
Concern	0.822	
Emotional response	0.781	
Personal control		0.582
Treatment control		0.724
Understand		0.730

*Brief Illness Perception Questionnaire